the path of humanity

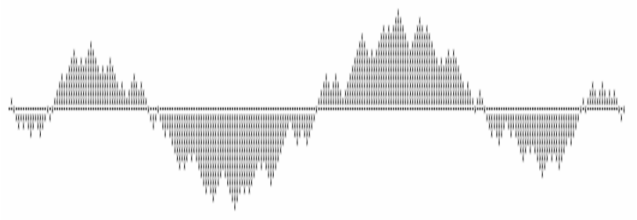
Henk Diepenmaat

‘As a sustainability researcher, I am profoundly impressed by this book. It highlights the question whether we can not only do things better as a society, but also do better things. The key lies in reinventing systems that are based on human values and our needs for individuality, connection, and accountability. This won’t happen overnight, but rather in steps that recursive perspectivism helps us to understand. One bizarre discovery is that there are patterns in the path of humanity with an important role for prime numbers.’

René Kemp, Professor of Sustainable Innovation, ICIS, Maastricht University Professorial fellow at United Nations University-MERIT

The Path of Humanity

The Path of Humanity



Societal Innovation
for the World of Tomorrow

Henk Diepenmaat

Parthenon

Society in Perspective Series, Volume V



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'Eadem mutata resurgo'
(*Changed and yet the same, I rise again*)
Inscription on the grave of Jacob Bernoulli (1654-1705) in Basel

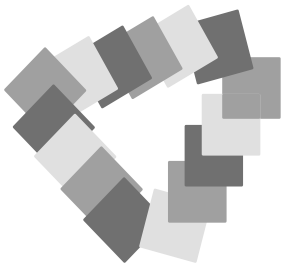
'I am quite conscious that my speculations run quite
beyond the bounds of true science.'
Charles Darwin, letter to Asa Gray (18 June 1857)

'To contrast national solidarity and international cooperation
as two opposites seems foolish to me.'
Gustav Stresemann (1878-1929),
German Democratic Party politician, from his 1927 lecture
after receiving the 1926 Nobel Peace Prize.

'To us, unlike Kepler and Fludd, the only acceptable point of view appears to be the
one that recognizes both sides of reality – the quantitative and
the qualitative, the physical and the psychical – as compatible with each
other, and can embrace them simultaneously'
Wolfgang Pauli. *Writings on Physics and Philosophy*,
Springer Verlag, 1994, p.259

'I think we should hold up Darwinism as an awful warning for
how we should <u>not</u> organize our societies.'
Interview with Richard Dawkins about evolution,
determinism, and free will, www.pbs.org, 1995.

'Just hold my hand and we're there
Somehow we're going somewhere'
Jon and Vangelis, 'I'll Find My Way Home' (1981)



For Frank and Chris,
To a wonderful journey to high peaks.

For Hilda,
For the peaks up to now and those in the future,
and for the way you navigate even the deepest valleys.

Foreword by Jacqueline Cramer

In your hands is a *magnum opus* by Henk Diepenmaat. It is a rich and substantial book, in which the author takes the reader on a fascinating journey along *the path of humanity*. The book's central idea is that the course of human development has been erratic but, over the long term, upwards. The path that our development is following has given the book its name. According to Henk, we can refine this upwards pattern even more, and with greater focus.

We started as a society of hunter-gatherers and through the phases of agricultural societies and city states have landed in the modern nation state. That was a path of trial and error. We are now at another point of transition. Our current late-modern society consists of more and more actors, increasingly climbing their own individual 'improvement peaks', according to the author, and the gaps, walls, and tensions between all these actors are unmistakably increasing. The book is structured around the argument that, despite this growing fragmentation in the shorter term, we are nevertheless growing towards a new phase in our societal development. This is, in Henk's words, 'the plurimodern society of Team World'. The quality of this society is much higher than ours, and, he says, we can absolutely facilitate and accelerate its achievement.

You may have a lot of questions at this point: what is this Team World, how does it work exactly, can that actually be done, isn't that rather optimistic, and how will it happen? I understand. It sounds abstract and even utopian. But Henk paints a colourful picture of our societal development along *the path of humanity* with broad brushstrokes. The developments in particular sectors, including construction, healthcare, and the financial world, are outlined in terms of this path, often with help from experts in these fields. And once you start to read you'll notice that the author builds his argument clearly and systematically in order to answer the above questions. Rather than simply stating or hoping that our future society will be better, with this book he aims to give a well-grounded argument for why he expects it will be better.

The nice thing about the book is that the reader is immersed in a sea of information without losing the way. This is because the book is based on a copious arsenal of scientific knowledge and insights, yet its more narrative sections read like a novel, thanks to the informal writing style and the mix of scientific reflections and his personal life experiences. Anecdotes about fixing a flat tyre and his son being startled to find a scorpion under his pillow bring the abstract explanations back down to earth. In essence, the author has the reader take his or her own journey. Its building blocks vary from the personal and familiar to highly abstract. Some readers will feel right at home reading about how academic scholarship functions and what the advantages and disadvantages of specialization are. Some will find his analysis of objective–subjective, rationality–irrationality, and material–mental relationships, and the importance of finding a balance between them compelling. Yet others will enjoy the theoretical adaptation of his 'societal balance model', his criticism of chains of production and consumption, or his typology of six innovation methods built

around the notion of societal balance (or lack thereof) that results. Or his description and explanation of Benford's and Zipf's pattern laws. Or the sawtooth and wave patterns that he distils from the number line that he uses to explain why he thinks (as a non-mathematician) that the Riemann hypothesis holds true. It's this interdisciplinary breadth that makes this book fascinating for a diverse range of interested people.

The intriguing thread running through the book is that while you read it, you are presented with a developed philosophy of society that the author uses to provide an explanation for the nature of our societal path of development: ***recursive perspectivism***. In a nutshell, according to recursive perspectivism, our societies consist of actors, and actors consist of perspectives. Hard figures, statistics, and prime numbers are introduced into our discussions of how we think about society. If you throw a dice, the pattern is random and unpredictable in the short term. But with all its irregularity, in the very long term, the average nevertheless moves unmistakably and inevitably towards 3½. Similarly, human actors, capricious and inconsistent in their short-term actions, together follow a long-term path of preference in what Henk calls a perspectivist space (an idea already presented in his doctoral dissertation). This makes it easy to see why at the largest scales our long-term societal development can follow a path to improvement without we humans driving it, and even without our consciously realizing it. Some forms of society turn out to be stable, others not, and this is also elucidated in terms of perspective.

The author's ultimate goal is to make a contribution to the methodological insights that make further societal improvement possible. His reasoning is that we are not good at understanding large societal practices, because of the multiplicity of actors who each act from their own perspective. Henk contends that he can see this complexity much better using the multi-actor approach that he developed in his previous works, and he gives a variety of examples. When you read them, the world indeed looks much more manageable. Societal practice is of course much less manageable than a structured reality. Unfortunately, it's hard to know which perspectives really matter. Furthermore, people are not always willing to see things from another's perspective, and prefer to stick to their own mental frameworks. Henk acknowledges this but also emphasizes that we have to keep our efforts focused on arriving at a more connected and partly shared understanding of different perspectives. After all, a better society is the result of greater cooperation in the right kind of coherence. Our history demonstrates this unambiguously, and this, according to him, is precisely what characterizes *the path of humanity*.

Henk stresses that he aims to stay far from dogma and from creating the impression that he thinks he knows better. But a book like this cannot be entirely value free. The author aims to address your own life experience. Starting with shared societal life experiences, you'll look together at the historical practice of societal development. At the same time the book aims to improve society by catalysing innovation in society. The nature of societal innovation gets ample treatment by the end of the book. Here as well, the perspective he takes is that of historical development. Using a description of the incremental development

of environmental policy and sustainable development, he outlines what societal innovation is essentially about: from a one-issue approach, through accumulating interests and needs (including their internal frictions), to a far-reaching synthesis of various aspects of sustainable development in multi-actor coherence and cooperation. He introduces several methods for giving form and content to societal improvement. It is all engagingly clarified while you read.

The Path of Humanity: *Societal Innovation for the World of Tomorrow* is a fine mix of theory, practice, and the author's personal experiences. It's an aggregation of all the insights that Henk has had in his 30-year career, drawing on his first research at the Dutch research institute TNO, his dissertation, the practical knowledge from his multi-actor consultancy, his part-time involvements with universities, his previous books, and his role as a bearer and transferer of knowledge. The book has become an enriching and honest source of inspiration that can help the reader to do what is necessary to help him or her along the path of being human.

With my experience in politics, societal practice, and academia, I realized that there are many obstacles along our shared path, and that sometimes we have to take many winding roads. Whether we get there or not does not lie in one person's hands but is a collective process. Although human development will always be somewhat haphazard, Henk has set out a clear long-term path of progress, unclouded by the issues of the day in our societal practice, by thinking deeply about societal development. His ideas and arguments shed an exceptional light on the fluctuations of human development up to the present day and represent a highly optimistic route to our future. It's encouraging to see that we've more or less been able to follow this path in human history thus far, with the attractive and less-attractive sides it entails. Henk offers ideas and methods that can help. *The Path of Humanity* can spark renewed thinking about the nature of our societal development, and what we can do together.

Jacqueline Cramer
Professor of Sustainable Innovation, Utrecht University
Former Minister of Housing, Spatial Development, and Environment
Amsterdam, September 2016

Preface by the author

This book explores the principles of our societal development. When I say 'our', I mean humanity as a whole. When I use the word 'societal', I include structural, configurational characteristics of our societies on top of substantive social characteristics. Exploring these principles can help us to better understand our collective history up to now. But more importantly, the purpose of this book is to enable us to further improve our societies with greater focus in the future. We are nearing a crucial phase in our history as humanity. The cracks in the cement of our societies are showing, and we cannot take it for granted that things will be better in the near future than they are now. However, we do have some choice in the matter – but we'll have to make intelligent choices. This book attempts to throw some light on just what making these intelligent choices for our future entails.

The book pushes some envelopes, and it chooses some unconventional routes. Human societal development is perhaps the vastest and most multifaceted subject there is to explore. Nevertheless, the central hypothesis of this book is that this massive development is constructed from a single building block. I call this building block 'perspective'. Every perspective consists of three components: an initial situation, a process of change, and a resulting situation. For example, you start off at home, then you get in the car and drive, and finally you're visiting your parents. Or let's say we are currently exhausting and contaminating our planet, then we take measures, and thus, in the future, we have a sustainable world again.

Perspectives can also be composite, recurring at a smaller or larger scale, in space (like two Lego blocks forming one larger one), time (like the series of smaller actions that go into fixing a flat bike tyre: the result of one is the beginning of the next), or in any way at all. That is why I call the concept of perspectives, which are both repeated and nested at several scale levels, 'recursive perspectivism' (recursive = recurring in a similar form). Everywhere, perspectives are meshed and interlinked. For example, driving your diesel car to visit your parents is praiseworthy, but it also has an element of unsustainability. And how else should we define societal patterns if not as experiencing, linking, and passing through huge networks of perspective?

Recursive perspectivism involves a far-reaching generalization. It functions as a unification methodology and applies to societies as well as to other phenomena. While writing this book, I often thought of a quote by the quantum physicist Wolfgang Pauli: '*This paper is so bad it is not even wrong.*' Pauli is referring to the positing of theories that are formulated so sloppily that it is impossible to even prove that they are false – the gutter of human thought. Although the workings of recursive perspectivism may sound quite abstract so far, you can observe its effects all around you, if you know how to look. Examples of it are Zipf's Law and Benford's Law (two laws governing statistical patterns observable in our environment), and the largest pattern of all: *the path of humanity*, the historical development of our societies.

I developed recursive perspectivism to describe as many phenomena as possible using as few concepts as possible. At first, perspective is as slippery and hard to grasp as a piece of soap in a full bathtub. But if you learn to work with it, a whole new way of looking at consciousness and societal processes reveals itself. Perspective, in its farthest-reaching interpretation, lies at the basis of human experience: everything we experience is experienced as recursive perspective. It constructs our consciousness, our needs and desires, and the logic of our intentions. Perspective is at the basis of situations, of change, of time and space, of subject and object, large and small, and mind and matter (an idea put forth by Spinoza as well as Pauli, who is mentioned above) – and also of our human societal development in its entirety.

I'm not a fan of absolute and eternal truths in general. But if you nevertheless accept that such a highly universal building block as recursive perspective is a fruitful and workable idea – and I do in this book and this series – it leads to many new pragmatic insights. These insights look simple at first, but they quickly cut across the range of academic disciplines. They start with philosophy and go through science all the way to the practices making up our daily lives (and back again). They link physics and psychology and sociology and management to mathematics. They result in continuous, qualitative, entropic, quantum-theoretical, and relativistic implications. This is actually logical if you assume that just one building block underlies everything, but it's also quite impressive if you're working on it. You see, I'm far from a master in all these fields. Yet in thinking, working, reading, writing, and looking around, I come to the conclusion that there are actually many more reasons to embrace the idea of recursive perspectivism and use it pragmatically than to reject it.

I outline how the entirety of human development, from the prehistoric Laetoli footsteps to today, and further into the future, is also given form by recursive perspective and is thereby subject to *clear-cut statistical balance principles*. These balance principles can only be seen well in perspective, at huge spatial and temporal scales. They explain many societal developments that we can observe around us, in such sectors as healthcare, construction, education, transportation, agriculture and food, and many more. I will also outline these developments (many people have helped me with this). If we start to recognize them for what they are – structural developments in network structures of actors and perspective, we can start to make better use of them, and the odds will be highest that things will be better for us in the future.

This book explores the development of our world – our society – as a structure of recursive perspective that is partly bubbling along, partly turbulent, and partly chaotic, with the ultimate goal a better understanding and more conscious guiding of our shared human development. This book is Volume V of the *Society in Perspective* series (published in Dutch as *Maatschappij in perspectief*; this book is the only volume translated into English thus far). The series is preluded by my dissertation and is the product of a long process of thought, work, and personal growth. It has been a fascinating voyage of discovery, but now and then also a harsh one, often shared with others but at times also lonely and alone. In some places, the book is highly intuitive and sometimes frankly speculative, and in others, it touches on

experiences familiar to us all. Ultimately it aims to make our journey to a better future easier to navigate.

The book is built on many concepts drawn from other people's ideas, works, and theories. I may not have grasped some of their finer points, and I often have only a mediocre comprehension of them. If I have not properly acknowledged someone else's genuinely original quote or idea, I would like to apologize for a lack of a source reference. I would also like to apologize if I have interpreted the work of others too idiosyncratically, or even erroneously, but please read the quote by John Stuart Mill from *On Liberty* at the end of this preface before drawing too harsh a conclusion.

A society does not improve if it *only* thinks cautiously. I think that the culture of intellectual 'claims', such as the intellectual-property battles currently prevailing in sectors of industry and science, has gotten entirely out of hand and is squarely blocking the way to society making any decisive progress. I suspect that this also applies to claim cultures of the non-intellectual kind. I personally think that recursive perspectivism is my modest contribution to *the path of humanity*, but above all my hope is that many people will incorporate it in thinking productively and working towards improving society. After all, what is an intellectual-property claim worth, compared with improving our world?

This book might not ever have been written if I'd followed the rules of scientific scholarship. But some great scientists also have a crystal-clear explanation for why books like this have a right to exist. I'll close this preface with a quote from Erwin Schrödinger, one of the developers of quantum mechanics (a theory I often thought about while writing this book), that expresses this very nicely:

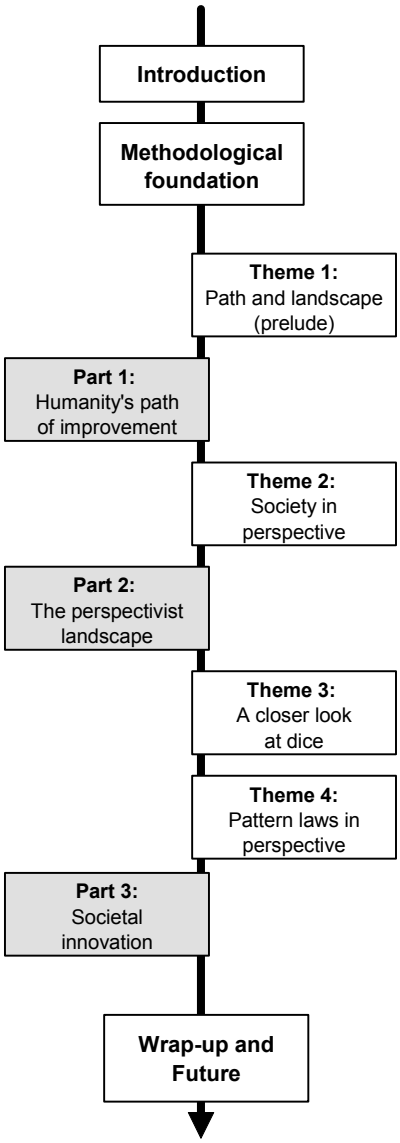
A scientist is supposed to have a complete and thorough knowledge, at first hand, of some subjects and, therefore, is usually expected not to write on any topic of which he is not a master. This is regarded as a matter of noblesse oblige. *For the present purpose I beg to renounce the noblesse, if any, and to be freed of the ensuing obligation. My excuse is as follows: We have inherited from our forefathers the keen longing for unified, all-embracing knowledge. The very name given to the highest institutions of learning remind us, that from antiquity and throughout many centuries, the universal aspect has been the only one to be given full credit. But the spread, both in width and depth, of the multifarious branches of knowledge during the last hundred odd years has confronted us with a queer dilemma. We feel clearly that we are only now beginning to require reliable material for welding together the sum total of all that is known into a whole; but, on the other hand, it has become next to impossible for a single mind to fully command more than a small specialized portion of it. I can see no other escape from this dilemma (lest our true aim be lost forever) than that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of some of them – and at the risk of making fools of ourselves. So much for my apology.*
(Erwin Schrödinger, preface to *What Is Life?*, 1944)

These are wise words. Therefore, I am deliberately taking the risk described by Schrödinger, supported in part by the quote by John Stuart Mill below. I invite you to run this risk with me. With this book and this series, I present a widely applicable building block and a unifying methodology to more consciously shape *the path of humanity*, our shared path, in the future. Given the enormity of the subject, a small amount of humility may be in order, but this book and series support and propagate a single message: an enormous field of societal improvement perspective is out there, for whoever is interested. We have so much to gain, as humanity and as society.

Henk Diepenmaat
Zeist, Christmas Eve 2015

Truth gains more even by the errors of one who, with due study and preparation, thinks for himself, than by the true opinions of those who only hold them because they do not suffer themselves to think. Not that it is solely, or chiefly, to form great thinkers, that freedom of thinking is required. On the contrary, it is as much, and even more indispensable, to enable average human beings to attain the mental stature which they are capable of. There have been, and may again be, great individual thinkers, in a general atmosphere of mental slavery. But there never has been, nor ever will be, in that atmosphere, an intellectually active people.

John Stuart Mill, *On Liberty* (1859)



The structure of this book

CONTENTS

Foreword by Jacqueline Cramer 7
Preface by the author 10

1. INTRODUCTION 25
1.1 An ambitious undertaking 27
1.1.1 A remarkable path 29
1.1.2 Blind naïveté? 31
1.2 The structure of this book 34
1.2.1 Painting at different levels 34
1.2.2 Does society paint itself? 35
1.2.3 The human urge to improve as a driving force 35
1.2.4 Improvement perspective on a dual track 37
1.2.5 The lesson of *the path of humanity* 38
1.2.6 The main structure of this book 39

2. METHODOLOGICAL FOUNDATION 41
2.1 Methodology 43
2.1.1 Education and work 44
2.1.2 Life as learning, society as artwork 45
Society as an artefact 46
Three principles of societal competence 46
Personal existential experiences 48
2.1.3 Flexible frameworks 50
The advantages of specialization: focus 51
The disadvantages of specialization: a double schizophrenia 51
Together, one flexible unit 52
2.1.4 The foundations of this book 53
2.1.5 A broad dialogue: the improvement dilemma 55
2.1.6 Improvement perspective as a pragmatic building block 57
Object–subject tension 57
Reducing dissonance 59
Rationality and irrationality 60
On irrationality, little steps, and big leaps 64
Towards a new balance 68
The unity of balance 71
The balance axis 73
Tension gets actors moving 74
Perspective 75
Improvement perspective 77

Recursive perspectivism and multi-actor models 80
Improvement perspective as a societal building block 85
2.1.7 A methodological framework 86
2.1.8 The improvement perspective of this book 97
A societal dissonance 98
The conservative pseudosolution 98
The utopian pseudosolution 100
Working on a methodological solution 101
2.2 One foundation, three parts, and four themes 103
Theme 1: Path and landscape (prelude). 105
Part 1: Humanity's path of improvement. 106
Theme 2: Society in perspective. 107
Part 2: The perspectivist landscape 108
Theme 3: A closer look at dice 111
Theme 4: Pattern laws in perspective 112
Part 3: Societal innovation 114
Wrap-up and prelude to the future 116

3. THEME I: PATH AND LANDSCAPE (PRELUDE) 117
3.1 Of Micro and Macro 119
3.1.1 A first glimpse of the perspectivist landscape 119
Introduction of improvement potential and experiential value 120
3.1.2 One big mountain or many peaks and valleys? 122
3.1.3 Pattern laws 125
Pattern laws are based on the perspectivist landscape 127
Probabilistic inevitability 129
3.2 Two interpretations of the landscape 130
3.2.1 Do many small steps *really* make one large one? 130
3.2.2 The continuous field interpretation: one long mountain ridge 131
The path of humanity: an accelerating ascent 136
3.2.3 The discrete quantum-theoretical interpretation 141
Inspiration from Planck 142
The first point: available positions 143
The more balance, the better 145
We are subject to perspectivist harmony 146
The second point: stepwise changes in improvement potential 153
3.3 This was the first glimpse 155

4. PART I: HUMANITY'S PATH OF IMPROVEMENT 159
4.1 Observations from the dialogues 161
4.1.1 Polling 163

4.1.2 Stirring it up 164
4.1.3 Fine-tuning 166
4.2 The balance model 171
4.2.1 Types and degrees of selfishness 171
The social value orientation ring 173
The Societal Balance Model 175
4.2.2 Entropic analogies of the Societal Balance Model 176
4.2.3 The promise of the Societal Balance Model 182
4.2.4 The N+1 identity 185
4.2.5 The balance model explains societal dynamics 190
4.2.6 The balance model is both objective and subjective 193
4.2.7 The social motivators of actors 196
4.2.8 The visible hand 198
4.2.9 Huge potential? 201
4.2.10 The answer after some further exploration 203
4.3 The path: an outline in broad strokes 203
4.3.1 The path in perspective: a first sketch 204
The central hypothesis: the perspectivist balance of society 205
The failure of winner-picking strategies 212
Why the Hadza do not have toasters 213
On rise and fall 216
4.3.2 With seven-league boots through human history 216
1 The autarkic phase: hunter-gatherers 217
2 The early sedentary phase: Agricultural and livestock rearing communities 219
3 The late sedentary phase: city-states 221
4 The modern phase: Colliding systems and the missing individual 223
4.3.3 A moment to catch our breath 234
Supertransitions form an improvement path 235
Cooperation leads to societal quality 237
The swan song of modernity 238
The path of humanity tells us what to do 240
4.3.4 Phase 5: The plurimodernity of Team World 241
A widening gap 241
The plurimodern transformation 245
Plurimodernity is a spectral notion 248
Modernist strain 250
Scale adjustment, rearrangement, and rescaling of layers 252
4.3.5 Modernity as a pivoting point 257
The path of humanity: an impression 258
Trade and the financial world: an impression 259
Modernity as a turning point 259

4.3.6 Plurimodern explorations of economic sectors 260
1: Construction 263
2: Juvenile healthcare 264
3: Personal transportation 265
4: Goods transport 266
5: Agriculture and food supply 267
6: Energy 268
7: Learning, education, and ICT 269
8: Defence 270
9: Governance, leadership, politics, and management 271
4.3.7 The Leitmotiv in the sectoral explorations 272
The blockchain as an example of plurimodern thinking and working 273
Plurimodernity restores balance 277

5. THEME II: SOCIETY IN PERSPECTIVE 279
5.1 The subject–object question in perspective 280
5.1.1 Our society as an interaction of experiential worlds 290
5.1.2 Societal tensions 290
5.1.3 Recursive perspectivism and the radical actor thesis 293
5.2 Copernican reversals 301
5.2.1 From dualism to recursive perspectivism 304
5.2.2 Kant as a turning point 305
5.2.3 Do we know the world? 306
Knowledge relations between subject and object 306
Recursive perspectivism does not presuppose a relationship of knowledge 308
5.2.4 On causality, anticipation, and confrontation 309
5.2.5 How knowledge becomes matter (and goes back to knowledge) 311
5.2.6 A necessary reversal 312
5.3 Shifting panels 315
5.3.1 A baby in its cradle 320
5.3.2 The concepts of physical, mental, and social 321
The material, spatial world around us 321
The mental world and I 322
The social world 323
5.3.3 Experience something – go through perspective – learn 323
5.3.4 Things 324
5.3.5 On thinking and acting 327
5.3.6 Space and time in perspective 329
Time 330
Time-space 331
The distinction between time and space 331

5.3.7 Situations and changes in perspective 332
Experiencing situations and changes 333
Is something a situation or really a change? 334
Situations consist partly of changes 335
Twice in the same place? 336
5.3.8 Dualities in perspective 336
5.4 Identity of actors in perspective 338
5.4.1 Perspective 338
5.4.2 The perspectivist actor 341
5.4.3 The radical actor thesis and intentional logics 343
5.4.4 Actors in interaction 347
5.4.5 The identity of an actor 349
5.4.6 Identity and development 350
5.4.7 The development of identity 351
5.4.8 The situated actor 352
5.4.9 Multi-actor practices 353
5.4.10 Developing and using identities: the identity model 355
5.4.11 Societal improvement 358
5.5 A value-seeking balance 360
5.5.1 Cleopatra's nose 362
5.5.2 Don't be led by the nose 364
5.5.3 A return to balance 368

6. PART II: THE PERSPECTIVIST LANDSCAPE 373
6.1 We're locking each other up 375
6.1.1 A philosophical rethinking 375
6.1.2 Recursive perspectivism revisited 381
6.1.3 Perspective, actors, societal practices 383
6.2 Two can do more than one 385
6.2.1 Anthropology and apes 385
6.2.2 The evolution of cooperation 387
6.2.3 Long live competition? 390
6.2.4 On coherence and cooperation 393
The stonesmith of the Vézère 394
The Hadza, the Datooga, and the Masai 395
The path of humanity rewards cooperation 396
6.3 Team spirit 403
6.3.1 The second worst definition of a team 403
6.3.2 Team configurations in three dimensions 405
6.4 On families and politics 412
6.4.1 Lack of political understanding 412

6.4.3 Actor-specific logic 417
6.5 Team World is based on balance 423
6.5.1 Plurimodernity comes in threes 424
Three perspectivist dimensions 424
Three components of societal quality 425
6.5.2 Away with the societal chains! 427
6.5.3 On people and machines 430
6.5.4 The Team World configuration 430
6.5.5 On norms and values, and economics 431
6.5.6 What determines human development? 436
Societal development in perspective 437
From entropy to tritropy: perspectivist balance 439
Alternative actor configurations: the first perspectivist balance 442
Three-dimensional power: the second perspectivist balance 444
Value and effort developments 449
Correspondence hypotheses: the third perspectivist balance 451
The practical scale invariance of the perspectivist space 454
6.6 The relativistic bridge: experiential value 465
6.6.1 Experience of perspectives is relative 465
6.6.2 Loss aversion and habituation 467
6.6.3 The relativistic experience of value and effort 470
6.6.4 Relativistic value in a one-dimensional consciousness 471
6.6.5 Development of experiential value and habituation 480
6.6.6 Value and effort play a remarkable game together 483
6.6.7 The relativistic perception between subject and object 487
6.6.8 All three perspectivist dimensions are relativistic 490
The relativistic value in two and three dimensions 493
6.6.9 The fundamental theorem of arithmetic in perspective 499
6.6.10 Abstraction and specification and prime numbers in perspective 501
6.7 The path of humanity in perspective 503
Plurimodernity in perspective 506
Why our experiences are in three dimensions 508
6.8 Quantum leaps in societal development 510
A discrete landscape 510
The Boltzmann principle 513
The leaps taken by societies and electrons 513
Wave–particle duality: location and delocation 514
Energy and matter, process and identity 514
A quantum-theoretical prelude 515
6.9 We seek the end of the path 515

7. THEME III: A CLOSER LOOK AT DICE 519
7.1 Playing dice 521
Pure dice and perception 526
Is there a perfect dice in the second interpretation? 529
Yahtzee! 532
7.2 Balance, symmetry, and stability 533
Statistical, thermodynamic, and ergodic relationships 558
Exploring dice in perspective 564

8. THEME IV: PATTERN LAWS IN PERSPECTIVE 565
8.1 Perspectivist basis of pattern laws 567
Right and wrong 567
Pattern laws 568
We create the patterns ourselves 571
8.2 Zipf's law 572
Our adaptive consciousness causes object and subject 575
8.2.1 A perspectivist explanation of Zipf's law 578
8.2.2 A mathematical explanation of Zipf's law 581
The harmonic assumption 582
A good balance in multiple dimensions is worth the effort 583
Balance in the lifeboat: does less equal more? 585
The average improvement potential per perspective 587
The incrementalist disarmed once again 590
8.3 Benford's law 591
Pseudo-derivation of Benford's law 595
Calculation of Benford's law 595
The inverse proportionality is based on the harmonic series 597
The discrete inverse proportionality is quantized 600
Simulations regarding Benford's law 601
Simulation 1: How stochastics leads to Benford. 601
Simulation 2: How stochastics in multiple datasets leads to Benford. 603
Simulation 3: How stochastics leads to the harmonic series. 603
A discrete explanation of Benford's law 608
Stepping stones 609
8.4 Perspectivist analysis 613
8.4.1 The determined block stacker (2D) 614
Building the wall 617
8.4.2 The determined block stacker (3D) 619
Stacking patterns 622
The difference between two and three dimensions 629
8.4.3 Stacking blocks in 2D, factors, and perspectivist configurations 631

Factors 631
The relationship between primes and factors as a pure structure formula: f_p 634
Binomial curves and the normal distribution 637
8.4.4 The relationship between structure and content 644
A 'real' Gaussian? 644
A closer look at the binomial pattern 646
Boltzmann, perfume, ball pits, and reality 648
8.4.5 Convergence of structure and content 650
8.4.6 Aspects of the perspectivist analysis 652
1: The relationship between primes and factors: structure and content 652
2: The central limit theorem connects structure and content 657
3: Uncertainty relationships in perspective 658
4: The perspectivist stairs: structure and content 663
5: Powers 665
6: Examples of perspectivist analyses 666
7: The relationship between structure and content: Pascal's triangle 678
8: The relationship between structure, content, and improvement potential 685
Logarithms and scale invariances 686
9: Symmetries decrease the number of factors 687
10: The symmetry correction for the number of factors 691
11: Of position and place 699
12: Number theory, prime numbers, and the Riemann hypothesis 701
First proposal for a proof of the Riemann hypothesis 738
13: Wave patterns and the Riemann hypothesis 741
Wave particle hybrids 741
Sawtooth patterns 744
Interleaving 747
How sawtooth patterns become wave patterns 758
Three new visions for a proof of the Riemann hypothesis 767
Viewpoint 1: the Denjoy route. 768
Viewpoint 2: The three categories of numbers for primorial numbers. 770
Viewpoint 3: Condensation of factors at primorial steps. 803
Second proposal for a proof of the Riemann hypothesis 805
14: Conclusion of the perspectivist analysis 814
8.5 Summarizing explanation of pattern laws 816
Dimensions 817
The harmonic row 817
Multi-dimensional balance: balance systems 818
The relationship between improvement potential and experiential value 819
From harmonic row to inverse proportionality 819
Explanation of Benford's pattern law 819

Explanation of Zipf's pattern law 820
Conclusion Benford and Zipf 821
8.6 Configurations and improvement potentials. 823
8.6.1 Primes in the dark 823
The lower limit in improvement potential 823
The upper limit of improvement potential 824
Other symmetrical factorizations besides two 826
Improvement potential is quantized 826
Recursive symmetry 827
Symmetry and asymmetry 828
Hybrid factorizations 828
Generalization to all hybrids 830
Hybrid factorizations differ by constant factors 831
8.7 A societal quantum theory 836
The societal climbing wall 842
8.8 Perspectivist consciousness is at the basis 848

9. PART III: SOCIETAL INNOVATION 849
9.1 Societal innovation in perspective 851
9.1.1 Innovation 851
Societal innovation 851
Clovers and daisies: societally complete coalitions 851
The citizen/consumer as a societal cornerstone: the penta helix 853
Free rein for the penta helix! 856
The citizen/consumer/voter 857
Mastering Three 859
9.1.2 Recursive perspectivism and societal innovation 861
9.1.3 A leap of faith? 863
Through modern to plurimodern benchmark: the camel 866
Methods for societal innovation 881
9.2 Sustainable development in perspective 884
9.2.1 Three interpretations, three generations of sustainability 886
Generation 1: planet 887
Generation 2: people planet profit (the Triple Bottom Line) 888
Criticism levelled at the Triple Bottom Line 888
Generation 3: the multi-actor interpretation 894
The balance interpretation of sustainable development 898
9.3 Multi-actor process management 901
9.4 The Innovation Cube 906
9.4.1 An actors' interpretation of the perspectivist space 906
9.4.2 Six value orientations 910

Mono-strategies 912
Double strategies 913
Triple strategies 914
Combination leads to societal innovation 914
Integral strategies and societal perspective 920
Multi-actor perspectives as interdisciplinary bridges: S-curves 921
The value paradox implies a value balance 926
The statistical double hypothesis 929
Of shareholders and stakeholders 933
9.4.3 The six value orientations in more detail 934
Value orientation 1: Process optimization 939
Value orientation 2: Utilization optimization 940
Value orientation 3: Team optimization 941
Value orientation 4: Product innovation 942
Value orientation 5: Multiplication/upscaling) 943
Value orientation 6: Societal broadening 944
9.5 The Backbone 946
Societal layers 946
Hidden potential 948
A Backbone takes societal stratification seriously 951
Backbone for the climate 955
The carousel as a metaphor for intelligent arrangements 960
9.6 Proficiency levels in societal innovation 967

10. WRAP-UP AND PRELUDE TO THE FUTURE 973
10.1 Looking back 975
10.2 Consciously following the path together 979

About the Author 983
Curriculum Vitae and Acknowledgements 984
Appendix 1028
Index 1030

1

Introduction

1.1 An ambitious undertaking

'And when we have made ourselves better we will
also improve the environment and make it better.'
Dostoyevsky, *A Writer's Diary*

This book, volume V of the Society in Perspective series, is an essay about improvement, with special attention paid to societal scales. Its central question is 'Can we improve our world?'[1]

There are many ideas about what exactly an improvement entails. Nevertheless, I won't keep you guessing for very long about my own answer to this essential question, even without discussing all these ideas in more detail. My answer is a wholehearted 'yes'.

This book describes a way of looking at the whole of human development up to the present that gives us more and better opportunities to improve our society in the future. My position is neither that of a utopian, say, nor of a populist, but rather of a strongly reflective pragmatist.[2] The book calls on your will and your ability to look at our entire human development practically, theoretically, and philosophically. The result is a general methodology for further societal innovation and for focused further improvement of our societal practices.

The demand for improvement in the world is especially appropriate in this very era. After all, we're living in tumultuous, exciting, and tense times. The modern machinery of progress is breaking down. We're starting to see cracks in the cement in our late-modern society. This is why many of us are experiencing the beginning of this third millennium as a

[1] I can enlarge 'world' from my experiential world here and now through all kinds of intermediate scales to the world of all humanity. The implicit question is thus: who is this 'we' to whom the question refers; whose world are we improving? It always revolves around an inherently societal world – the world of societal practice.

[2] The reflective pragmatist is a recognized type in the work of, among others, developmental psychologist Jean Piaget and the researcher of professionals Donald Schön. This type also has roots in the pragmatist school of philosophy. A reflective pragmatist typically reflects on his/her experiences and consciously improves them. I work as a *strongly* reflective pragmatist. What I am trying to express with this is that I don't shy away from either philosophy or scientific theory, and in fact I involve them intensively in my reflection on societal practices. In essence I also see science and philosophy as practical processes, albeit with particular mores that diverge from many more conventional practices. See also the methodological framework further on in this book.

transition period. Change is in the air. We're all ringing out the old era, expecting that it will disappear while we lead our daily lives and that another age will appear in its place. This can take many different forms. But we can't be absolutely secure in the knowledge that our future will be better.

Technologically we're racing ahead, and the fact that we can do this is of great benefit. At the same time, we're failing in terms of society. Individuals are feeling more and more alienated in the societies we form with each other, as witnessed by the growing numbers of refugees, like those now crossing the Mediterranean Sea trying to reach Europe. At the same time, the developmental model to which the West owes its prosperity seems to be reaching its limits. Financially and economically, the world shakes on its foundations with regularity. Depletion of natural resources and ecological disruption (for example, climate change), once only possible future scenarios, are now visible everywhere around us, for anyone willing to acknowledge them. Last summer I visited the glaciers in the Alps. They are still grand, but I can see how much they have shrunk in thirty years or so, and that's downright worrying. Doubts are arising as to whether we can house and feed nine billion people peacefully. These doubts are hypocritical, mostly the worries of the well-off, since war and scarcity already cause hundreds of millions of people to suffer every day, and millions to die every year. At the same time, it is unique, historically speaking, that 'we' can formulate these global concerns together. Against the background of our world's hypocrisy and powerlessness, it expresses a new shared sense of responsibility, as well as a societal consciousness on an unprecedented scale.

As humanity, we've faced major trials and gone through intense transition periods before. Today, however, it's less clear than ever what our future will look like.

Generally, there are two attitudinal extremes in the face of societal transition, one passive and the other active. The passive attitude is the exact opposite of my view. In it, there is little we can do to develop society as individuals. Society, according to this approach, is simply much too complex for us to understand it, let alone guide it with any kind of direction. We can seize opportunities now and then as they present themselves, we can support unexpected leaps forwards, but we will nonetheless primarily have to endure change for better or worse. Adherents of the passive perspective would argue that we live our individual lives, after all, within the contours of a society that 'happens' to us. This is proved by the fact that the current transition phase is happening to us and it's hardly being managed at all.

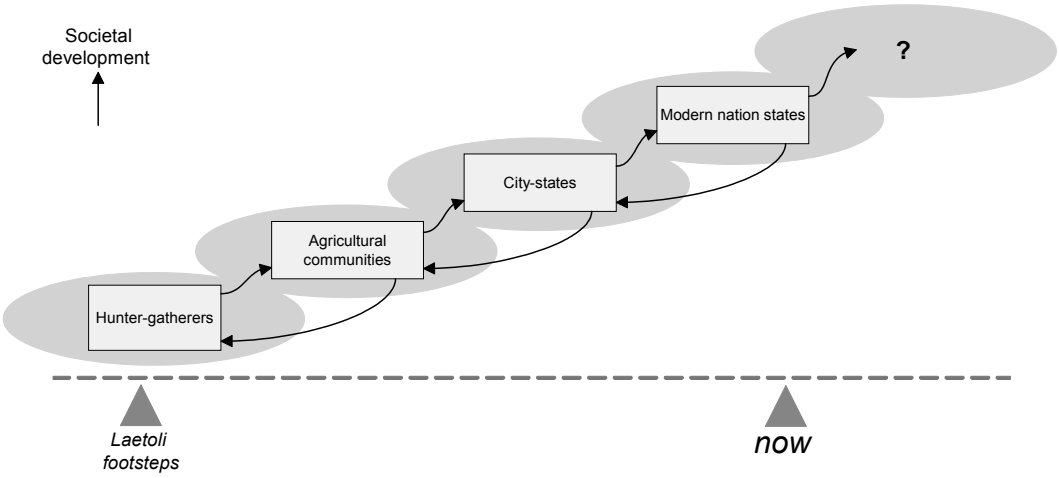
The active attitude answers the question of whether we can improve our world with a diametrically opposed 'yes': of course we can experience, examine, and tackle societal challenges and opportunities together. As humans, *together* we have the exceptional ability to understand our situation in time and to use our experiences up to now to think through and design new and better futures, and by testing them out along the way, to try to make them a reality. And if we can do this on the small scale of our daily lives, then why not on

the larger societal scales, working closely with each other? Although our track record so far may not be impressive, the fact that we now explicitly view problems like the environment, hunger, and war, which hit individuals the hardest, as global issues is certainly a huge step in the right direction.

In this book, I will make a case for a way of thinking and working that can help us go into our future optimistically and with clear minds. I will provide supporting evidence for why a loud and clear 'yes' is the answer to our central question, and I also provide a framework for how to make this transition. And although I may be doing this partly from an optimistic viewpoint, it's mainly based on a philosophical, theoretical, and practical interpretation of the development of our human society.

1.1.1 A remarkable path

In my opinion, not only are we capable of improving our world even more, but we have actually been doing so already for quite some time now. We're doing it by trial and error, and most consciously on smaller scales so far, but these scales are growing steadily. Since our very beginnings as humans, we've been following a remarkable historical path of improvement.[3] I call this *the path of humanity*. It's easiest to see this path over the very long term; it's completely invisible on short timescales. Our journey along *the path of humanity* begins at the dawn of human history and extends through the present and into the future. No one knows how far it goes. The figure below gives a general idea.



The path of humanity to the present day.

[3] I use the term 'historical' in the sense of involving a coherent development that unfolds in time. 'Historical' thus does not have to be involved with a written or narrative tradition (another interpretation of 'historical').

A fine, if somewhat arbitrary starting point for the path is the Laetoli footsteps, fossilized footprints left by a small band of early hominids about 3.5 million years ago, in what is now Tanzania.[4] The set of tracks is a poignant echo from this distant and primitive human past. The presence of both large and small footprints, indicating adults and children, and the impression it gives of a shared, somewhat slower pace also give us, even today, an iconic and impressive picture of the essence of *community*. Modern humans (*Homo erectus*) came onto the stage barely 2 million years ago and acquired food through a combination of hunting and gathering berries, nuts, fruits, pulses, and seeds. These first people could easily carry all their possessions, knowledge, and experience with them; they lived a hypernomadic existence in small autarkic (self-sufficient) groups. *The path of humanity* starts from this distant nomadic hunter-gatherer past and leads, through agricultural communities, city-states, and nation states, to the late-modern present.

The path shows that this is not the first time we've been in a time of transition, and it won't be the last. Once again, we set out from a present day and take the step towards an uncertain future that has yet to unfold. Whether or not we'll be moving up or down in the short term or will have to keep muddling on for a while is an open question; we'll have to see. But sooner or later the path will return to its upward course.[5] This book will tell you why I think so.

Our route along *the path of humanity* is quite obscure now and then. We take great steps or even leaps forward, sometimes we virtually stand still for a long time, and now and then we also fall back along the way. It is certainly not a monotonic improvement, since we are barely aware that we've been following the path until now, and there is plenty of room for the fall downwards. But in the long term, the upward trend will win. The fact that *the path of humanity* up to the present day is clearly observable, etched in history, is the best evidence.

Although the path may be very dimly lit during our journey so far, at the same time it is crystal clear that seen from the perspective of history, something is happening with the very structure of our collective societies. The structure itself is developing, and this upward movement has to do with an increase in the numbers of experiential worlds, actors, and coherence. This increase is accompanied by changes in scale, usually upwards but frequently downwards too. Currently, in the Netherlands, we're testing the European-level and global-level societal structures and learning to appreciate local structures again.

In general, up to now, the path has primarily led us towards better societies. It's therefore worth the effort to look at *the path of humanity* in more detail, so that we can follow it more

[4] There are tracks of early hominids that date from millions of years earlier, but for the purposes of this book, the Laetoli footsteps are a nice image to start with.

[5] It could take centuries, and we could regress quite far in the meantime. But with a thorough understanding of what *the path* to the present day has taught us, we may be able to prevent a regression, and perhaps foster further progress.

closely and more consciously from now on, and take the next steps into the future together. The diagram above implies that there is an intriguing opening for society at the question mark in the upper-right corner. This book aims to fill in the details as well as to help bring it about.

In a nutshell, this book explores the potential of *the path of humanity* as a guideline for improving society even more and for making societal innovations consciously. We can further improve our world by studying the path more and understanding it better. If we understand it better now, we can follow it more consciously in the future, and we'll have the best odds of doing better in the future as well.

1.1.2 Blind naïveté?

'If a baby zebra loses its mother, no other zebra will look after it.
But elephants are different. They mourn their dead, they comfort each other,
and they do care for babies whose parents have died.'
Elephant expert Marjo Hoedemaker talking to elementary-school students.
De Volkskrant (newspaper), 18 November 2014

'Those who have the privilege to know have the duty to act.'
Albert Einstein

This discourse has a positive and optimistic character. I think that we as humanity – speaking on average and in the long term – are slowly progressing forwards and that *the path of humanity* shows this progress. Pessimists, who call themselves 'realists', think that it's naïve to believe that human development follows a path. According to them, the world is much too big and complex to draw constructive lessons for society from it.

Personally, I'm much more optimistic. What is my optimism based on? After all, thinkers who have stated that there is a progression in human development (such as Augustine, Hegel, Marx, and Fukuyama) get 'debunked' time after time by the 'realists' just mentioned. According to them, there are several developments that point straight in the opposite direction.

People are hardly ever nice to or behave fairly with each other. That's a euphemism – we frequently slaughter each other, on increasingly larger scales and in more and more refined ways, as demonstrated by the world wars of the previous century and the recent beheadings and bombings in Syria and Iraq. We are now capable of bombing the whole world to smithereens. Famines caused by political quarrels have claimed millions of victims. For many people, the last century was no picnic at all, and the question is whether this century will be much better.

Prophets of doom predict that an ecological disaster will destroy our society. United in our complacency, we'll all be killed off by climate change, resource exhaustion, and pollution.

Or we may crack under growing administrative incompetence. Who among our politicians and leaders can still cope with the increasing complexity of our late-modern societies? Are the classic forms of leadership still adequate? Epidemiologists are predicting new diseases; as I write these very words, Ebola is just waiting for a chance to do its disastrous work on an ever-greater scale as a contemporary bubonic plague. Every picture of its victims in Africa is a slap in the face for humanity, because even family ties, the most beautiful and powerful social practices we know, crumble under this violence. We cannot provide the most basic human healthcare, not even to young children. It's an appalling failure.

The same 'realists' above also point out subtly that well-known politicians, administrators, economists, technologists, and scientists who do believe in improvement are looking for it in a thousand different directions. In addition, one person's improvement is another's horror scenario. For some people, this is why the conclusion is negative and pessimistic: our environment is unfathomably complex, and humanity is intrinsically small-minded, selfish, divided, tending towards evil, and doomed. A path for improvement? Moving forwards? Blind naïveté. Get real!

I know all this, and it's not entirely untrue; I do not want to shut my eyes to these arguments. But the fact that many other paths are being walked, that we take a wrong turn en masse with some regularity, and that now and then we completely lose our way, *in no way alters the reality that first and foremost, the general outlines of the path of humanity reveal themselves magnificently*. History clearly shows that we have by and large been following this remarkable path of societal improvement for many hundreds of thousands of years, but hardly aware of it. In the last hundred years, perhaps the last few centuries, the vague outlines of this path have been becoming sharper in our consciousness.

This book recommends that we continue to study this path and start to follow it consciously, and it describes the first steps towards doing so. The subject of the book is as vast and far-reaching as the ideas presented in it. These ideas are certainly not isolated random thoughts. They have deep roots in the experiences of many people. Many ideas are in line with the insights of past and present thinkers and build firmly on them. At the same time, the basis of these ideas is still highly intuitive. They have the status of initially substantiated hypotheses, if they can be called that, since hypotheses must be experimentally falsifiable. This is hard to do on a societal scale. Although I provide rudimentary foundations for these ideas, the foundations need to be worked out in much greater detail. The ideas must be firmly confronted; they will arouse controversy, and much is certain to change.

This book is my attempt to add to the methodological insights that make further societal improvement possible. I'd like to stay far away from dogma and instrumentalism about *content*. I'm personally wary of people who think they know what's better for others within the discourse about society, and who want to convince others that they're right at all costs, even subjecting them to their opinions if they can't convince them otherwise. What

underlies these attitudes is often either a fairly random collection of cultural and personal experiences or pure short-term self-interest. These attitudes are not unique to missionaries or tyrants, of course, and may apply to us all at times.

That's why I prefer to appeal to your own life experience. You and I both experience what 'societal competence' means every day, live and in person. Your own life experience has made you an expert in it by virtue of your participation in many societal practices, from the large scale (you are part of humanity) to the small (you live your life as an individual, and as such you participate by playing various roles in many different societal practices).

Starting from our shared life experiences in society, we can look together at the historical practice of societal development. And then, in my opinion, we mainly see this: coherence and cooperation may not grow at the same rate all the time, but they are certainly growing in general. And this increase in coherence and cooperation – again, speaking on average – is causing an increase in prosperity and well-being. This growth takes the form of *the path of humanity*. The path is clearly delineated over tens of thousands to millions of years, through wars, natural disasters, pandemics, political blunders, and a multitude of selfish individual actions. The path also entails huge shocks and setbacks, but it is unmistakably developing.

The path of humanity is the product of a wealth of life experience, namely that of the whole of humanity up to now. It shows us the route to improvement that we've followed thus far, even though we've often stumbled along it and have generally been virtually unconscious of it. We don't understand the lessons the path shows us very well, and thereby we are oblivious to a huge force for societal improvement. It's time that we realize this more deeply and let this permeate our shared consciousness. Once we understand the path better, we can connect it to societal consequences. This will help us step into a better future. This book will end with methods that support this entry into the future. Some extra sense of finding societal direction, and some footing in finding it, is after all appropriate here, precisely in this confusing late-modern era, on the eve of a new leap forwards – or perhaps, on the contrary, a great fall backwards.

1.2 The structure of this book

'Success is not final, failure is not fatal:
it is the courage to continue that counts.'
Sir Winston Churchill

1.2.1 Painting at different levels

If you look from close up at a painting, such as a late Rembrandt (with less detail), then you see mostly just different-coloured areas of paint. At this micro-scale, the picture as a whole is missing. Once you move farther away, then a majestic and miraculous painting arises out of the chaos.

In a similar way, *the path of humanity* emerges out of human history.[6] If you look at it too close up, it's hard to discern a path through this history; it comes across as fairly chaotic. That's how most of us live our individual lives: in a sometimes-bizarre mixture of anticipation and confrontation, on a small scale with our noses right up to the canvas. Life is experienced and lived its most intensely like this. You see a different pattern at a different distance. And if you look at human history from as far away as possible, then you can see the entire path of humanity. It's quite hard to look from such a great distance, because it combines the insights of many individuals and disciplines across an enormous span of time and space. Necessity compels you to make huge abstractions. But if you look in this way, the path becomes clear. The progression of human development and societal improvement are hard to miss on this huge scale. As a humble human being trying to lead your own individual life, though, you're literally out of the picture at the scale of *the path of humanity*.

Rembrandt put paint to canvas sometimes intuitively and sometimes methodically, always looking from different distances. He created wholeness from separate elements, beauty out of chaos. He added a few more things and then a few more details, and what he created this way was stunningly good and still is today. This ability to understand different scales in conjunction with each other and to work with them is the mark of a great painter.

Here, comparisons between a painting and *the path of humanity* are meaningless, of course. Humankind does not 'get' the greater societal scales, and it is hardly aware of them. The whole of human development just seems to be charging ahead like a blind horse, with us clutching the saddle. Even in the view of religious people, who suspect a divine hand behind

[6] In fact, the path rises out of the entire recursive-perspectivist network, but this will be discussed in Part two.

this (where else would all this organized complexity come from, as the creationists among them would say[7]), we mortals cannot fathom this style of creation.

1.2.2 Does society paint itself?

'METHINGS IT ISWLIKE B WECSEL'
Computer-generated sentence from *The Blind Watchmaker*, by Richard Dawkins

We are quite blind to society as a species. There is no human master painter working on larger societal scales. Only once things have got hugely out of hand, like after World Wars I and II, do great minds stand up and dare to name the wider societal connections and explore them in practice. 'It's too late to fill in the pit once the calf has drowned' is a fitting aphorism on a folksier level. The League of Nations and the United Nations were the results of World Wars I and II, conflicts on an enormous scale. As these wrongs sink further away into history, our interest in them decreases, and we throw away the paint rollers and coarse brushes and go back to work with finer brushes, with our noses up against the canvas. That's just how we lead our lives. The blind horse continues on its way.

It is a fortunate coincidence that *the path of humanity* seems not to be so terribly prone to human societal myopia, at least in the longer term. I don't mean to trivialize the directions some people have taken us in so far, since historical figures and other societal actors do throw their stones into the river and slowly change its course. But for them someone else. Again and again, larger societal structures develop along the path, even if no individual is able to comprehend or watch over this process. *The path of humanity* can be seen on different continents in variants and phases that strongly resemble each other, without any advance coordination between the actors.[8] Again and again, people unflappably ascend as an unconscious collective higher along the rubble-strewn, messy path of development, with all its accompanying ups and downs.

1.2.3 The human urge to improve as a driving force

The path of humanity is virtually invisible to the individual people who constitute it, largely unaware of doing so. It transcends the human scale. What is the driver behind this remarkable societal process?

In my opinion, the driver is the human urge to improve. In the light of *the path of humanity*, it is just not that relevant whether you're a creationist or evolutionist, religious or atheist or agnostic, conservative or innovator, whatever your political leanings, or wherever and in

[7] Here we touch on the argument between the creationists and the evolutionists. Creationists derive a creator from the existence of order. Evolutionists see order and organization as the inevitable outcome of a random process of variation and selection. See *The Blind Watchmaker* by Dawkins (1986) for a fine description of the evolutionary perspective.
[8] See the work of Arnold Joseph Toynbee for a monumental description of societal development.

whatever era you live on this planet. What connects us, and what ultimately brings about the largest societal practices (for better or worse) is much stronger: all people are improvers. Improvement is the most distinctly human condition.

Improvers reduce unwanted tensions. They seek out, recognize, and create value. Value is just what people think and feel is important, and therefore what they will work for. Value can be material or immaterial, and it can be for yourself or for someone else.

Perhaps we're not always looking explicitly for value. Sometimes we ramble aimlessly. Sometimes we act from our subconscious, and then we're looking for value without knowing it. But the moment a person seeks shelter from the rain or cold, goes in search of food or a better job, cares for the children, or gets together with the neighbours to build a dyke, so the village doesn't flood (a typically Dutch practice from the past that still informs political practice today), he or she is showing signs of the urge to improve, of life force, of attempting to reduce tension and seek value. People doing this are showing that they (and those near and dear) won't easily be beaten by chaos, indifference, or the forces of nature.

Of course, the world around us can feel overwhelming, and we cannot be completely up to dealing with the scope of the evil we sometimes face. We may give up if we can't take it, or surrender with an extreme final act of resistance. But seeking to improve our lot is a very fundamental human quality. Even if we're merely content or idling away for the moment, we'll oppose any deterioration or decline in our situation.

What is better or worse in our minds can take on all sorts of forms and gradations. There are matters that attract us; we attach enormous value to them, and they can move us to tears when they occur or make us angry when they don't. And there are other things we prefer to avoid. We often don't understand why others think something is valuable (or not) or how they think they'll get (or avoid) certain things. There are also extreme forms of better and worse. People can be tired of life and just end it; for them, that's an improvement. People can brutally murder members of another ethnic group or faith and call it an improvement. Sometimes it seems that the more fundamental the group is by nature, the greater its aggression. Something you see as an improvement at one time in one context can be deeply regrettable at another time and in another context. And once you've secured something of value, or definitively and irrevocably let it slip through your hands, you'll usually focus your attention on something else. If you've been frantically busy, you want to give your mind a break and just do nothing – and for you, that's an improvement.

All these variations and nuances do not change the fact that *Homo sapiens* is first and foremost an improver, from within any and every experiential world (experiential worlds will be discussed in section 5.1.1 of chapter 5), in any situation and context, over and over. For what would the alternative be? Sitting passively against a tree, no different from the

rock next to us, waiting for the end? Even leaning against a tree and waiting would indicate an orientation, if a weak one, towards 'better'.

1.2.4 Improvement perspective on a dual track

This human power to improve is essential, and in this book, it is cast completely in terms of actors and their improvement perspectives. That has a magical quality to it, because this process starts as soon as we start to experience the first improvement perspective and act on it, which is when we really start to live consciously, and it keeps on going. And it will stop when the last human consciousness is extinguished.

Like Baron von Munchhausen pulling himself out of the swamp by his own hair, actors wrest themselves from the unimaginable chaos and indifference of the cosmos that we cannot understand, by means of formulating and creating improvement perspective, and together we create society. This is why as prehistoric people we built primitive shelters and went to gather and hunt for food. This is why we're also developing the largest and most complex societies in this age.

Where this improvement perspective comes from is a question I cannot answer. That's also not that remarkable, since the deepest nature and origins of other fundamental concepts, such as thought and matter, are also a huge and perpetual mystery. Improvement perspective is no different.

We can describe the concrete details of improvement perspectives – for instance, going to the greengrocer if you feel like eating an apple, or fixing the present problems of economic development by moving to a climate-neutral economy free of problematic waste products (a more circular economy). This route will be discussed copiously in this book. Societal practices are very easily understood as interrelated concrete perspectives of different actors. The farmer grows apples, the greengrocer sells them, and the customer eats them (and the criminal robs the till). The scope of our late-modern societal practices is becoming huge due to the enormous number of actors (and their perspectives) that they entail, so enormous that we no longer comprehend them at all. I explored this track in my previous books. In this one, I'll also elaborate it more in terms of qualitative societal strata (see the various illustrations). This book will explore this subject matter even more deeply.

Yet, in addition to this 'content' track, this book will go more into another one adjacent to it: the structural. I primarily conceive of perspective as the building block of the *content* of all societal practices. Going a step further I assume that although motives can be vague and ambiguous, and can greatly differ, actors will deal more or less efficiently with the perspectivist capacity available to them. A consequence of this (which results in the structural point of view) is that although perspectives may greatly differ as to content, statistically speaking they will have very similar properties when it comes to general structure. For example, perspectives all require an input of effort and produce a valued output. Of course, it will take more work to make a transition to a more circular economy

than it does to buy an apple, but the economic shift requires the use of more connected, coherent perspective than the purchase of an apple. And, of course, as people, we all have pleasant surprises and disappointments, but that doesn't detract from the fact that we still experience them against the background of our average experiences with regard to effort and results.

The assumption that a single type of building block, i.e. perspective, is the basis of our societies, and in fact, our human consciousness is a far-reaching one. It continues a line of thought that was already in my doctoral dissertation and that I continued in earlier volumes of this Society in Perspective series. Now and then I feel a kinship with the first alchemists, who in amazement began to suspect that the enormous variety of material things could be made from only a few chemical elements. They must also have sometimes found the enormity of their assumptions to be bizarre. Today it's all child's play.

The many intuitions that can be explained by perspectivism, and the insights that this explanation produces, make it a productive avenue, and one I will continue to develop. Using improvement perspective as a recursive building block of societal practices, I will take both a structural, quantitative look and a substantive, narrative, and qualitative look at the development of our societal practices, and thus at *the path of humanity*. These two tracks will entwine into a colourful double spiral in this book, leading you to a deeper understanding of the path that we as humanity are on together, and giving you tools to help further develop and provide a more focused improvement to our societies.

1.2.5 The lesson of *the path of humanity*

The Path of Humanity outlines in abstract and with broad brushstrokes the cumulative result of all of our small-scale power to improve, all our improvement perspectives, all our improvement activities, over time – the good *and* the bad moves. And then you won't be able to miss it: the heart of the matter is that even the entire path of humanity, the path that we are largely taking unconsciously but in increasing interaction with each other is, in general, a path to improvement. The fact that we as humanity are barely *conscious* of improving things on this enormous scale, that the actions of even formidable individuals are nothing more than a little rustle along this enormous path, doesn't seem to matter at all.
The history of humanity is, of course, partly competition pure and simple, written in battle and blood. We can see this in the fierce competition that characterizes today's business world and economy, as well as from the battle scars on prehistoric skeletons and in the world wars of the last century. I can never look at poppies without thinking of the generation of young men who lost their lives in the trenches of Belgium and northern France in the First World War.[9] In this negative sense as well, we experience leaps of scale together. Nevertheless, *the path of humanity* clearly shows that we make progress neither through increasingly bloody competition with each other, nor with increasing selfishness.

[9] The poppies thrived as a pioneer species in the shell-scarred land between the trenches of World War I.

On the contrary, the path shows that we are actually operating on increasingly greater scales of coherence and cooperation, which is precisely what on average causes prosperity and well-being to increase the most.

Our human history is a widely distributed experiment, in which many societal practices great and small have been examined. This history is marked by human happiness and human suffering. In a puzzling way, many small-scale improvements and random experiments add up to large-scale societal development, to *the path of humanity*. This is not because we as humanity made a plan and carried it out. It is because we as individuals and groups recognize something that would be an improvement, carry it out, then support and perpetuate it, even if it has been largely created by chance out of many small contributions. From building a dyke to founding the United Nations, we perpetuate societal improvements, if we can just see their value clearly and broadly enough.

For the first time in human history, we can look back at the path leading up to today, thanks to the scientific revolution. And the lesson here is unmistakable. Competition and conflict must sometimes create space, remove barriers, and support choices. Thus these two forces certainly play a role in the process, even if they are not constructive by nature and even if we tend not to treat the losers fairly. The route we are following may be stained with selfishness and soaked in blood, but the dominant route to societal value is that of ever-greater coherence and cooperation. *The path of humanity* is a path of coherence and cooperation. Once we start to understand *the path of humanity* better and start to follow it more consciously, we and our societies will reap the benefits in the future.

1.2.6 The main structure of this book

This book consists of a methodological foundation and three main parts. The *Methodological Foundation* explains the methodological basis underlying this book. Part 1, *Humanity's Path of Improvement*, discusses in detail some events along the *path of humanity*. This part takes a first look at the possibilities of societal improvement and gives a more narrative explanation of the societal path that we are on together, from isolated groups of hunter-gatherers to our common future. It emphasizes our current position in late modernity and the particular issues and decisions that this position entails.

Part 2, *The Perspectivist Landscape*, clarifies that *the path of humanity* is not just a random path through the world's disarray. Humans as improvers develop their societies in a perspectivist landscape of improvement that is and has always been there (a priori). In this landscape, we're always looking for the highest peaks and see them as improvement. The fact that we can see *the path of humanity* through all of history's noise and randomness is due to the a priori inherent structure of this perspectivist landscape.

We have quite a handicap as we travel along this path. First of all, we're barely aware that this landscape exists. Second, what we do perceive of this landscape is right in our vicinity – we're terribly short-sighted. Third, to make matters worse, this landscape consists of lots of

peaks and valleys if you want to walk through it step by step, and these peaks and valleys show up when you least expect them to.

Therefore, you can compare our journey along *the path of humanity* to walking along a mountain ridge with deep, unexpected gorges and valleys, and ever-higher peaks, while you are extremely short-sighted. You try to climb up and you see the peaks, the possibilities for improvement, in your immediate surroundings. However, you frequently take a wrong turn, deviating to the left or right, or dropping into a deep canyon (now and then) or a shallower gap (all too often). Or you climb back up after falling, back up to previously scaled lower peaks that you see around you, so of course you keep climbing.

We don't know in advance precisely which route we *will* take. Nevertheless, the landscape more or less determines where we'll emerge. This is a matter of trying it out enough and having enough time. It's like rolling a dice over and over again. Exactly what will happen is unpredictable, and it's possible that you'll roll a six 100 times, (the odds are very small by the way: $(1/6)^{100}$). But it's quite certain that the more you roll the dice, the closer the average will approach 3.5. We don't know the exact average, but we know it approximately, because the dice is seeking a peak in a landscape of possibilities (a phenomenon explained in Part 1). This is how *the path of humanity* evolves in the perspectivist landscape. The perspectivist landscape has managed to hide itself very well until now. It's not readily apparent, you have to really unveil it, unmask it. You have to wrest the structure of societal practices and societal progress from the content. And that is just what happens in Part 2.

Part 3, *Societal Innovation*, uses the path and landscape to follow the ridge more consciously and with greater focus than before to even higher societal peaks. Although this will never become totally simple, we can navigate much better than we're doing in our current state of flagrant ignorance of both the path and the landscape.

First, *Sustainable development* will be situated on *the path of humanity*. Next, four general methods for societal innovation will be discussed. The first is multi-actor process management, a form of societal improvement that emphasizes the actors, their intentions and changes, and their coherence. The second is the *Innovation Cube* (also known as the *improvement cube*), a perspectivist cube that reveals the existence of six societal value orientations that when combined make it possible to climb along *the path of humanity* with additional and focused societal innovation. Third, we present the *Backbone*, a way of seeing and working that does justice to the nature of societal multi-actor networking. The Backbone has various closely connected layers, each with its own focus, and in this way, it provides structure and support for even monumental societal innovations (such as the path to climate neutrality). Fourth and last, we present five *Proficiency levels* that make it possible to better check and ensure that the requirements for adequate societal innovation are established and worked out as well as possible. This way, we get a clearer grasp and view of the path to a society of even better quality, and together we can bring about further societal improvement with greater focus than before.

2

Methodological Foundation

2.1 Methodology

'I'm preachin' dis sermon to show,
It ain't necessarily ... so!'
George Gershwin / Bronski Beat

This book aims to improve society by catalyzing societal innovation. By this I mean creating added value, consciously and with greater coherence and cooperation, that is also experienced as such at the individual level. How can we sensibly approach such a vast subject as this?

First, a word before I begin. I've never felt especially well equipped to tackle this subject. Its scope and depth are still frequently intimidating for me. It sometimes bothers me that although I speak to a lot of groups about change, I can't deal with it myself. I know that I'm not exempt, somehow, and that the lack of improvement that I see everywhere also applies to me.

Still, I've been working on this subject for decades, and I'm continuing to work on it. That's because I think that we can still improve our society much more. Early in my life, I saw the outlines of how this could happen, and I've continued to work on making these outlines sharper and more specific. I also think that it's especially appropriate to innovate our society more consciously and more daringly, particularly in this late-modern era of transition. There's a lot at stake – the very quality of our society – and if we act together, we can take enormous steps.

My idea that society can and must improve is based on several foundations. Education and work experience play an important part, but they do not tell the whole story by themselves. The roots are in my life as a whole, including some very personal life experiences. And that's quite a challenge for the accountability of this book. They can't be scientifically substantiated, since most of them are not at all reproducible, traceable, or verifiable. But I'm not trying to make them so. Societability is simply not scientific rigour. Other people's individual lives and the societal development of the world are not repeatable, traceable, or verifiable either, and that's a good thing too. The scientific viewpoint offers a remarkable but overly specific, overly oppressive look at society. I take a wider view myself, and I therefore call this book an essay.

I can, however, justify my methodology. It will clarify the foundations on which this work stands. It makes it clear (at least I think it will) that such a vast and scientifically elusive subject as societal development and improvement can certainly be explored using

nameable frameworks. I firmly establish this basis in this chapter. Once I've outlined my fundaments, I'll present the three main parts of this book: Humanity's Path of Improvement, The Perspectivist Landscape, and Societal Innovation.

2.1.1 Education and work

First of all, education in its different forms plays an important part in my approach. Natural-science and social-science programmes at various universities gave me the scientific tools to go exploring widely and deeply, and both will be recognizable in this book. This basis is not only interesting but also formative for this subject. A well-rounded academic foundation, preferably including social and 'hard' sciences as well as humanities, is in my opinion essential if you seriously intend to tackle societal improvement. That's why I frequently accept a part-time job in a university. I feel at home having one foot in science, because of the intellectual climate there (yes, it's still there, but less and less) and the interest in theory formation and reflection.

At the same time, I perceive science as overly fragmented into narrower disciplines, too detached from the rest of society, and too focused on its own ends. There are outstanding exceptions I could mention, and I certainly don't want to tar all scientists with the same brush, but that doesn't detract from this general picture. It's a sad situation, and it's why I have trouble fully connecting with current scientific practice (which explains that one foot). I see it as a microcosm of the same self-centredness that is weakening society at large today. This may simply make sense, because after all, scientists are people too, no better and no worse than you or me. But I think the bar needs to be higher precisely for these people who exercise their powers of reflection. I expect them to acknowledge the weak as well as the strong in an internally-oriented and disciplinary culture, and – crucially – to go and do something about it.

The fact that, in my experience, this is only occurring to a slight degree doesn't make me feel very positive about giving traditional scientists and traditional scientific knowledge a major role in improving society. That would still only amount to rummaging around at the margins of society. At the same time, science has actually broadened my views about the possibilities for societal improvement. Maybe everyone should be part scientist. I'm not talking about prevailing scientific practice, which is obsessed with publishing for colleagues. I'm talking about people who together consciously explore how relevant parts of societal practice function and how we can improve them, in both a reflective and generalizing way. How we deal with the losers created by the improvements we make, and even strip the whole notion of 'loser' of its negative consequences, is another crucial aspect that must be sorted out.

My professional activities also play an important part in the approach. As a young man, I started working for a research institute for 'social technology'. I chose this very deliberately at the time, as I felt 'social technology' to be an especially appealing name. The appeal didn't last very long, though, since the discipline's powerhouses have quickly taken over the

business of naming things. That is a terrible waste of a name that is close to a missionary calling. After ten years there, I had learned a great deal of academic content as you'd expect, but even more about the various cultures and motives of research institutes, businesses, universities, and government ministries (in terms of both civil service and politics). I wanted to return to practice and stand on my own two feet. I've now had my own practice in multi-actor process management for twenty years. If a direction needs to be explored and created somewhere in a complex playing field, I see it as my job to help people do it. I've worked on multi-actor project and programme management, innovation strategy and management, sustainable entrepreneurship, coalition building and cooperation, strategy development and policy, consumer information, and the positioning of organizations. The areas I've worked in have included construction, sustainable energy and energy conservation, education, healthcare, emissions of industrial processes, agro-food, indoor environment, biotechnology, water, advisory infrastructures based on multiple information-technology expert systems, and many, many more.

This has provided me with a wealth of experiences. The greatest things are created and accomplished in professional practice. At the same time, I also observe that, like scientists, the professions are too much divided into isolated disciplines, too separate from the rest of society and focused too much on their own goals. And yet maybe everyone should be a bit of a practising professional. Not in the sense of the rather stereotypical 'do-er' who takes pride in blindly rejecting theory; that's just as limited as the stereotypical scientist, just the other way round. Where the scientist overvalues theory and undervalues practice, the practitioner conversely overvalues practice and undervalues theory. But if everyone more consciously worked in a profession that could explain its principles, theories, working methods, and concrete contributions to society to people outside the field, then practice would no longer be closed and limited, but open and multifaceted. It creates much more space for a powerful and conscious societal practice.

I've encountered both utopians and doomsayers in my work. By now you can probably see it coming: I perceive them as too isolated in their own disciplines, too detached from the rest of society, and too focused on their own goals to accomplish anything. But perhaps everybody should have a modicum of utopianism and a little talent for doom-saying. The latter helps us to understand where we absolutely don't want to end up. And utopianism does precisely the opposite: it broadens our consciousness to include what we might be able to have together. It's good to think about what we could accomplish with each other, if only we could … (fill in the blank). That inspires, gives energy, and guides this energy in better directions: away from dystopia and towards utopia.

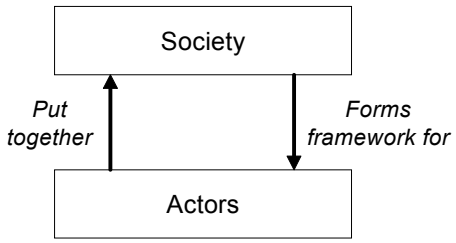
2.1.2 Life as learning, society as artwork

Although education and professional experience were both important for my understanding of how societies improve, I've neglected the most important source.

Society as an artefact

Our society is in the first place not a subject for study, or a work area. Our society is first and foremost the matrix in which people like you and me and other actors live their entire lives. Conversely, actors, the provisional condensate of all these lives, all together form society, at every moment, continually.

We experience our society, and at the same time, together we are its components. This last idea, that our society is an artefact, a work of art that we *make* with each other, often gets lost with all our fragmentation and short-sightedness. Yet it's precisely this insight that gives us a route to societal improvement.



The reciprocal relationship between society and actors.

Three principles of societal competence

'Like dissolves like', says the chemist. This is why table salt dissolves in water.[10] Oil and vinegar do not get along. If you put them both in a glass, the oil will rise to the top. But a good cook can make an excellent mayonnaise from oil and vinegar, adding a little egg yolk and some seasonings. The whole is greater than the sum of its parts. To put together something really tasty, then, the ingredients can't be all alike, but neither can they be totally different. A good mayonnaise is unity in diversity, an ingenious balance.

Life in society is the same. An important principle of societal competence is that people who differ from each other as actors can also come together to form another identity, another actor.[11] It's also known as solidarity, or coherence between actors. What this is, and what the driving force behind it is, has been answered in different ways by different political and sociological schools of thought. For example, you can find that force in mutual benefit, where everyone is different but has complementary roles. The farmer feeds the agricultural university employee, and the agricultural university 'feeds' the well-being of the farmers through agricultural study programmes. Or you can find it instead in shared

[10] *Like dissolves like*: related substances dissolve in each other. Thus, in chemical jargon: polar substances in polar solvents, and non-polar in non-polar. Table salt dissolves well in water (both are polar). Oil and water do not mix, since oil is non-polar and water is polar.

[11] Another principle is that actors can also enter into competition with each other, and fight.

standards and values, where everyone is the same. You can also find it in power or authority, which brings everyone together into one whole.[12]

The great sociologists such as Max Weber and Émile Durkheim studied this interrelatedness, but they were not the first ones to see things this way. For example, the motto of the French Revolution was 'liberty, equality, fraternity'. Liberty indicates that everyone can choose their own way, equality expresses the idea that everyone has equal status, and fraternity means that together we also are an entity. Although some great crimes against humanity were committed using this slogan by the revolutionaries, it was and still is an inspiring motto.

In my opinion, both the sociological schools of thought and the French Revolution motto emphasize three principles of societal competence:[13]

Actors are all **the same**; this is precisely why we can understand each other and empathize with each other.

Actors are all **different**; this is precisely why we can each set our own course and mean something for each other, and make a difference for each other.

Actors together are **a single entity**; this is precisely why we can achieve a quality and power that we can never achieve in isolation as individual actors.

I think that all three of the above qualities contain an element of societal practice.[14] Although they appear to be mutually exclusive, together they form a special mix, as I will explain.

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[12] The German sociologist Max Weber, one of the first great sociologists, understood power as the ability to steer the actions of other individuals or groups, even when these actions go against their interests or wishes. Power is distinguished from authority in that power has no other legitimacy than this ability itself. Authority has a wider legitimacy (for example, through elections).

[13] See also Appendix C of my dissertation.

[14] The French sociologist Émile Durkheim, one of the first to focus on social cohesion, stated that if a society becomes increasingly complex, then solidarity is created less and less *mechanically* (based on shared standards and values) and more and more *organically* (based on mutual benefit). (The terms mechanical and organic are Durkheim's own.) The organic mechanism relies – now in my own terms – on people experiencing that working in coherence and cooperation with each other, using their different abilities (differing in things like culture, division of labour, specialization) results in added value. In times of social transition, the historical system of coherence and cooperation is far from optimal and functions less and less effectively, the organic connections are crumbling, and people are turning away from the existing structures. *The Path of Humanity* describes broadly how appropriate social orders evolve – the periods of decline are, I think, nothing more than episodes of large-scale *anomie* (a term of Durkheim's meaning turning away from rules and order) – and explores guidelines for developing appropriate forms of organization for our future.

These concepts are not at all theoretical for me, but rather principles of societal practice as I experience it first-hand every day. All three occur *simultaneously*, in varying proportions, and this proportion is what characterizes a societal practice. A healthy society is always recognizable by a balance between these three aspects. *The path of humanity* is nothing more than (our) unconsciously abiding by this balance. This balance can be expressed by giving a name to the building block of societal competence. I call this building block 'improvement perspective'. If a society systematically deviates from this balance on a large scale, it pays the price in terms of quality. It will encounter impassable obstacles that limit its further progress. The motto of the French Revolution said as much, centuries ago.

Personal existential experiences

'Nothing lasts forever, nothing is lost forever.'

My first realization of these three principles began to dawn on me while growing up with my father, mother, two sisters, and a brother in a mining village in the south of the Netherlands. The family was one close-knit unit, in which we were all related and thus the same, but we were all individuals as well. All the same, all different, together as one – well in balance.

I also saw this idea shining through on larger scales at an early age. I can still clearly remember standing on a hill as a boy of seven or eight, looking in desperation at a field where two groups of kids, one from the next village over and one from my own village, were approaching each other to play 'war'. (Just to be clear: this wasn't urban gang war. I lived on the outskirts of the village, and we played a lot in the fields and orchards. Our favourite game was cowboys and Indians, 'fought' between about forty of us.) I felt caught between a rock and a hard place. I couldn't fight on the side of my own village because I also had friends in the neighbouring village. Even though it was only a kids' game, a spectacular battle for dominance was already being fought in my head between being different, being the same, and being something together. As a result, I became an involuntary third faction, a bit cowboy and a bit Indian. I can still see myself standing there on the hill, and I experience it all over again. All different, all the same, and all together a single entity. But *different* won the day, and I was not at all in balance then. I felt that people didn't understand me, and I was somewhat lonely.

Philosophers sometimes talk about existential experiences, and about how it's these experiences that can give us the deepest insights. We all have existential experiences. I can testify first-hand to their ability to lead to deep philosophical insights. I've made great leaps of philosophical insights into societability under personal circumstances that were marked by either happiness or misery.

In 1981, when a relationship with the woman who is now my wife was looking very likely, the first thing I did was to go away from her for a week. I wanted to really think about the ramifications of what was clearly taking form before my eyes. This may be a much-too-rational reconstruction; you could also say we had something together that was larger than

the two of us, and things were going much too fast for me. But after that week it was clear to me and I took the plunge, and we've been together for 35 years now. When my mother died quite unexpectedly less than a year later – I was 19 – it felt in some ways the other way around. I felt almost physically pulled apart, torn, crushed.

I wanted to understand what grew quickly in one case and in the other was pulled, torn, and crushed. I began to see the contours: it was a partly shared life, a shared identity, a shared consciousness. Together my wife and I were a collective actor. When our first two sons were born in the years after, new connected identities and new collective actors arose. I became a father, we became a family, there were reciprocal relationships with the boys, together as well as individually, and between the two of them – all sorts of things happened. It was a situation I recognized from my youth, but not from this end. Different, the same, one together.

The deepest insight came to me during my most intense experience up to now.[15] My wife was seriously ill and had been operated on several times. She was being kept in a coma in a soulless little room in the intensive care department of a teaching hospital. She was also pregnant with our third son. It all turned out to be too much for her, and he was stillborn in intensive care, physically already a complete little person, but what did he understand about life?

He was lying on a cloth in a steel tray, at his mother's feet. I knew that his life had already ended without even having started properly, but his mother was still in a coma and didn't know yet. Whether she would ever be able to realize that was still a question. I couldn't move; it was as if I was trying to cross an intersection where every traffic light was red. I felt it was important to reflect on his death, for him, for her, for me, for us. But I got bogged down in doing so.

His unborn life existed mainly in the shared consciousness of his two parents. How could I say goodbye to him *alone*, when he was so intrinsically from *both of us together*? How could we do that *together*, if *she* wasn't conscious of it? And where was *he*, as a part of our family, after all the anticipation and expectation? Where and how did my two sons fit into this story – the oldest, just three, who had sat on my lap comforting me a few days before, and the youngest, not even a year old, who had no idea of what was going on? I couldn't say goodbye alone, and we couldn't do it together. It was a traumatic and incomprehensible experience. No-man's land. Schrödinger's cat in the flesh, and squared.

In a flash, as if hit by lightning, I suddenly understood something that I already had a vague understanding of, but now a couple of layers deeper. It's not at all about individuals in a

[15] For those who read Dutch, I describe this in *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosphy of Societal Practice* in preparation, published by Parthenon, page 149 ff.: Leven op het scherpst van de snede.

shared, material world, but about partly shared consciousness. An actor is characterized by a coherent consciousness. A societal actor is characterized by a coherent societal consciousness. A societal consciousness like this is a highly dynamic thing that acts from within one consciousness and continually plays with the boundaries between many consciousnesses. If a baker and his or her customers enter into a societal relationship, they share part of this societal consciousness but are different regarding other elements of it. A father, a mother, and children form a family and share a consciousness but are also different in their individual capacities as father, mother, and children.
Thinking more about this later on, I understood that we act mentally on a material world, in other words as thinking people in a physical world, but that human being and world are not already there beforehand. We must first *create* what 'is' mentally and materially while experiencing. I also understood that there are many more identities than just individual ones, both greater (collective actors) and smaller (roles). I understood that, once we have reached a certain age, we may have experiences within temporal and spatial frameworks (the shadow cast by Immanuel Kant), but that these frameworks do not exist beforehand (moving away from Kant). They must first arise in experience and emerge from it. I saw the relativity of facts and opinions; how can they already be there beforehand and forever, if their distinction is completely based on what you have experienced up to the present?

I'm not sure whether you completely understand what I'm getting at, or whether I'm being clear enough. I've written about this extensively in a previous book.[16] But how can education, science, and professional practice ever compete with experiences like what I've described above? Scientific requirements of repeatability, traceability, and objective distance – professional requirements of method and discipline – are out of place and irrelevant.

I don't want to make life more intense or complex than it already is, on average. Most people live their lives not thinking so much about what goes on around them. Most people don't take an interest in philosophy, let alone study it in any depth. But if you want to improve society, it has to be *all of* society. Since we assemble society out of our many identities, by definition we improve society together, based on a shared understanding of these many identities. Our position on *the path of humanity* sets some strict requirements for how we look at ourselves, together and as individuals. If you're going to make the world a better place, you have to take this societal consciousness seriously, or else you might as well keep quiet.

2.1.3 Flexible frameworks

I've learned the most about how societal practices function by participating in all sorts of ways, as a whole person, as a student, as a professional, and as a private person, and

[16] Henk Diepenmaat, *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation), published by Parthenon.

thinking about it afterwards. I did it partly on the basis of the insights described above. The best and the worst experiences depend completely on the degree of coherence and cooperation, on the way things are arranged between actors, in my experience. And I experience it every day.

In the best situations, people and things seek and find each other naturally. If it's routine, it occurs so smoothly that we're barely aware of it. Simone de Beauvoir expressed a side of this idea very nicely: *'The only time when problems have a solution is when they don't occur.'*[17] In the worst situations, we don't find each other, while we should be able to. It makes a world of difference whether we work together or work at cross-purposes. That difference is the better world. That difference determines the quality of a society. That's how simple it is, in my opinion.

The advantages of specialization: focus

As humans, we have many faces. Dividing ourselves into the roles we play and adapting our personas to the situation has advantages in daily social intercourse. A hardware-store employee knows different things than I do. If I need screws, he or she can supply them, even though neither of us can make screws. Where does the store get the screws? I have no idea. And if I'm waiting in the queue at a hardware store because I need a yardstick, I don't need to hear all about the problems the cashier's teenage daughter is going through, as much as the worries of parents of teenagers are something close to my heart. I just want to buy a yardstick. You also take on many different roles over a day, a month, and your whole life. It's this focus that enables you to excel in certain roles. We train in, focus on, and join a nearly boundless and flexible set of specializations and thus together form the largest societal practices as well. This is downright impressive.

The disadvantages of specialization: a double schizophrenia

At the same time, I see that humanity is suffering more and more from what I'd like to call a double schizophrenia: one that is both personal and societal. It holds true for scientists, professional practitioners, philosophers, prophets of doom, and utopians. If an actor stands out as only one role, not paying attention to the others they play, he or she stands out as an incomplete person. If a society stands out using just one of its actors, without an eye to the other actors, it stands out as an incomplete society.

Personal schizophrenia expresses itself like this: we look *into* the test tube like a chemist, while it's also important to know *why* we are looking at the test tube. We do things as an employee or contractor that we would never consider as private persons in our private lives. As consumers, our purchases support production methods that we have a huge aversion to as citizens. As politicians, we do everything and anything to get votes despite once having

[17] Simone de Beauvoir, *The Mandarins*, 1954. This quote fits excellently with the definition of problem solving discussed in chapter 2 of my doctoral dissertation ('Model-based support for multi-actor problem solving', University of Amsterdam, 1997).

felt called to serve the public. We no longer vary our roles, in the full realization of the connections and coherence between them, but split our personalities, so that they have too little contact with each other. This is one half, the personal side of this schizophrenia.

With this personal schizophrenia, in one and the same movement, we also compartmentalize our entire society with meters-high walls; this is the other half, the societal counterpart of this schizophrenia. As consumers, we buy cheap clothing, closing our eyes to the sweatshops in the Far East. We don't want to know and we don't make the connections. We buy the cheapest chicken without wanting to know about the corresponding factory-farming conditions, and by doing so, we make our antibiotics worthless. We step over the schizophrenic tramp sleeping at the train station. In fact, he shares our fate, and we should not only help him, but also learn from his condition. We keep building physical walls – the Great Wall of China, Hadrian's Wall in Britain, the Berlin Wall, Israel – and are now contemplating one around the European Union, as well as internal ones separating its nations. But we build many more walls in our minds. Ultimately *the path of humanity* will break down these walls, sooner or later, in the way the fall of the Berlin wall was predestined. With the exception of Berlin, however, the walls are still there, and their presence does a great disservice to society.

Without placing any blame at these people's doorsteps, it's only logical that practitioners, scientists, philosophers, utopians, and doomsayers are not whole people and do not hold the keys to societal improvement. The roles they overemphasize are also played, but in a balanced proportion with other roles, by whole people. By 'whole' people, I mean people who can see both their operation in their partial roles and their participation in larger societal connections in some coherence, from within a consciousness of connection. Thus they consciously understand which actor's identity they are taking on. An actor can be a small role played by an individual, like you when you buy a loaf of bread from the bakery. An actor can also encompass a great many human activities, for instance, humanity causing the enormous emissions of CO_2 and thus the greenhouse effect that is so very disturbing. The concept of actors thus covers an entire spectrum from the smallest individual focus to the whole of human actions.

Together, one flexible unit

Since people form a society together, they (we) should improve it together. 'Together' implies actors who are different from each other but who nonetheless are all recognizable as actors and also form a single unit. The important thing is thus to increase our societal consciousness. This won't happen with tears in the fabric of society caused by ignorance, or deliberately constructed walls between actors who independently practice philosophy, science, professional practice, or any kind of business in isolation. Then people barely know of each other's existence, let alone each other's potential, wishes, and needs.

As actors, we cannot act towards something that we as actors do not experience. But we do for a large part have control over what we experience. We thus can improve our world by raising our societal sensitivity, taking an interest in each other and in the actors around us.

Of course, our professions and educational backgrounds play a part in this, but we can only bring about focused improvements in society as whole people working from a clear and articulated societal consciousness, and from a clear *and* flexible use of the concept of an actor.

2.1.4 The foundations of this book

'... we can finally count all the books in the world.
There are 129,864,880 of them. At least until Sunday.'
Google, 5 August 2010

This book is about societal improvement, and it relies heavily on the path I've taken so far in my life. I collect, bundle, process, support, and expand on what seems useful to me. Besides a deep appreciation for professionalism and drive in themselves, I also strongly criticize isolated professional attitudes, such as those of practitioners or specialists or scientists once they make their knowledge and expertise absolute. I incorporate some highly personal experiences. So isn't this book just the chance opinion of a loner, someone somewhat averse to rules and conventions? Why should you read it? There are 7 billion more people like me and 130 million other books!

Eclectic, anarchistic, casuistic, and anecdotal could all be fitting descriptions of this book in the eyes of a sceptical reader. At first glance it looks hard to make a general and methodologically responsible whole of all of this, you might say. I'll deal with these charges one at a time.

First of all: the book is unmistakably eclectic. An eclectic combines the best of many styles without committing too much to the prevailing ones. Eclecticism is therefore not a widely appreciated method of doing things, in particular from within the prevailing styles (and this is an understatement). So I don't see the label 'eclecticism' as a complete condemnation. On the contrary, eclecticism is a strength. Society has, after all, many different styles. This is one of the three basic properties of societal competence: *all different*. Societal styles are also all the same in a certain way, as members of a category, and that is the second basic property: *all the same*. And when they're combined, you automatically have the third basic property: *together, one whole*. This is why a modicum of scepticism is not out of place with regard to books about societal competence that are *not* eclectic, or people who condemn eclecticism. A special-interest group or a culture that is not very reciprocal is sure to be hiding behind a dominant or absolutized style. Indeed, what is called for if society is the subject is to acquire a wide range of information and to use what's appropriate. Eclecticism is an underappreciated quality, above all when our society is involved. It is an especially relevant societal condition! Thus, this book is eclectic, and you should be glad that it is, even though it undoubtedly requires a certain flexibility of mind from you as a reader. The argument frequently jumps from alpha thinking (about culture, e.g. history, philology) to beta thinking (about non-human nature, e.g. physics and mathematics) to gamma thinking (concerned with human nature and behaviour, e.g. psychology, sociology,

and economics), and just as easily back again. And that's also a good quality in a book about societal development. It doesn't require bias and pre-occupations, but it does require a sense of direction, and a mentality of connection underlying it, and they are provided by *the path of humanity* and recursive perspectivism, respectively (more about this later).

Next: the book may sometimes seem somewhat anarchistic. It may appear to have little respect for systems of rules and order. But if this impression persists after you have finished the book, it means you have misunderstood something because I haven't done my job properly. The book certainly takes a critical look at all kinds of *existing* orders, rules, and practices. I'm hesitant about people who blindly and adamantly conform to preconceived and defined mores. Among them, I include the more rabid practitioners, price-driven consumers, power-mad politicians, rules-driven civil servants, profit-driven businesspeople, publishing-obsessed scientists, armchair philosophers, and other examples of fundamentalism. But it's not because I reject their orders, rules, and practices out of hand. It's mostly because we are in a period of transition, and these previously defined orders do not (or no longer) offer the societal added value that our position at a 'crossroads' on *the path of humanity* requires. Outdated societal orders, or orders that create little value, must therefore be clarified and structurally modified, sometimes even radically replaced by better ones. *The path of humanity* gives an impressive look at these kinds of changes. Until now, we've been stumbling through them, largely blindly, enjoying benefits but also experiencing a lot of pain.

I'm certainly not going to call myself an anarchist, but instead a supporter of an open, transparent, shared, and adaptive order. With this, I give one and the same rebuttal to the anarchist (who rejects order), the disciplinary specialist (who works within a limited order), the conservative (who cherishes the order of the past), and the fundamentalist (who nails the order down). They're allowed to exist, as long as they don't go overboard; we all have them inside us to some extent. And who am I to forbid them? However, I don't think that with these attitudes, isolated from each other in their respective corners, we can rise to the challenges posed by our period of transition. We need an order of the future, an order of coherence and cooperation, and it must indeed be broad and diverse, shared, forward-looking, and flexible. Cautious, explorative curiosity is a quality we'll have to use a lot.

Then the last point: casuistic and anecdotal. If one person writes a book about *the path of humanity* and improving society, relying heavily on his personal experiences to do so, doesn't that make this book very casuistic, perhaps too anecdotal? Doesn't the conflict between the one-sidedness of the source and the breadth of the subject matter become much too great? I'm highly aware of this very pitfall, and that's why I make sure that it all is represented here in several ways. Of course, I do this by reading a large and wide selection of sources, and thus I'm standing on the shoulders of giants. But that doesn't say everything. I safeguard the foundations of this work in other ways.

First of all, besides my highly personal experiences, I work from broadly shared experiences. I often discuss societal improvement with my audiences at workshops, lectures, and classes. Some of these are students, but more often they're adults with a secure position and a lot of experience. I assess their attitudes about societal improvements, and I use the results to make mid-course corrections. Very few of my ideas are based purely on my own experiences, since I usually draw on those of many other people as well.

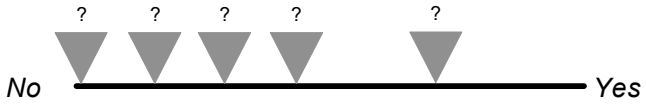
Secondly, I base my work on fundamental concepts that are familiar to everyone. I only use one building block for improvement as a foundation, one that we all intuitively recognize: an actor-based improvement perspective. Similar models for improvement have already been discussed by many philosophers, scientists, and practitioners in many other different idioms, in many subforms, and on many different scales. But I will prune it back to a bare-bones version, which makes it very widely applicable. Improvement perspective relies on the distinction between objectivity and subjectivity. Perspectives can connect in many ways, for example in the way that dominos or Lego pieces combine to form a new, larger pattern. Many connected improvement perspectives form a societal practice, on many different scales and in all kinds of domains, and on the scale of the whole. This coherent use of improvement perspectives is what I call 'recursive perspectivism'. Precisely because this book is constructed from one extremely flexible building block, improvement perspective, it can incorporate very different specific experiences and still be highly universal.

Thirdly, I develop my ideas within a particular methodological framework. This framework is based on the building block for improvement introduced above, and it covers practice, theory, and philosophy. It can certainly withstand a certain amount of eclecticism, anarchism, casuistry, and anecdotes. Above all, it supports the continual search for a new, coherent, transparent, and flexible order, with high societal quality.

Below I'll shed some light on the main ideas of all three aspects: the broad dialogue, improvement perspective, and methodological framework. I'll try to show you that this path is not just in my head. That *the path of humanity* retains its structure, remains broadly rooted, and can boast of a high degree of representativeness. That it won't stay something we're unaware of, but that it can be a deliberately taken path of humanity in the future. The following elaborations of these three aspects form important methodological foundations of this book.

2.1.5 A broad dialogue: the improvement dilemma

The question of whether we can improve our society is one I regularly ask in lectures, workshops, and classes for professionals, managers, and CEOs. The people I meet there are well educated, hold positions of responsibility, and have a range of experience. Their answers lie somewhere between the two extremes of absolute 'yes' or 'no' (see figure below), but 'no' generally carries much more weight than 'yes'.



Can we improve our world? (Many possible positions)

Then I go into more depth. After some consideration, many people think that there is something to be said for and against both extremes if I challenge them to justify their initial positions. My next question, asking them to explain in detail, often leads to the observation that there is a distinction between theoretical and practical ability. Our current societal practices give us many advantages. But people know and at the same time keenly feel that we are far from the theoretical peak of our societal ability. Social injustices are widespread throughout the world, and right around us too – just follow the news media. We immediately recognize these injustices for what they are, and they touch us emotionally. We also realize that many more practices in society are less than optimal and in theory can be much better. Examples are education, healthcare, packaging waste, the food chain, working in a huge uncaring company, politics, the greenhouse effect, mortgage lending, the question of corporate executive salaries, and the social performance of scientific research. And this is just a random selection.

That's why the question of whether things can *theoretically* be better can really only be answered with *yes*. Whether we're capable as humans of achieving it in *practice*, whether we have it in us to truly improve our society, is a much trickier facet of the central question to answer. There can be very great differences of opinion about this. The majority of my audiences are usually pessimistic.

If I look at the discussion over the years, it leads to the following situation. Generally speaking, people answer the question of whether a better world is *theoretically conceivable* with 'yes', and the question of whether it's *practically* possible with 'no'. Here there's a gap created between theory and practice, between desire and reality, between thinking about the world and acting in it. We're in a predicament I call the 'improvement dilemma' (see figure).



Can we improve our world? The improvement dilemma as provisional consensus.

Although societal improvement is desirable and theoretically conceivable, it's impossible in practice, according to many of the well-educated and influential people, most of them Western, to whom I speak in workshops, classes, and lectures.

2.1.6 Improvement perspective as a pragmatic building block

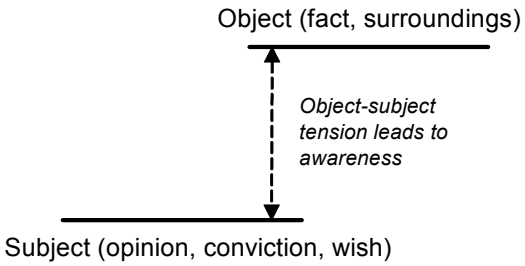
The above is another example of how theory and practice are different things. There is often a distance between the world as we'd like it to be and the world as it is, between how we like to see things and how things are. We all recognize this distinction, at many different scales. I've made our relationship with this distinction operational, in the form of *improvement perspective*: a concept that I think lies at the basis of all (conscious or unconscious) improvement, including societal improvement. Below is an introduction and explanation. I've gone into quite some detail here, because further on in this book, perspective will turn out to be the conscious building block of all societal competence. Our societal landscape is composed of it, and it will turn out to be the vehicle of societal improvement, at any and every scale.

Object–subject tension

The most general way to talk about the difference between reality and desire is as an object–subject tension. Objective refers to how something is in and of itself, how it appears to us from the viewpoint of our environment, from outside. Subjective refers to how we look at something, what we think or feel about it, how we appreciate something from within. If you feel like having some ice cream, this is a subjective interior experience of something objective.

Our entire society is one big ocean of object–subject phenomena. In some places and at some times, it's nearly smooth as a mirror, and at others turbulent and wild. If there's not any object–subject tension, then nothing is going on. Literally nothing: we're not aware of anything. If there is object–subject tension, it expresses itself in (and as) consciousness. The more tension, the more aware and alert we are.[18]

Object–subject tension occurs in many ways in the foreground, for example in the distinction between thinking about a society and living in it, between opinion and fact, between intention and action, between knowledge and matter, and between humans and world.



Object–subject tension: the greater it is, the more aware we are (and aware of it).

[18] Until that line of tension breaks, of course.

For many people, the distinction between object and subject in daily life is always plain as day. These people are the inveterate dualists among us.[19] Subjectivity is an inherently personal experience. People who are aware of their subjectivity can take a step away from it. Subjective opinions can be doubted, considered, and revised. You can toss them around without changing anything 'real'. By contrast, there is no doubting objective facts; they're always observable, since they're in the material environment around us and accessible to us all. Something objective is obvious, clearly there, and true, in the world around us.

That's how it is for the dualist. I personally think that the distinction between object and subject is not at all as clear-cut as that. It moves, we toy around with it, we play leapfrog with it. You can consider your own subjectivity (your opinion) for example, as an object, and adjust it from this higher level of subjectivity (consciously changing your opinion). You can also reassess something that you thought was objective. In hindsight, it turns out to have been subjective. Playing with object and subject is the essence of learning, developing, and living. Dualists glue their shoes to the road while we need to go further ahead together.

Proving that object–subject tensions are not absolute is simple. For example, two actors can see completely different things while looking at 'the same' thing. Actors can experience 'the same thing' in totally different ways, each thereby thinking that these are different things. Two actors can see a young woman in their family having her first relationship with a young man, and one can support her with love while the other can stone her to death. Object and subject can even change places over time. Galileo had to stop propagating his ideas about the earth revolving around the sun (in essence a material system) to avoid a conflict with the Catholic Church, which at the time was the ruling authority and held that the earth was at the centre. However, what was once the opinion of a loner is now seen as objectively true, and what was then the (virtually) undisputed truth has now become a remarkable idea of eccentrics. The earth now revolves around the sun (at least that's a convenient way to look at it; Einstein also looked at relativistic foundations this way). This shift took some time and came about gradually; obviously all sorts of interim forms of it also occur.

The mind–matter issue is a subject of deep philosophical disputes. The following observation is important for the purposes of this book: our societal development up to the present refutes rigid and absolute dualism – see the examples above. In my opinion, dualism allows very little space for any further development, and thus object and subject, mind and matter, are anything but set in stone.

[19] Dual means 'two-part'. Dualism is basically a philosophical term referring to the standpoint that people and world, thought and matter, and subjective and objective are two rigid and fundamentally different domains that form our society in interaction. In my opinion, this kind of mentality puts a chokehold on societal development. A flexible and pragmatic recursive perspectivism offers an alternative.

Nevertheless, object–subject tension is an extremely pragmatic notion. This tension continually makes us, as intentional people (subject), aware of an environment in which we find ourselves (object). Again and again, object–subject tension situates us as subjective actors in objective environments. Objectivity and subjectivity are not absolute notions, but relative ones: something is objective from a related subjective viewpoint. The place where the object–subject tension is the greatest is the place where we still direct our attention and live most consciously.

Reducing dissonance

'If horses worshipped gods, those gods would look like horses.'
Xenophanes, ~500 B.C.

As far back as the 1950s, Leon Festinger had clearly expressed how people cope with what I call object–subject tensions, in the form of his cognitive dissonance theory.[20] This cognitive psychological theory, in a nutshell, says that when the factual (objective) environment does not match the (subjective) wishes, views, or convictions of an individual or group, it is experienced as a *cognitive dissonance*. The core of his theory is that people perceive these dissonances as undesirable and will do their best to *eliminate* them.

In essence, there are two routes for minimizing dissonances. You can modify your environment to bring it in line with your taste and convictions. That's why you decorate your house in your own way. You are bringing object into agreement with subject, say, by painting the walls in colours you think are pretty. You can also work the other way, and adapt your taste to your environment. If you really love exclusive limited-edition designer furniture but can't afford it, you can start to appreciate IKEA furniture more as well-designed furniture for a mass market, and appreciate exclusive design less. You're (often partly subconsciously) bringing subject into agreement with object, because the route doesn't look feasible to you otherwise. You could also start to work harder to earn more, and focus on creating a lifestyle more compatible with exclusive top design as another way of bringing object into agreement with subject. All three of these examples reduce dissonance in their own ways. The first and third bring object to subject. The middle brings subject to object. These are the extreme variants; all kinds of hybrid forms can exist in complex situations. We make a compromise with ourselves and think it's good enough.

I'll give another few examples of reducing object–subject dissonance. When we see something repulsive, we physically turn away, and we may clap a hand to our mouths or even cover our eyes. Something really terrible has to stay as small as possible, and cannot and may not be spread, or grow. And if we run into something extremely dangerous, we walk away. Mentally speaking, we do the same thing, pushing away unwanted thoughts and thinking of something else. And we want something we like to be near us; we like to look at it, and think about it, and talk about it as if we want to reduce the distance between it and

[20] Festinger, L. (1957), *A Theory of Cognitive Dissonance*.

us. Out of the abundance of the heart, speaketh the mouth, as the saying goes. In all these cases we're reducing object–subject dissonance.

Rationality and irrationality

'The majority of men are subjective towards themselves and objective towards all others, terribly objective sometimes – but the real task is in fact to be objective towards oneself and subjective towards all others.'
Søren Kierkegaard

A sensible person allows rationality to dominate in reducing object–subject dissonance. The rational, cool, objective view should prevail over the irrational, warm, subjective view. No reasonable person would be opposed to that, would they?

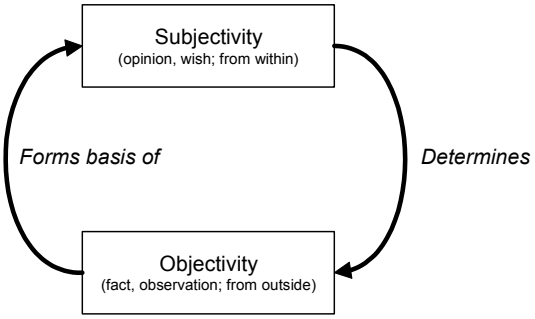
But what exactly is rationality? Synonyms in the dictionaries are reasonableness, soundness, and measurability. It's a tricky concept that bridges the gap between what is measurable and what we think is reasonable. It has to do with objective reasoning – acting on the basis of reason and facts. It's easy to find specific examples of rational behaviour, especially if you're resistant to their irrational counterparts. However, if you want to define rationality more broadly and rigorously, it's easy to fall into philosophical pitfalls. The mind–matter problem will also let its imposing shadow fall here.

I personally hold a view of rationality and irrationality based directly on the concepts of objectivity and subjectivity, and more specifically, on the balance between them. This view shows that rationality is firmly based on the objective world around us, and why, conversely, irrationality supposes a great distance from this objective world.

Rationality has to do with repeatable and reasoned behaviour. Think before you act, you're thinking based on observable facts about your environment instead of opinions, and act only on this basis in your environment. This is something we all recognize. There's little sense in denying the existence of a dog if it's biting your leg; you need to do something about it. And if a bus is racing towards you, you'd better take an extremely rational action and get out of the way. On the other hand, you *don't* want to run away from a bus that will take you where you want to go – that would be downright odd – but rather to wait for it at the bus stop. In concrete situations like these, the distinction between rational and irrational action is crystal clear. Avoiding an angry dog, staying out of the way of a bus headed for you, and waiting for the right one at the bus stop are all rational actions. Running at an angry dog, walking into the path of an oncoming bus, and leaving the bus

stop without boarding the bus you wanted are irrational. This is because both the distinction and the relationship between objective and subjective are clear here.[21]

Rational behaviour supposes that you know what is objective (what is 'real' and 'true') and that what you think and feel (subjective) is determined by objectively perceivable observations and results (truth). Objectivity thus forms the basis for subjectivity, or to turn it around: subjectivity is founded on objectivity. Still, circular reasoning creeps in here. Isn't what you objectively experience actually based on subjective choices? Don't *I* determine where l go? Doesn't that mean that objectivity is also based on subjectivity? Objectivity and subjectivity presuppose each other and need each other (see figure). They are nothing without each other.



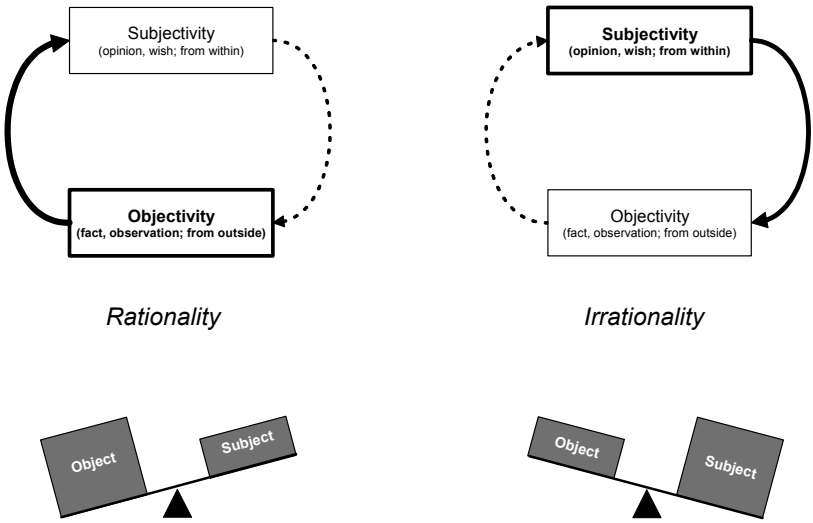
Objectivity and subjectivity need each other and presuppose each other.

We're touching firmly here on philosophy and on the philosophy of science. Dualists value the existence of subjectivity and objectivity, calling it 'mind and matter', without acknowledging this circular reasoning at all. They postulate a hard and absolute distinction between facts and opinions, knowledge and matter, and subject and object. There is incontrovertibly an a priori (i.e. it was already here) objectivity independent of us humans, thus a material world, and a human-linked subjectivity, thus a mental world. This is what dualists build their rationality on. However you only have to remember Galileo, and you see that this hard and absolute separation isn't there at all, in this same societal practice within which even the dualists live their lives. It isn't in science or philosophy either: theories and philosophies keep replacing one another. If the history of science has made one thing clear, it's that facts can become opinions, and vice versa. A hard and absolute preconceived separation between object and subject does not exist, in my opinion. I'm not alone in this position, by the way: many philosophers, especially of the pragmatic and phenomenological philosophical schools, have already presented this to me. Antidualism is one characteristic of a pragmatic–philosophical view of life.[22] I actually don't believe that this is absolutely and

[21] Never crystal clear, though, because things will be different if you're the dog trainer, suicidal, or avoiding public transport, respectively.
[22] For example, the philosophers William James, John Dewey, and Richard Rorty.

a priori true. I'll give up my view for a better one, but for the time being, this view absolutely works best for me.[23]

Therefore, my view of what is rational and what is irrational is as follows. Rational behaviour entails that you (as an actor) assign more weight to what takes place outside yourself (objective) than to what you wish and experience from within yourself (subjective). 'Outside' is then where other actors can join you, while 'inside' is only for yourself. You always base your opinions, your decisions, and your wishes (subjects) as completely as possible on facts and observations around you (objects). Objectivity is dominant – the subjectivity that you allow is strongly based on objectivity and is used to adjust this objectivity (see figure below, left). You align yourself with your environment, which determines what is possible and feasible. Of course, the world remains surprising and uncertain as always, yet this seems to be the most careful and secure route for many people. The boundaries of what you can achieve as an actor are then largely determined by your environment as it is, as it appears.



Pragmatic determinations of rationality and irrationality.

Seen from this perspective, then, irrational behaviour is precisely the opposite. As an actor, you give more weight to what you think and feel yourself than to what is happening around you. Subjectivity dominates, and objectivity has to align with you (figure above, at right). This doesn't seem very smart, because it's uncertain, unsafe, and careless. In most cases, your environment will correct you very harshly. In extremely irrational cases (in the best Spanish tradition), you'll be tilting at windmills.

[23] Indeed, I'm a highly reflective pragmatist!

The Israeli psychologist Daniel Kahneman recently wrote a book about two dominant and diametrically opposed ways of thinking: fast and intuitive, versus slow and rational.[24] In this book, he shows that we are not nearly as rational as we think we are (or would like to be). He specifically discusses irrational mechanisms that people use to deal with what I call (to extend Festinger) object–subject dissonances. He calls these deviant, non-rational variants *cognitive biases*. Psychologists have identified dozens of cognitive biases, particularly in the last fifty years.[25] They cover areas such as decision making (for example, the use of anchor points: the luxury car in the middle of the showroom isn't really for sale, but it makes your purchase seem cheaper and therefore smarter), social practices (such as the tendency to overestimate your own role in positive events, and to underestimate it in negative ones) and memory bias (such as the tendency to reconstruct coincidental and slow developments in yourself as well-thought-out, deliberate, and bold when talking to others).

Thus, many cognitive biases can generally be understood as mechanisms for reducing the tension between convictions (subjective) and environment (objective), or keeping them manageable by adapting the convictions.

Object-subject tension is everywhere: in daily practices, in science, and in philosophy. In practice, we act immediately to minimize the distance between wish and reality. We buy that ice cream and eat it. In difficult situations, we think about the problems first so that we can solve them later. This enables us to see clearly what the starting situation, action, and results are. In science, we make the distinction between what are sometimes called the beta disciplines oriented towards matter and observation (objective experience), and the gamma disciplines oriented towards knowledge and a subjective experience. Here people attempt to splice experience, to separate object from subject in an *absolute* manner, but that is doomed to failure. In philosophy, the mind–matter or mind–body problem is known as one of the discipline's real hot potatoes for good reason. Distinguishing knowledge and matter as two distinct spheres, both with the right to exist, is called a dualistic position. Dualists rightly have a massive mind–matter or a mind–body problem, since what are these two spheres without each other, how do they relate to each other, and what happens in between knowledge and matter?

Object-subject tension is how improvement begins. Underlying every *conscious* improvement is an unwanted discrepancy between beliefs and circumstances, a gap between potential and achievement.[26] This also explains why two people can experience the 'same' (objective) situation differently (subjective): they have had different past experiences and thus have different beliefs. That's why they see different potentials and experience different tensions.

[24] Daniel Kahneman (2012), *Thinking, Fast and Slow*.

[25] See the entry on 'cognitive biases' in Wikipedia.

[26] Potential: possibility. In electricity, potential represents tension, so the term fits very well here. Ultimately tension results in motion.

This tension results in an imbalance in the actor who experiences it. This actor will try, even if only for a moment, to try to restore the balance by eliminating the tension. In a multi-actor situation, not everyone experiences the same tensions, but that does not change the fact that every actor wants to get rid of any experienced object–subject tension. This creates value that the actor would otherwise go without.

With really unexpected improvements, people are only aware of the tension after the fact, but the general mechanism is not that different – the tension is identified retroactively. This is not unlike the situation that you start to feel hungry when you smell a restaurant as you walk past it.

One famous example is the discovery of penicillin in 1928 by Alexander Fleming. While working on a type of bacterium called Staphylococcus, Fleming accidentally discovered the antibacterial effect of this mould, which became the first general antibiotic. Scientists call this serendipity: recognizing a chance event as a discovery because you've been trained to watch out for it.

Subject–object tension is at the basis of our capacity as improvers. A conscious improvement is, after all, nothing more than bringing a world we experience objectively a little more in line with how we want it to be (or vice versa).

Terms like cognitive dissonance (Festinger) and cognitive bias (many psychologists including Kahnemann) express the idea that in our cognition (beliefs, ideas), we deviate from objectivity (our actual surroundings). These terms give the dissonances and biases a cognitive character, implying a rational psychological position, i.e. with rationality as the standard. Cognitive biases point out the sometimes-bizarre and extremely irrational ways in which we deal with dissonances, and how they can fool us. We are apparently much more irrational in how we construct and minimize dissonances than we think, as these rational psychologists have made us so keenly aware. It is ironic that they use rationality to point out our innate irrationalities.

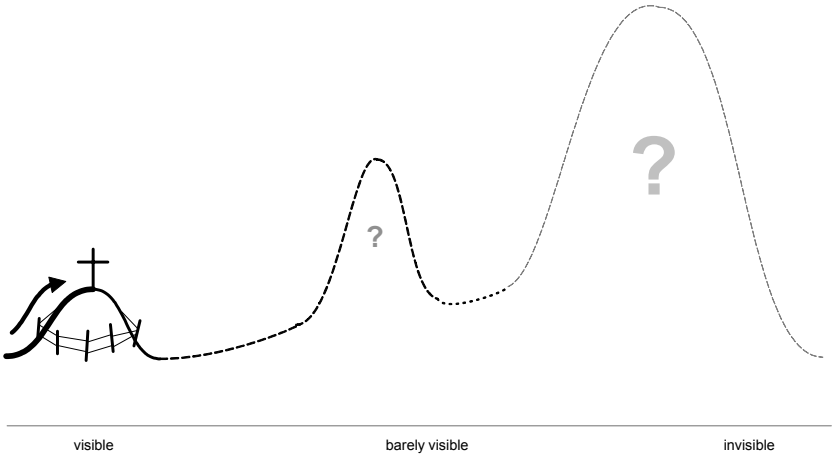
On irrationality, little steps, and big leaps

It's a good thing that we're becoming more aware of the irrational, more intuitive sides of our thinking and its effects on our actions. If we're armed with this knowledge, we can prevent these effects (or use them, as they do in the advertising and public relations world, with a thin line dividing use and abuse) and leave irrationality out in the cold, neglected. But that's unfair to irrationality, since it has a very remarkable quality. It allows us, not our environment at that moment (how it is experienced), to determine the limits to what we think we can achieve. It gives human intuition, the human power of imagination, free rein and allows it to take over. This is a very wonderful and woefully underappreciated aspect of irrationality.

Rationality and irrationality are not each other's antagonists, with the former desirable and the latter undesirable, but rather each other's complements. Rationality is conformist with regard to its environment. Rationality leads to small, gradual steps towards improvement, with the existing environment setting the tone. Just be normal, don't rock the boat, and everything will be fine. On the other hand, a certain degree of irrationality, unconventionality, or nonconformity in our attitude towards the environment can lead to real leaps of improvement. This is something we can all recognize: the point when you're completely stuck is when you try 'something crazy'. To be honest, most of the time the crazy solution doesn't work. But now and then some real gems are created. This is how we separate the many crazies from those rare geniuses who find those gems that give us huge leaps of improvement. Since we only recognize the gems after the fact, the boundaries between crazy and brilliant are thin.

What is actually the use of irrationality and taking leaps into the unknown? Do we really need leaps? Don't the many little and more secure steps to improvement still add up to a very big leap? But think about it yourself: if you look at the course of *the path of humanity*, is it mainly characterized by many small, gradual steps, or by the big leaps? Or let's say you follow the stock market indices and exchange rates as an indicator of economic growth. Is it the small, gradual steps that dominate, or the big shocks? Look at your life: is it the small steps that most determine a life path, or the leaps (meeting a partner, moving to a particular city, losing someone you love, changing your working environment)?

Many small steps to improvement make significant progress by definition. But the chances you'll be able to take many small steps in a row towards improvement are very small. We're quickly approaching the limits – the irrationality – of rational thinking. I sometimes compare this with someone who wants to climb as high as possible and starts at the bottom of Mount St. Peter ('Sint Pietersberg'), a hill near Maastricht. All this person can do is take small steps, since this is all he or she can see. But baby steps won't take you far. In the best case, the climber will finish at the highest point in the immediate surroundings, 171 meters above sea level. If he/she encounters a gorge, even this summit will be impossible. This person will never know about the Rockies, the Alps, or the Himalayas, and flying in space is inconceivable. The highest attainable peak is limited by the use of rationality. Someone who only thinks step by step will not get any higher than the highest peak in the immediate environment that is manageable, doable. This is how rationality always and inevitably creates its own prison (see figure below).



Rationality creates its own handicaps, its own cage.

I'd like to share two experiences that helped me to better understand this. The first involves an impressive story I heard in a castle in the centre of Utrecht many years ago. A former monk told me about helping the struggle for the emancipation of small coffee growers in Central America who were being brutally exploited by coffee traders. It could rightly be called a struggle: the coffee traders refused to give up their position, blood was shed, and it cost human lives. But I'll never forget what he said was one of the strongest obstacles. It was the coffee growers' total lack of any inkling at first that things could be different. Initially, I concluded, the monk didn't join the growers in their struggle against the traders, but struggled just to convince them they could improve their lives. But that didn't make the efforts or the results any less relevant. The small-scale, exploited, impoverished coffee growers only knew about Mount St. Peter, to use the metaphor above, and they were already at the peak. The monk could see the higher peaks from his perspective and gradually was able to get the growers to share his wider view. Ultimately it was the growers themselves who made the journey, because they could see these 'new', higher peaks better and better.

Once the higher peaks are clearly enough in sight and the paths to them sufficiently apparent, the genie is out of the bottle. Then we set out, and the climb takes place (virtually) by itself. We cannot help it, it's the human condition: we'll always be improvers. The famous mountain climber George Mallory tried, again and again, to climb the summit of Mount Everest unsuccessfully in the early 20th century. Asked why he kept climbing this unattainable peak, he gave his famous answer, 'Because it's there.' The mountain's compelling presence cost Mallory his life, in the obvious way, given his pronouncement: on his way to the top. Making improvements is the same way. Once possible improvements are experienced, the seeds have been sown. The improvements are compellingly present, and we'll try to make them. The important thing is to learn to see more and greater possible

improvements.[27] Then the change will not be without some trial and error, but it will happen by itself. Because we are what we are: incorrigible improvers.

The second experience involves a class in multi-actor process management that I taught as part of the Advanced Management Programme at a business university. These professional programmes are expensive. There is usually a range of types of people who attend. Two familiar categories are successful heavy-hitting CEOs who are being rewarded with the course so they can theoretically refresh their ideas, and – more commonly – the up-and-coming new generation of 'very high potentials' who only need to take the final step in their career path. Altogether they are a critical audience, and you can't pull the wool over their eyes.

I do have concerns about the many business universities in the world. I'm a great supporter of an entrepreneurial and creative way of thinking and working. I'm acutely aware that value (including societal value) is something that above all must first be created together (and shared after the fact). However, many of these business universities teach an entrepreneurial style that makes it necessary to look at corporate social responsibility as something separate. If you have to take corporate social responsibility and sustainable business as an extra course on the side in addition to 'regular' entrepreneurship, what then is that regular entrepreneurship? What kind of entrepreneurship becomes the standard practice for the students who graduate from these universities?

I see the world, and the Advanced Management Programme as well, as one large laboratory, and I was given (or perhaps I took) full freedom to do something with the foregoing thoughts. I tried two different styles. The first time I approached it from the participants' *own* position and focused on how they could advance their *own* objectives by dealing more consciously and actively with the playing field in their environment. In short, I was appealing to their view of only the peak in front of them that they were climbing. That is also the filter on which they were selected and recruited for this course by the private sector and the business university. I presented it mainly as an investment in yourself. My class was highly rated.

The second time was for a different but similar group. Partly encouraged by the success of the first course, I approached this one from the angle of common interest. I stressed that the accent had to be less on one's own objectives, and more on the connections, the coherence between the actors. It was a more societally focused approach, seeking the much higher peaks for many more parties, and looking further into the future. The theme was precisely the same in every other way: multi-actor process management. I began full of enthusiasm, but that turned out to be naïve; they rated my class much lower, just above 'fair'. To be honest, I hadn't expected such a difference, and for some time I had a real case of the blues.

[27] This book is playing a part in helping.

I had given the first group a top-level class, but the second group considered it a mediocre performance. For me, it was exactly this combined experience that was so especially valuable. Ultimately, although the participants were certainly talented, and motivated to learn and improve, they weren't interested in the broader landscape. Even intelligent people, successful people, experienced people, up-and-coming people turn out to be short-sighted in terms of society, or at least that was what I observed.

As a result, I had a more profound realization about a lesson that I already theoretically understood. If you cannot see the wider landscape and the possible routes through it, if you have no idea that there are other, higher mountains, how can they ever capture your interest? If we cannot explain our position to others in the broader societal landscape, then we won't get very far. At best we'll end up at the top of the hill that we happen to be climbing, and only by chance will we notice a higher summit. It's exactly this process of chance that makes *the path of humanity* rather bumpy.

There is a very simple principle, one that is too rarely understood even by intelligent and passionate people in crucial positions. Attention for each other has a huge payoff in societal value, but you need to dare to take a broad view of things.

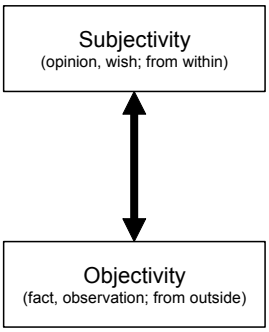
And then you have to dare to look ahead together. You can experience it on the very small scale, say within a relationship or a family. You can experience it in professional situations: if you do something with several parties, consulting closely with each other and ensuring that the group is coherent, the resulting quality is so much better. However, the enormous power of this principle is best seen at the largest human scale of all, that of *the path of humanity*. With greater and greater coherence and cooperation, things are going better and better. Until now, we haven't been conscious of being on the path. If we become more aware of this path and follow it in a more focused way, it can be so much better for us!

The greatest blockages to further societal improvement are not in our environment. They are within us, because we conform to our *immediate* surroundings, the environment we know objectively and well. Many people today think we're too irrational. They are rightly concerned about issues like overpopulation and environmental problems. On the contrary, we're much too rational. We're all climbing our own little manageable peaks. This limits us tremendously, and it even threatens us in this time of transition. We have to open the blinds much wider! Helping this happen is one of the ambitions of this book.

Towards a new balance

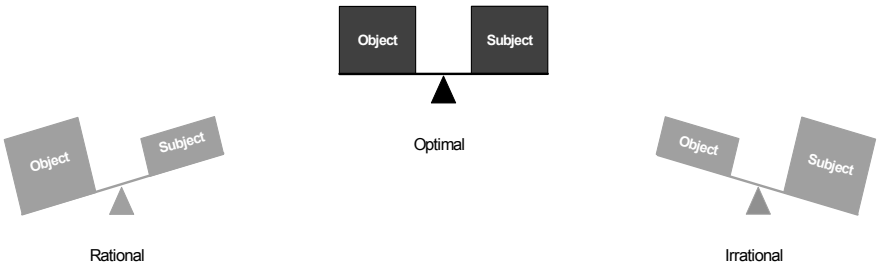
Let me make one thing perfectly clear. I'm not advocating irrationality. If I have the choice between objectivity and subjectivity, I'll probably choose the former, the rational variant, even though many psychologists tell us that we overvalue our rationality. Blind obedience to subjectivity, the irrational variant, carries enormous risks. Our surroundings will then attack and hit back in totally unexpected ways, much more than is already the case now, in natural ways. We are dancing on a volcano that could erupt any minute, and we've chosen this place ourselves in complete ignorance.

Yet the rational relationship also has its major limitations. Rationality creates its own prisons. We must not close our eyes to this. As I expressed it in an earlier book, too SMART quickly becomes a bit DIM.[28]



I know that I just said that 'I have the choice between using objectivity and subjectivity.' But I don't really have this choice. What I mean is that of course I can choose to a certain extent, but the choice is in no way between pure rationalism and pure irrationalism. That is an *idée fixe* of rigid dualists. There are many possible mixtures in between.

The rational perspective considers objectivity as compared to subjectivity. The irrational perspective considers subjectivity as compared to objectivity. By doing so, both perspectives miss the opportunity for maximum societal value – a really high quality of society. What I am advocating for is (on average) a more even balance between objectivity and subjectivity, between what our environment shows us from outside, and what we think, feel, and wish from inside ourselves (see figure below).



The most value is created with subjectivity and objectivity in balance in the middle-to-long term.

[28] SMART is the perfect paradigm of the rational approach: operations must be Specific, Measurable, Acceptable, Realistic, and Timely. SMART is a compass to the top of Mount St. Peter. DIM is what rabid rationalists become: Dogmatic, Inflexible, and with a Measureless lack of inspiration. The maximum achievable height is 171 meters. So all too SMART quickly becomes DIM.

We badly need more balance between what we think we observe in our environment and what different actors subjectively want and wish for from the inside out. It's precisely when we can't find what we want in our objective environment that we go looking farther afield. We explore out of curiosity, and then the higher peaks further away come into sharper focus. Once we can see these peaks and the paths to them clearly enough, we'll climb them automatically along the way. After all, we're improvers. That is our human condition.

According to the prevailing ideas, rationality is good and irrationality is bad. As an actor, you have to align your wishes to your surroundings, your subjectivity to your objectivity, since that's the rational way. Don't draw attention to yourself, just be normal. Yet that's not what Galileo Galilei did. He thought that the Earth revolved around the Sun, and not the other way around, which was the prevailing reality, and he ignited a raging dispute with the Catholic Church. Max Planck also won the Nobel Prize for an idea that the vast majority of his fellow physicists felt was completely absurd: that energy is radiated in fixed 'packets' and not continuously. The result was quantum mechanics, one of the most ground-breaking and fascinating theories in physics. Albert Einstein also turned the world of physics upside down with a number of especially controversial ideas, even though he was a patent-office clerk from outside the establishment. For example, he postulated that energy was equal to mass. And what about John F. Kennedy, who believed we could put a man on the moon? In retrospect, it's amazing that he wasn't taken away in a straitjacket (his assassination in Dallas in 1963 shows just how great the resistance to him was). I think that we will truly be able to appreciate the enormous value of his visionary views in a few hundred years, or maybe a thousand (I say, with an eye to the future).

Invariably, the most innovative leaders, thinkers, and artists behave irrationally at the beginning of their careers, at least according to the prevailing objective standards. Of course, you could also say that these very people are acting especially *rationally*. Rationality and irrationality are after all eminently actor-based values. Galileo was completely convinced that he was right by his observations. When the ecclesiastical court's judgement turned out to go the other way, he cried out, 'And yet it moves', referring to the Earth (as legend has it). However, we would have to conclude that the whole of humanity around him was irrational, and that's not how we normally talk about irrationality. What is rational is determined by how heavily the surroundings are taken into account. Society's opinion won handily over the observations of an isolated individual. The opinion of the masses was objective, the facts subjective. Until it was proved otherwise anyway, that's obvious, but we only know these things after the fact.

Our late-modern society is made up of more and more actors, who are all scaling their own individual peaks (or standing there, trying not to slide downhill) while the gaps, walls, and tensions between them all are unmistakably increasing. This is keeping us far too close to sea level. We have to explore and scale new peaks together. *The path of humanity* shows us that we've been doing this unconsciously for many hundreds of thousands of years: following a path of balance, without realizing it. In the future, we'll be able to follow this

path more consciously, but to do that means we have to find a new balance. Then we'll scale higher peaks better and faster.

The unity of balance

Balance implies that we can slide along a scale with units, from objective to subjective and back again. Think of grains of rice on a scale, for example. I'll go into exactly what the rice means later, so I'll use the neutral word 'units'. Imagine that we have 10 of these units to distribute between objectivity and subjectivity. The possible distributions between objective and subjective are clear. They go from completely objective through interim states to completely subjective. The sum of the two always has to add up to 10:

Objective	Subjective	
10	0	Material
9	1	Objective/environment
8	2	
7	3	Rational actor
6	4	
5	5	Balance: optimal actor
4	6	
3	7	Irrational actor
2	8	
1	9	Subjective/human
0	10	Mental

Different proportions of objective and subjective.

We can now very easily situate the rational attitude (the rational actor), the balanced relationship, and the irrational attitude (the irrational actor). If something is completely, 100%, objective, then we place it completely outside of us, in our environment. According to the dualists, we're talking about the material domain: if it's not mental, it must be material. Take the chair you're sitting in, or our planet revolving in space. They're there, say the dualists, regardless of what you may think of them.

Conversely, if something is completely, 100%, subjective, then we situate it completely deep inside us, as wishes or thoughts. According to the dualists, we're talking about the mental domain. After all, if it isn't material, it must be mental. Take what you're thinking about your child, or that annoying squeaky door. Whatever you may think or feel about them will not alter the environment, say the dualists. The squeaky gate won't change just because of your opinion about it. (Festinger might raise an eyebrow at this.)

Mental and material, neatly separated from each other – that all sounds familiar and obvious, until you go a layer deeper. Properly speaking, 100% material cannot exist. How would we know about this matter if not a shred of subjectivity is involved? After all, *you* are

sitting on your chair, and *we* are on the earth, revolving. We have knowledge of matter through the grace of our subjectivity. Take away subjectivity, take away *you* and *we*, and objectivity has also disappeared. Take away thinking, and we're no longer aware of matter. Who is there to enjoy the sunset then?

The same is true for 100% mental. If there is no objectivity at all, no matter, what would thoughts be about? A consciousness is still conscious of *something*. Aren't you thinking about something now, perhaps about your dog, or something else? Mental things exist by the grace of the matter that they ultimately are about. Take away objectivity, and subjectivity disappears as well. Take matter completely away, and mind disappears too. In what surroundings, and to what purpose, should we get up when we wake up in the morning?

Object–subject tension is completely absent at the very top and bottom. There is no more tension, since it only involves half (one) of the complements, and you can't cut through the object–subject continuum at the border of objectivity and subjectivity. There won't be any tension left. One half needs the other to exist. At the outermost edges of the distribution, there is zero object–subject tension, since one of the two vanishes. On one side there is something we do not think or feel anything for, thus something that we do not experience (100% objectivity), and on the other side we have thoughts or feelings about something that does not exist at all (100% subjectivity).

The object–subject tension is therefore the greatest at the balancing point, where objectivity and subjectivity are equally large (see table above). Consciousness is greatest at this point. Here is where people experience things. There is clearly something there (objective) that we have feelings about or think about, and want to act upon (subjective).

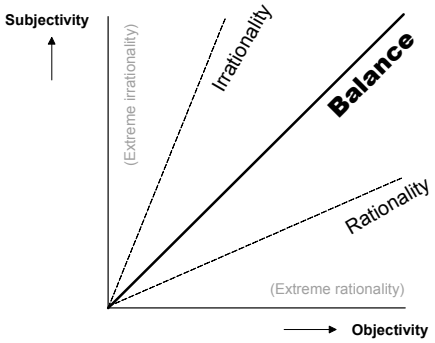
Compare this with a foot race between two individuals: if one racer can run very fast and the other is crippled there won't be any tension, and it's not a contest at all. If one of the two is stronger than the other, then it may be a contest, but in name only. The most value is created if the two runners are equally good and both want to win. This is the case in the state of balance. As soon as one party has won, the tension is gone.

The things most keenly experienced in our environment (objective) are the things we feel or think the most about (subjective). At the edges, either object or subject falls away, and there's no tension left.[29] In the middle is where humans and the world are the most in balance, and that is precisely where the tension and thus consciousness are the greatest.

[29] Note that this is completely contrary to the dualistic principle that mind and matter already exist and have always existed. I confess that I'm philosophically inclined to be a pragmatist and a phenomenologist . Rejecting a presupposed and absolute dualism is a typical trait of both of these schools.

The balance axis

The possible shades between objective and subjective can also be depicted using something other than a table. Take a graph with two axes. The horizontal axis represents the degree of objectivity, and the vertical axis represents the degree of subjectivity. In principle, you can now place *every desired ratio* of objectivity to subjectivity in this field, and also on *every desired scale*. The angle of the line going to the point determines the ratio of objectivity to subjectivity. The length of the vector determines the scale.



A diagonal view of balance: the balance axis.

At the upper left, the subjective proportions dominate, in other words, the degree and scale of irrationality increases as it goes towards the upper left. At the lower right are the dominantly objective proportions, thus where the degree and scale of rationality increase. I've also shown two random rational and irrational lines of proportion: the number of units increases the farther from the origin you go, but the proportions are the same at all the points on the line.

The optimal proportion is right on the diagonal.[30] The diagonal is thus a (continuous) *balance axis*, where you organize your environment (objectivity) optimally based on your own wishes (on the basis of your subjectivity). And because wishes and potential are perfectly in balance, on average, this is where the maximum value is generated, as I will establish and explain in this book. What we normally call rational is thus actually a bit too conservative. Too over-optimizing, and too under-exploratory, to use another but related kind of jargon. Here, we see only the lower peaks in our immediate surroundings.

Where objectivity and subjectivity are most in balance is precisely where the object–subject tension is the greatest. That's where we are the most aware, we have the best view of the

[30] Optimally, objectivity / subjectivity = 1. For rationalists, objectivity / subjectivity is > 1. For irrationalists, objectivity / subjectivity is < 1. But it's all in the eye of the beholder.

peaks around us, and we are most capable of making improvements. This is true at all scales, including the societal.

Tension gets actors moving

Object–subject tension is always – the name says it all – a hybrid. It consists of a share of subject and a share of object, a share of human and a share of world, and a share of mind and a share of matter, says the dualist. Recalling the chemist's rule of thumb 'like dissolves like' it is obvious that object–subject tensions are experienced and acted on by 'something' that must be from both of these domains.

That 'something' that experiences and acts on the basis of object and subject is an actor. An actor unites subjectivity and objectivity, mind and matter. The moment there is even a glimmer of object–subject tension, an actor has already awakened. When the tension is at its highest, this actor is in full glory: he/she/it will and shall do something, i.e. the actor is *intentional*. Once the tension has gone away, this particular actor will have disappeared from the stage.[31]

When I say that an actor is of both domains, I mean it very literally and concretely: take a furniture maker in the workshop. A furniture maker is nothing without a workshop, and the workshop is nothing without the furniture maker.[32] The furniture maker in isolation is capable of being subjective, and the workshop objectively exists, especially according to the dualists. But to form a consciously improving actor, in the sense of one who takes action, furniture maker and workshop are required *together*. The furniture maker without a workshop is useless and cannot act (not as a furniture maker anyway). The workshop without the furniture maker is also useless, since it has no intentionality, no subjectivity. There is no tension to eliminate. Exactly the same applies on the large scale to humans and our world: *together* we form society. This is what makes society a multi-actor practice.[33]
In normal speech, we are rather cavalier with the concept of an actor. We often name the person, possessed of a body and mind (mind–body), but usually we mean their environment (the rest of their entire context). For example, we say we're going 'to the doctor', but in fact, we walk into the doctor's office, where the doctor also is. We say the cabinet minister, but we mean their ministry and the machinery of regulations and operations behind it. Conversely, we sometimes name the workshop. We take the car 'to the garage' (where there is also a mechanic who will fix it); or we go 'to the shops', while there are real people walking around in the shops who help make it worth our while to go there.

[31] See (in Dutch) 'de emergente actor' in Henk Diepenmaat, *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation), published by Parthenon.

[32] This example was partly inspired by the famous example of Heidegger's hammer.

[33] I call this the 'radical actor thesis': a society consists of actors, and only actors. See the previous volumes in this series. I can complete this thesis with the radical perspective thesis: an actor consists of perspectives, and only perspectives. Consequently, society consists of perspectives, and only perspectives. I will return to this later.

An actor is of both domains, according to this book. An actor is both mind and body, according to the dualist. An actor experiences both objectivity and subjectivity, says the pragmatist. That already provides much more flexibility and power to change. The actor experiences both objectivity and subjectivity most consciously when the tension, thus the balance, is the greatest. Once a furniture maker experiences object–subject tension – say, a squeaky chair – he/she will try to eliminate it, or at least reduce it – something he/she experiences as an improvement, using the possibilities in the workshop (remember Festinger's cognitive dissonance theory).

Object–subject tension is completely in the eye of the beholder: it is an actor-based phenomenon. A century before Festinger, John Stuart Mill had a pithy way of expressing the reduction of dissonance: 'We avoid pain and seek pleasure.'[34] We want to avoid misery, we want to get rid of it. A potential improvement, however, is something we want to grab. Whether it's seizing opportunities, or avoiding misery: a potential for improvement represents an object–subject tension that must be got rid of, capitalized on. Something is going on, objectively, and we have a feeling or opinion about it, subjectively, and the objective environment has to be brought into harmony with the subjective wish. If we do this, we experience it as creating value (experiential value).

Perspective

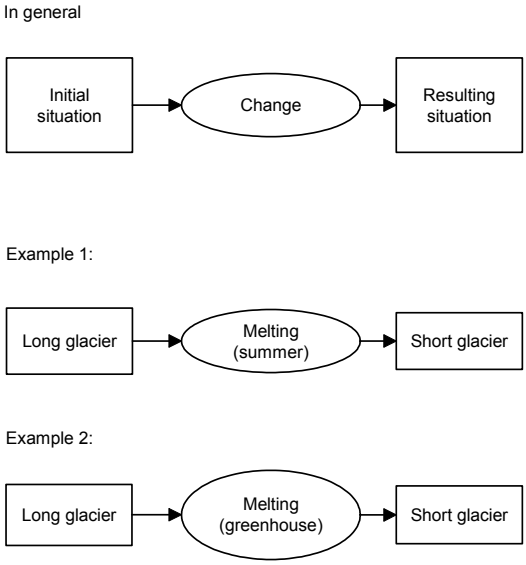
The experience of object–subject tensions depends on actors. Conscious improvement, both solving problems and capitalizing on opportunities, reducing trouble and increasing pleasure, always revolves around eliminating object–subject tensions experienced by specific actors. That what has great value for one actor can be worthless or even represent negative value for another actor. I myself have creaky stairs, but I actually feel they're one of the charms of my house. My positive (subjective) experience resolves the object–subject tension, so I'm not an actor in fixing the noise. This certainly also has to do with the fact that fixing it will cost a lot of effort and money, since the stairs actually need to be replaced. It's a job for a good carpenter who is itching to do the job. If I were to run into a carpenter who could do the job in some way that doesn't involve replacing my entire stairs, then I would probably start to see the creaking as a problem. A carpenter who comes to my house will call the creaking a problem. It's all about the details.

Improvement can be made concrete by naming it in terms of a specific improvement perspective, experienced by a specific actor. I use the term perspective in this book and in all of my work with an unusual meaning that is at the basis of how I see experience in general, and societability and societal improvement in particular.

Every perspective consists of three components: an initial situation, a resulting situation, and a process of change between the two situations. As an example, take a glacier (the initial situation), which melts (the change), resulting in a shorter glacier (the resulting situation, see example 1 in the figure below). Many people who know glaciers will be in

[34] John Stuart Mill, 1859, *On Liberty*.

agreement that this is a summer-winter effect: for them, it is an objective, rational, and realistic perspective. It's even material, physical. Everyone can see that, can't they?



A general perspective, an accepted perspective, and a controversial perspective.

However, a perspective can be both mental and material, and it can differ for different actors. If the melting is caused by an increased greenhouse effect due to CO_2 emissions (see example 2 in the above figure), then this perspective will be seen very differently by different actors. Climate activists will call it an objective and rational perspective in their material environment. And in the social environment of a shrinking group of climate sceptics, this is, in fact, a subjective and irrational perspective – a figment of the eco-fundamentalist imagination that must be suppressed. It's interesting to observe that the degree of melting seems to partly depend on the nature of the belief.

People cannot agree on the facts, says a scientist sitting on the sidelines. The cognitive biases are enormous here, says the psychologist standing next to him or her. The reflective pragmatist only concludes that in *his or her* environment there are different object–subject tensions, different experiential worlds, and works with them, of course using the pragmatist's *own* object–subject tension. This tension determines what he/she is aware of and it's *this* tension that the pragmatist will want to reduce.

The perspective of one actor can contain the actions of another actor. Different actors can have different beliefs or opinions about the same perspective. Actors can be working in completely parallel universes, and unknowingly be on a collision course with each other. The fact that object–subject tensions can tumble over each other, gnaw and tear, and be completely separate from each other is a property of societability. Things can quickly get

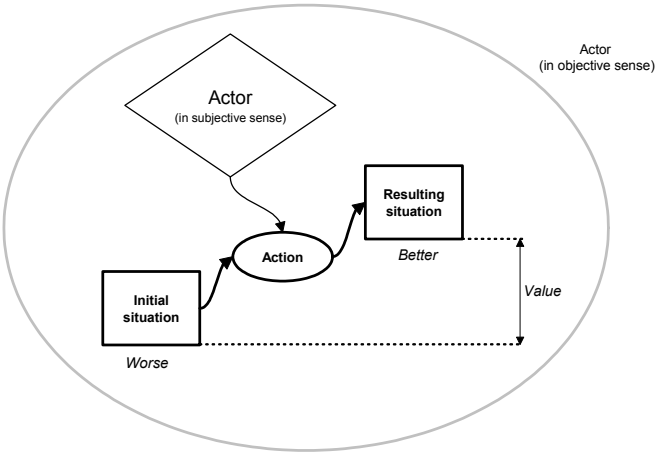
terribly confusing. This explains why we are so bad at understanding large-scale societal practices. Our society is a kaleidoscopic, dazzling object–subject game. However, by staying alert to which perspectives are experienced by which actors, we can come to understand societal multi-actor practices much better. Actually, everyone who works professionally with societal practices should receive a thorough training in this. Otherwise, it's like looking for a needle in a haystack. This is the case with most of today's leaders, politicians, and activists. It's enough to make you conservative, if it weren't such a one-sided position by itself.

Improvement perspective

> *'It is perfectly true, as philosophers say, that life must be understood backwards. But they forget the other proposition, that it must be lived forwards. What a sentence. No matter how deeply you think about it, ultimately our earthly life will never be completely understood, precisely because I can never get enough peace to take in that position: backwards.'*
>
> Søren Kierkegaard

An *improvement perspective* is an especially interesting variant of a perspective. Improvement perspective consists of the same three components (initial situation, change, and resulting situation), after all, it's a perspective. But now we're talking about the actor as well, who has a belief or opinion (in the subjective sense) about the perspective (for the actor, objective). The actor is an integral part of it, experiencing the starting situation as worse and the resulting situation as better. And the change may be actively *caused* by this actor. Since the actor belongs to both domains, he/she[35] can intervene, in the objective sense, based on his/her wishes, in the subjective sense. The change can be genuinely and objectively carried out by the actor, in that actor's environment, where this perspective is (in the actor's experience). This makes the change an action of improvement (and subject becomes object). This is illustrated in the figure below.

[35] Or 'it', since an actor can also be an organization.



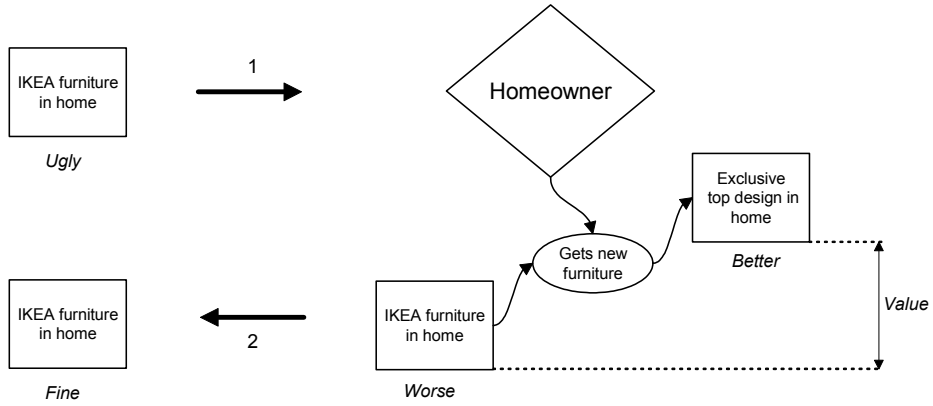
An improvement perspective introduces an intentionally acting actor. He/she has an opinion or belief (subjective) about the environment, and because of it, changes something (objective). The arrows in ***bold*** *denote a temporal order.*

The experience of an objective perspective in terms of better or worse means that a subjective actor is present, who because of this subjectivity is experiencing an object–subject tension with the perspective.[36] This actor will want to eliminate or reduce tension (in line with Festinger's cognitive dissonance theory). There are *two* extreme ways to do this, as I've just described (aside from the many, many hybrid forms). The actor can decide that the current environment is acceptable and modify his/her subjectivity, or intervene and thus bring the objective environment into harmony with his/her wishes. How does this look in terms of actors and improvement perspective?

In the first scenario, the actor decides that the effort doesn't actually really justify the outcome. The wish to improve vanishes, the subjectivity resolves, and with it the object–subject tension as well. The objective situation remains the way it was, with no further intervention by the actor.[37] The subjective situation changes, from worse to better.

[36] See (in Dutch) 'de emergente actor' in Henk Diepenmaat, *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation), published by Parthenon.

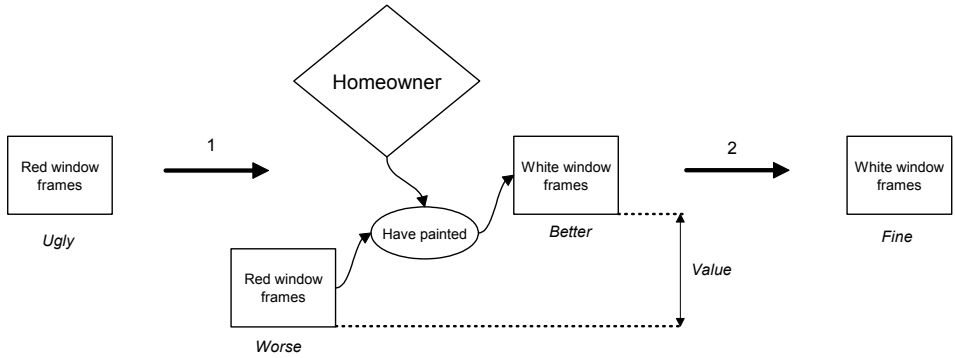
[37] Of course, the actor knows that he/she has made a decision – this is definitely a change.



Abandoning the desire to replace furniture (subjective) eliminates the object–subject tension. Without the desire, action is no longer necessary.

I already used the example of someone who loves exclusive designer furniture, but since it's too expensive, has a house full of IKEA furniture (see figure above). Although she thinks IKEA design isn't as good, she can't afford the exclusive top designers she actually prefers. If the actor decides that IKEA furniture is actually well designed and attractive, the object–subject tension – the notion of worse and better – is gone, without anything having happened in the objective environment. It is subjectivity that makes the adaptation, as it saves the actor doing something (in this case something expensive). Now that energy can be turned to something else.

The second way of resolving the tension is to actually carry out the action. The actor acts in her objective environment. The conflict between object and subject is now resolved by bringing the objective situation in the subjective actor's environment in line with her subjective desire.



Painting the window frames (objective) eliminates the object–subject tension. Wishing is no longer necessary after the action is completed.

Let's imagine you think red is a hideous colour, but the new house you just bought has red window frames (see figure above). Since you think white window frames are nicer, the present situation is worse. So what do you do? You hire a painter to paint your window frames white. Now it's objectivity that you adjust: you bring the environment in line with the way you want it. The dissonance, the object–subject tension disappears, and with it the actor who wants to modify the red window frames.

If an actor decides to act, he/she needs to know objectively when the goal has been achieved. At that point, the actor has created the value aimed at by performing the action. In the example of the window frames, the goal is achieved once the window frames are white. That change is valuable for this actor.

Thus, in theory, there are two roads open for minimizing object–subject tension. The subject can be brought into harmony with the object. This is sensible (from the actor's point of view) if the value of the result is less than the effort and consequences of the intervention, as with the IKEA furniture. Or the object can be brought into harmony with the subject. This is sensible (from the actor's point of view) if the value of the result is greater than the effort and consequences of the intervention. And of course, a hybrid form (a compromise) is possible too.

The examples above are still fairly dualistic. Here, subjective is mental and objective is material. But the environment can also be mental, of course. Suppose you find out that a colleague you thought was unfriendly is actually very nice, so you adjust your opinion. This is a mental intervention in a mental domain. The opinion to be changed is the objective part and the wish to adapt is the subjective part.

These days, subjective is more and more often conceived of as material. People think that we can understand thinking by studying the brain. Although there's no doubt that brain research is shedding new light on how we think, I don't think the nature of mental processes can be understood with material concepts. It denies the essential nature of object–subject tension, namely that 'objective' is outside in the environment and 'subjective' is what happens inside us. If we all go and look at a brain, this is objective and not subjective. We've seen here how the subjective experience and the objective environment interact with each other in intriguing ways.

Recursive perspectivism and multi-actor models

Let me summarize. An actor emerges once he/she experiences the first glimmer of object–subject tension. The tension increases, creating an intentional actor: a subjective actor with an objective perspective, who wants to minimize the increasing object–subject tension, this reduction being experienced as valuable. This is the essence of improvement, the essence of consciousness. The actor can make an improvement by adjusting subjectivity (doing nothing with the objective environment but disappearing from the picture as a subjective actor), or by acting (following his/her subjectivity and adapting the environment, as an

objective, achieving actor). In both cases, the object–subject tension is reduced, until the actor has disappeared. An actor emerges on the scene, and then disappears from it.

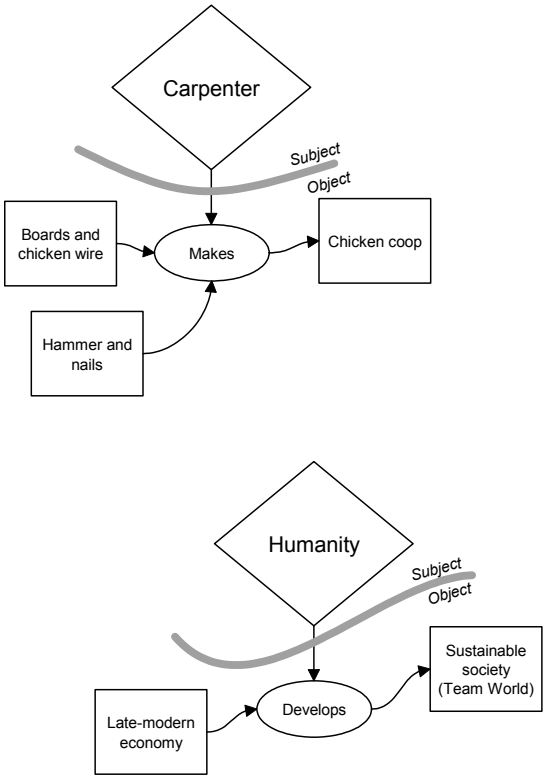
Our society is characterized by a huge number of actors and improvement perspectives. According to recursive perspectivism, society is made up of actors, working together to reduce dissonance and create value. Recursive means repeating itself, also on different scales: actors and improvement perspectives occur on all kinds of scales and in all kinds of complex forms of coherence. It's like Lego: you can keep on adding things, and you can think of several blocks together as a larger block. Recursive perspectivism sees society as a complex multi-actor practice.

Societal practices link subjective actors through their objective perspectives. Actors and improvement perspectives are highly scalable concepts that are easily linked. This is the foundation of recursive perspectivism. They range from the smallest improvement to the largest. Clashing perspectives, because of one scarcity or another, can result in huge conflicts. Unfortunate convergences of perspectives can result in serious accidents. And many interconnected, coherent perspectives and many actors working together result in the healthiest societies. The notion of composite and actor-based improvement perspective takes us to the concept of societal coherence and cooperation. It also leads to the possibility to design and develop focused coherence and cooperation.

Using models can help us to understand this better. The multi-actor modelling language developed to do this is described in my doctoral dissertation and in Volume IV of this Society in Perspective series.[38] This language is capable of describing even complex societal practices in terms of actors and improvement perspectives. On the following pages are some simple examples that express the enormous recursiveness of actors and perspectives on a wide range of scales. The heights of the various rectangles in this and similar models do not refer to different value scales for the actors concerned, since they cannot be maintained graphically in more complex models.

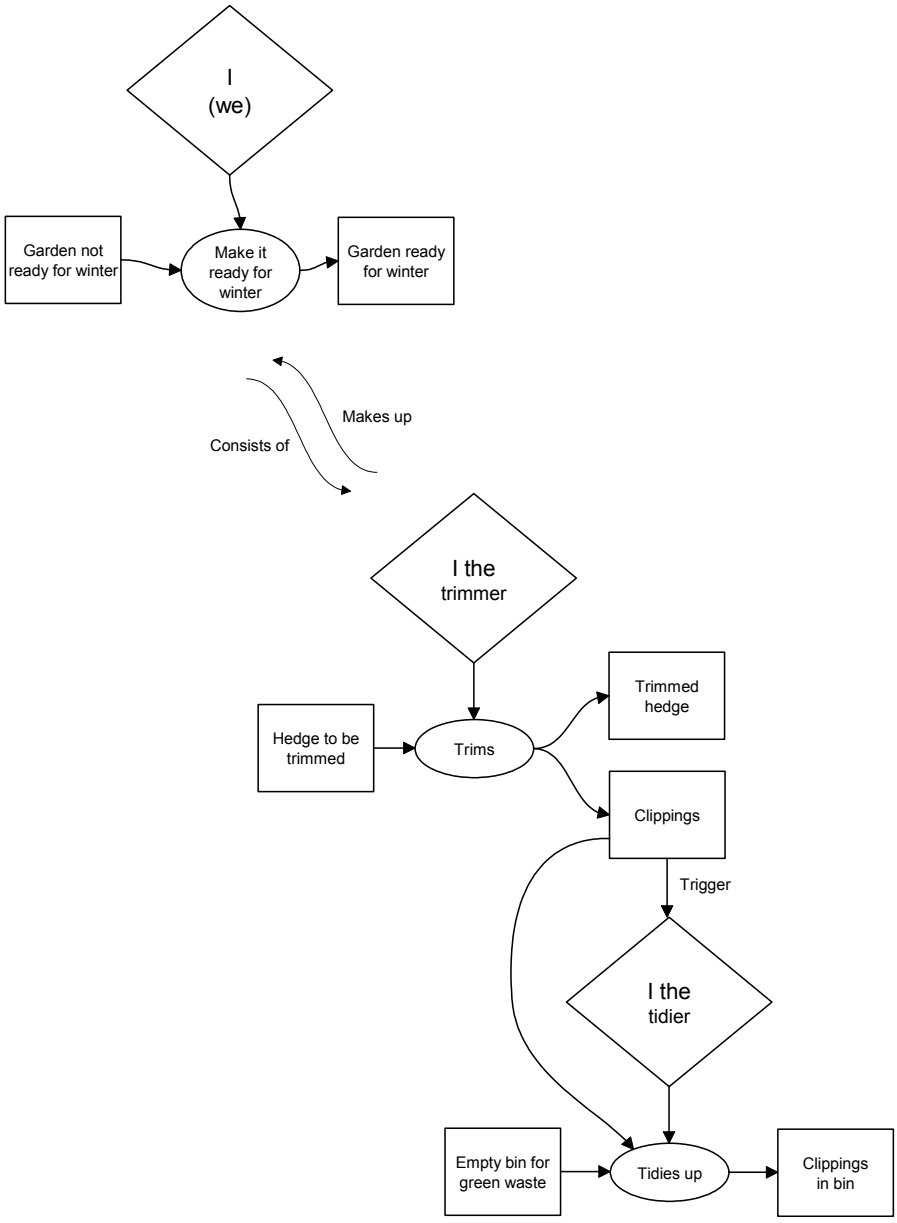
The first example shows two intentional actors: a carpenter making a chicken coop, and the whole of humanity that is developing our late-modern economy into a sustainable society. The carpenter is, of course, part of humanity and its own development perspective.

[38] PhD dissertation: 'Trinity, Model-based Support for Multi-actor Problem Solving' (University of Amsterdam, 1997). See also: *Multi-actor procesmanagement in theorie en praktijk*, published by Parthenon, 2011. English translation *Multi-actor Process Management in Theory and Practice* is in preparation.



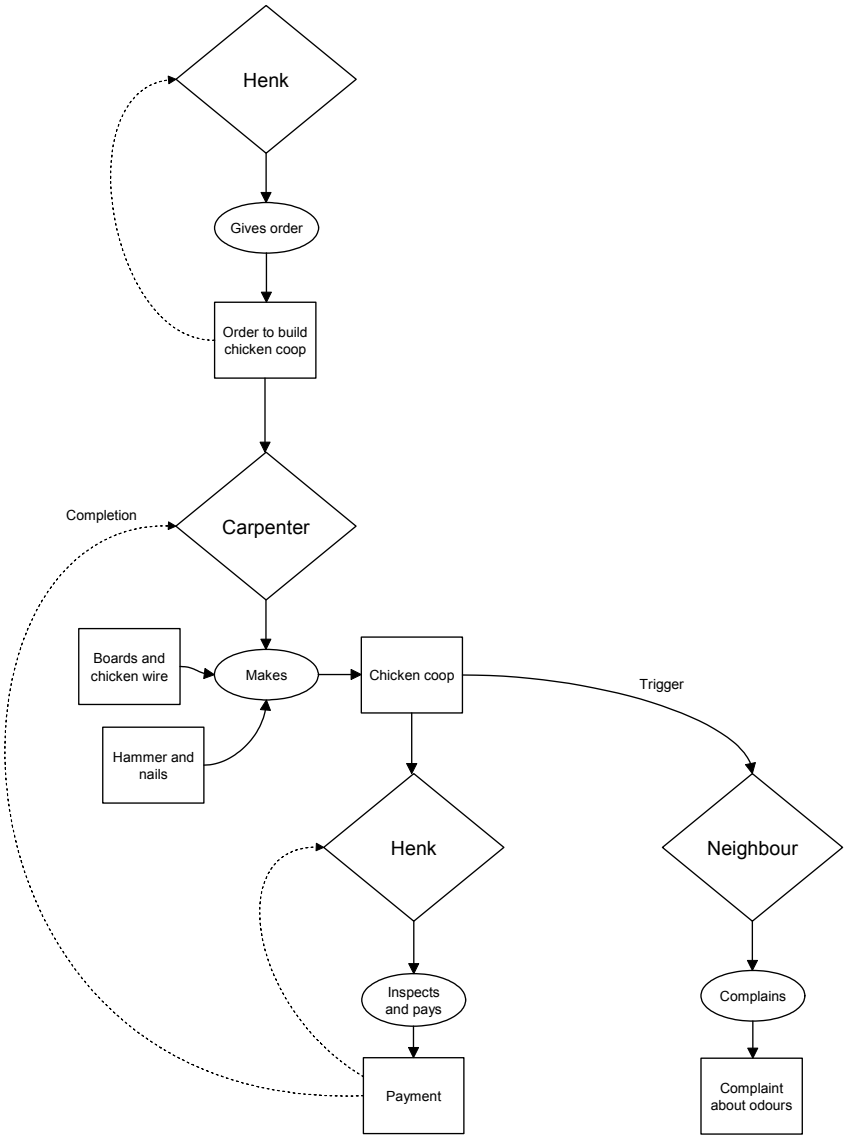
Actors and improvement perspective on entirely different scales.

The example on the next page shows how one composite actor (myself) getting the garden ready for winter can also be described in greater detail as two (and many more) actors who prune the yew hedge and clean up the trimmings together. If I do it alone, the lines illustrating the coherence are short, since they are within my own consciousness. I could also do it with my sons. The one pruning and the one cleaning up may have different competences, but to be able to act coherently they nevertheless must be aware of each other's perspectives. In that case as well, a shared consciousness is required. This shared consciousness is expressed by the upper part of the figure (there is one coherent actor with one partly shared consciousness).



Linking improvement perspectives at different levels.

The third example links me to the carpenter and my next-door neighbour. First I communicate that I'd like a chicken coop, and then the carpenter builds me one. I check that the work has been properly done, and I pay him. The carpenter's object–subject tension disappears when he receives his payment. However, the smell from the chicken coop bothers the neighbour, and she complains. But the carpenter is not losing any sleep over it.



Linking improvement perspectives by different actors.

The above model can easily be expanded into an enormous societal practice by including other actors. The building materials come from production chains, I need a licence to keep chickens in this densely populated country, the chickens still have to be bought, the complaint can be received in various ways, and keeping chickens results in a range of after-the-fact activities from enjoying the eggs to calling a veterinarian. We can also unravel the carpenter's tasks easily into a coherent mass of interconnected mental and material actors and improvement perspectives. Societal practices have a strong tendency to remain

invisible, since actors see their own perspectives best, and at most will consider the actors and perspectives in their immediate surroundings. It's as if we're using a powerful magnifying glass to look, right around us, at the small piece of an enormous, vibrant landscape of actors and perspectives. It's not surprising that we don't see higher peaks in our future. Looking farther afield and with a wider gaze, together with others, requires consciousness and practice. Thinking and working in terms of specific actors and specific improvement perspectives helps enormously. (See Volume IV of this Society in Perspective series for a more detailed explanation.) Then the higher peaks will automatically appear in view. I'm not saying this only from blind faith. I'm saying it because I've seen the contours of the perspectivist landscape.

The multi-actor models above show how we can understand society as an enormous, multifaceted, recursively linked patchwork quilt of actors, each with their own specific improvement perspectives, who depict emerging and disappearing object–subject tensions. On one scale, you can place actors and perspectives next to each other like dominos. You can also work on multiple scales, the way you do with Lego pieces: several actor-perspective combinations together form one larger one, and conversely, a larger piece can be broken down into component actors/perspectives. This illustrates the recursive nature of actors and improvement perspectives.

If problems and opportunities arise, then object–subject tension is created. If the problems are solved and the opportunities are seized, then these specific tensions are reduced to zero in coherence and cooperation, and when possible, action is taken to create value. See the example of hiring a carpenter to build a chicken coop. The carpenter sees an opportunity and seizes it, the tension increases and then decreases. Then the chicken coop bothers the neighbour: a problem arises for her, and she wants to do something about it. For the time being, her tension is created and exists at the edge of our model.

Improvement perspective as a societal building block

That was a long ride. Passing through object–subject tensions, the mind–matter problem and a reassessment of irrationality, we've arrived at an actor-based improvement perspective. Improvement perspective entails a new societal building block based completely on object–subject tensions experienced by specific actors.

Improvement perspectives are the steps taken by actors towards improvement. They range from virtually 100% mental to virtually 100% material (and everything in between). They can be both small and sizeable, and can exist in both time and space. They are modular, connected like dominos, and they can form larger and smaller blocks, like Lego pieces can. This is precisely why I talk about a recursive perspectivism (recursive means self-repeating): it occurs on many scales and in wide networks. Actor-based improvement perspectives can be easily understood as the component parts of arbitrarily complex societies, and this is precisely how I will use them in this book.

I investigated this in more detail in Volume IV of this Society in Perspective series.[39] I describe how to more clearly identify both what is in the actors' landscape(s) and improvement perspectives in their immediate environment(s), so that professionals can achieve concrete goals working together. This is the toolkit of the multi-actor process manager who aims to improve very concrete situations involving many parties (actors). This book also goes into the structural side of the process. Since *the path of humanity* is a journey through a perspectivist landscape, the structure of complex networks of improvement perspective explains how *the path* arises. The path is not deterministic, that is, we cannot know exactly what steps will occur in our future. We can, however, learn to understand the perspectivist landscape much better and see what opportunities it harbours for finding and climbing higher societal peaks together. Among other things, this understanding results in six value orientations that together use the perspectivist space and can keep us on *the path*. They create a framework for focused societal innovation, on the small and large scales.

2.1.7 A methodological framework

'Nothing is as practical as a theory based on a clear philosophy.
And nothing is as philosophical as a theory that works in practice.'

While writing this book, I was very much aware of how important it is to have a recognizable methodological foundation. I've already mentioned two ways I've tried to create it: by entering into dialogue with people, and by using the idea of a recursive societal building block: perspective. Now it's time for the third way: the methodological framework.

Scientific circles attach a lot of value to clarifying one's position with regard to one's discipline, and following a scientifically recognizable method. Modern science is all about reproducibility, traceability or verifiability, recognizable research methods, and delineated disciplines. Today, this method mainly results in publications in the appropriate scientific journals read by a small group of colleagues within one's discipline. This is why I'm sometimes asked by academics which discipline my work fits into, what particular research methods I use, and in what journals I've published.

In essence, these are questions about the methodological foundation of my work, and so, of course, it's appropriate to ask this type of questions. However, the way a scientist asks these questions doesn't fit well with the way I work. It is hard to define my work in terms of a particular academic discipline, scientific journals, or particular research methods.

This narrow scope neglects too many of the essential aspects of societal practice. I'm curious about new experiences and keep seeking them out, and I involve all the experiences

[39] Published in Dutch as *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation).

I have had that could be of help in my efforts to understand societal practices better. These experiences are professional as well as personal. They are scholarly as well as practical. I've learned the most profound and confrontational lessons in societal competence in situations that were, besides being personal and highly subjective, (fortunately) very difficult to replicate in some cases. It's precisely these experiences that inform me the most and that have catalyzed my understanding of the nature of societal competence.

For someone more firmly embedded in the framework of a discipline, the flexible ways in which I'm developing and learning to understand society may seem to be unstructured and eclectic at first, superficial sight. I began my academic career as a chemist, which is why I thought the way I naturally worked wasn't scientifically proper. I only discovered in my mid-twenties, when I considerably broadened my academic foundation, that there were now schools of thought that considered the free but definitely not unfocused way I acquired knowledge as the most important way. One example is the work of the developmental psychologist Jean Piaget on the development of human expertise. Viewing knowledge and expertise as by-products and inextricable parts of a practice, or even a life process, was something I recognized with joy.

At the time, I was working as a knowledge analyst. My task was to verbalize and model the expertise of top experts, in close consultation with them, so that others could benefit from it. For example, we would diagnose and solve problems involving the indoor environment (i.e. problems with the air, carpeting, and other factors affecting the environment in homes and office buildings). The vast majority of human expertise is difficult to fit into the ideal scientific model. I've worked with people who could tell what the indoor environmental problem of a house was by simply cycling past the front door. They could barely explain how they had done it when we first talked about it, but their diagnoses and remedies were almost always spot-on.

Several times now I've experienced that this admittedly rather unstructured way of developing knowledge is also dominant in productive scientific groups: science is a thin veneer over an infinitely broader and deeper, and less structured, social process. I hold scientists in high esteem. They're often the most intelligent people I know, and I wholly endorse their mission of developing, articulating, and exchanging knowledge to improve our lives. Yet sometimes I can't help suppressing a grin when I see how some scientists hide their real selves behind a scientific façade, especially when they say something is true *because* it's been researched. After all, research is largely based on very ordinary human motives and drives. The result is that the scientific journals of some disciplines are full of research results that are difficult to replicate: the drive to score points by getting published is stronger than the desire for quality.

It is the fact of our being human and our urge to improve things that drive our individual and collective action in the context of a multi-actor practice, and scientific insights play a part in it. But the role of science is just that, a role played within a larger societal

framework. The same holds true for all the roles we take on in the societal discourse: they are functional veneers over something larger. The rudest-sounding person at the telephone helpdesk can be a caring mother to her children. The most money-grubbing banker can take action on social issues as a member of the Lions Club. This is the schizophrenia that I mentioned earlier (see 2.1.3).

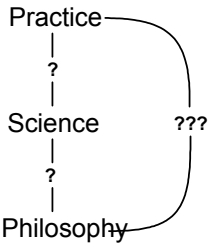
I gain the most understanding about societal practice by participating in it and then reflecting deeply on it, using all my experiences, not by studying it in a classical, more reductionist and contemplative sense. This is the attitude of a highly reflective pragmatist. Life is inherently partly subjective and partly irrational, largely (the vast majority) not replicable or verifiable. At the moment there are about 7 billion of us here, each with our own viewpoint. That is something we must take seriously.

Although solving the methodological problems of improving our societies will certainly be no picnic, what will help in any case is allowing the whole, integrated human being behind all the roles we play to come more to the forefront. This person is usually hidden, because we encounter actors in their particular roles. If we can start to understand more of the ways these various roles are interlinked, we can strengthen our bonds as a society.

The path of humanity paints the whole of human development on the appropriate timescale, using broad brush strokes, and that's how the next possible step in our societal development emerges the most clearly. *The path of humanity* by far transcends the scale of the individual. No one can get a clear view of the entirety of human history (past, present, and future). Not even I feel especially skilled or competent for the task, although I've devoted this entire book to it. A lack of knowledge and understanding has often forced me to use a wide roller instead of a fine brush. I've even felt somewhat intimidated occasionally by the enormity of the task I've given myself with this book and this series. Specialists from a range of disciplines and practices will think somewhat regularly that more detail or accuracy would have been appropriate here, and often they will be right.[40] As a child of the late-modern network economy, I have the advantage of being in a better starting position than thinkers of all the generations before me, as many sources of knowledge and information are only a mouse click, e-mail, or phone call away. And my education and work as a multi-actor process manager, as well as my consultancy and teaching positions, have enabled me to study many practices in depth.

Helped by these circumstances, I write about the essentials of societal development, using a firm perspectivist substrate that combines practical, scientific, and philosophical contexts in a methodological framework.

[40] I will confess straight away that I now and then use the motto of the 'Most Noble Order of the Garter', *Honi soit qui mal y pense*, and work on with the best of intentions.



What is the relationship between philosophy, science, and practice (1)?

For us all to see and follow *the path of humanity*, it's a good idea to become well aware of deeply and broadly attached intuitions, and thus to stay close to human *practice*. Beware of absolute innovators, who are just as biased as arch-conservatives, and neither type comes anywhere near half human, let alone whole![41] With this all in mind, I have spoken intensively over the course of several decades with many practitioners about societal improvement. These conversations were about improvements in many different sectors and on all kinds of scales, as well as the question 'what is the essence of an improvement?'

The people I talk with are usually smart people (some of them extremely smart), well educated, and often holding key positions – certainly not your average bloke. They come from all kinds of circles and countries, but mostly representing the Netherlands and Western ideas (and of course this leaves its traces). A complex and multifaceted dialogue has taken place, encompassing lectures, workshops, classes, e-mails, webinars, group and bilateral conversations in offices, university lecture halls, meeting rooms, restaurants, operating theatres, living rooms, cafes, on Central-American boats and African market squares. Most of these people had ideas with regard to what is needed to bring us closer to a better world (which they feel is both important *and* difficult).

They have reinforced my idea that there are deeply experienced and broadly shared intuitions about the central themes of this essay, and that has turned out to be very valuable while writing this book. I would never have been able to formulate the thoughts and concepts around *the path of humanity* (to be discussed in the following pages) so well without the interaction with all of these people from societal practice. On top of that are my own life experiences. Thus, this book is heavily based on societal practice. At the same time, it will disappoint people who expect only a discourse on societal practice as they know it.

[41] As limited as absolute dualisms are, as I've abundantly discussed, see Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation). Here as well, the spectrum of truth in all its diversity lies between the limits of rigid conservatism and noncommittal, flitting-about innovation.

'Practice', after all, comes down to simplification. Different people (actors) can value (subjectively experience) the 'same' object very differently. This is even the essence of societability. One consequence of the primacy of this object–subject question in the societal discourse is that *philosophy* pervades our societal practices, albeit discreetly. Accordingly, the book will use a framework strongly rooted in philosophical tradition to interpret *the path of humanity*: the recursive perspectivism previously described.[42]

Philosophy literally means *love of wisdom*. Philosophers reflect on the fundamentals, the most general and universal aspects, of existence. Many professional philosophers feel that a concrete objective of societal improvement is an odd and even undesirable use for philosophy. Philosophy should be done purely for the sake of philosophy, they say, making philosophy a cousin of the arts (think of 'art for art's sake'). This looks like a respectable standpoint in any case. *Practitioners* don't mess with philosophy, do they? For this reason, professional philosophers will knit their brows here and there, since this book does not subscribe to philosophical mores and only follows the philosophical hermeneutical tradition a tiny bit, and yet it still makes some strong philosophical pronouncements. I do this certainly not out of a lack of respect for the philosophical tradition, on the contrary, but rather because I am working from a methodological framework (see below).

I am also heavily indebted to science. I do complain about it a bit (or more than a bit), but that's mainly because I cherish it so much. Universities are:

> *the carriers of traditions, the guardians of deep knowledge. They should be the centres of innovation where research takes place without regard to profit or immediate application.*

This is a citation from *The History Manifesto*,[43] on the whole a brilliant plea for 'thinking about the past to see the future', with a special accent on temporal scales of dozens and hundreds of years. If I complain, it's because too many scientists are deleting 'immediate' from the quote above. I personally would prefer advocating research 'with regard to short- and long-term societal benefits'. We need the sense of wholeness that long time scales provide more than ever in this postmodern era of fragmentation. This is, of course, exactly what *the path of humanity* revolves around, on the greatest possible human timescale (you can see virtually none of *the path of humanity* over a span of dozens or even hundreds of years). It is inevitable that we build on the ideas from many scientific disciplines and of many thinkers and writers. Yet this book does not play by all the scientific rules of the game either. It is more eclectic than monodisciplinary, and it does not shy away from mixing personal introspection and anecdotal experiences with the most highly abstract considerations.

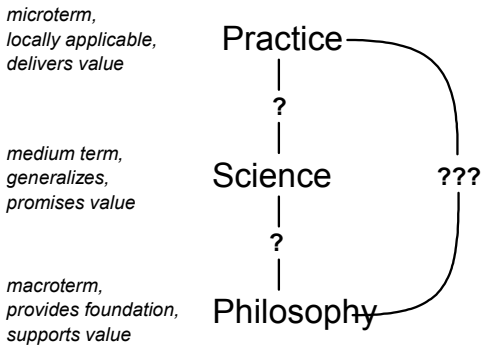
[42] See also Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation).
[43] *The History Manifesto* (2014), Jo Guldi and David Armitage, Cambridge University Press.

Practitioners, scientists, and philosophers all have their own legitimizations, claims, and rationales. If you scratch the surface, it turns out that professional practice, science, and philosophy each fall apart into many subcultures and schools that can barely agree on anything. The parcelling of the notion of 'knowledge' – itself already half of a dipole, along with matter at the other end – over spheres with clear boundaries and temporal scales, such as 'philosophy', 'science', and 'practice', may provide disciplinary frameworks. However, our society doesn't fit everything neatly into these categories. Frameworks emphasize specific kinds of knowledge such as practical, scientific, or philosophical knowledge, and corral them into reserves that correspond badly with and differ greatly from each other. In the same way that mind–matter dualism creates a mind–matter problem, these reserves create a practice<=>science problem, a science<=>philosophy problem, and an enormous (since it combines all three areas) practice<=>philosophy problem.

Practice is focused on actions in the here and now, and thus it directs attention to a short time scale. Practice seeks immediate value. Science is focused on generalizing theories and has an average time frame of, let's say, years to a few centuries. Science mainly promises value. Philosophy focuses on the foundations of experience and has a hermeneutic dialogue several thousand years old.[44] Philosophy is the foundation of value (literally as well – think of the field of ethics, what is 'good'). The problem is shown in the figure below. There is strong resistance to the other fields at the boundaries. It goes without saying that there are some fine exceptions, that we are trying *en masse* to bridge the gaps (certainly those between science and practice), and that we must not overgeneralize. However, we often see science and philosophy rejecting practice, as well as detecting strong anti-intellectual tendencies in societal practice.[45]

[44] This dialogue has literally been going on for a few thousand years. Even today, we still read, discuss, and quote earlier philosophers such as the ancient Greeks, even though they no longer can take an active role in the dialogue. Good philosophy is quite immune to the ravages of time, in keeping with its boundary-seeking nature.

[45] On the one hand, pure science turns away from its practice, and other the other hand, large segments of applied science are dancing more and more to the tune of commercial interests. For an underpinning of this statement, see the TED talk by Ben Goldacre from 2011, 'Battling Bad Science'.



What is the relationship between philosophy, science, and practice (2)?

But why can't practice use long timelines and generalizing reflection? Who still looks back at where we came from and at where our transactional production–consumption machinery is taking us as a species? Practice is fully trapped in the issues of the moment. And why should the generalizing scientific view not have an eye for the personal needs of individual practitioners? Why have case histories and personal well-being lost the scientific argument to statistics, generalizing models, and efficiency, even in the knowledge that all these things are important? Why do we give so little consideration to our philosophical a priori assumptions as participants in society? Right now our society is screaming for these connections. The key to solving many of the great problems of our age – such as environmental and sustainability issues, financial and economic disruptions, poverty, and disease – can, I think, be found in reconnecting these differing domains and even letting them overlap even more. We can tackle climate problems and pollution (at the core, all forms of scarcity) on a global scale, and our healthcare and school systems can handle the needs of individual patients and students better. Rigid categories with impassable boundaries are wholly undesirable; the remedy is a dynamic and shimmering spectrum extending from local, subjectively situated experience to foundational, general objective experience. Society in its full breadth is in between the two ends.

This book unmistakably shows the strong influence of an academic mentality. 'Science' is far from a monolithic entity; it has many flavours and mixtures. Concerning culture, tradition, and methods, a distinction can be made between more hermeneutic, more empirical, and more conceptual disciplines. They can be divided into those focused on the products of human endeavour, such as history, linguistics, and literature (known in Dutch as the 'alpha' disciplines), more focused on matter and nature, such as biology, physics, and chemistry (the 'beta' disciplines), or more focused on the nature of human activity, for example, psychology, sociology, and economics (the 'gamma' disciplines). They can be placed on a spectrum ranging from the more theoretical, touching on philosophy, to the more practical, touching on practice. Compare epidemiology with string theory, or technology with fundamental science.

Science ideally encompasses the four-pronged combination of:
- a sceptical attitude towards what we think we already know;
- a careful interest in what scientists of the past and present are doing and thinking, supported by a 'publication regime';
- an irrepressible urge to theorize and activate, then to further validate and build on existing knowledge; and
- a continuous, public, and repeatable process of observation and testing, to know what happens and to refute what is not sound.

I therefore consider a scientific attitude to be one of the most powerful prescriptions that humanity has ever written. However, this method is not at all restricted to scientists. Skilled workers of all sorts used a very similar method long before the scientific revolution, and are still doing so on an ever-larger scale, even far outside the groves of academia.

Although 'refuting the theory that is no good' may mean 'confirming practice that works' here, they both produce generalizing knowledge. A scientific theory is usually more abstract, its depiction involves more language, and its underpinnings are ideally more repeatable.[46] Conversely, a practical understanding usually is closer to practice, is built up and transmitted within the same practice, and its underpinnings (its development) are often a practical process of trial and error, for instance, the way the first churches were built, or how a hunter-gatherer Hadzabe father in Tanzania teaches his sons and nephews the principles of hunting.

Although a practice augmented with theory and a theory with practical use (oxymorons according to very rabid practitioners and theoreticians) may have different starting points, ultimately they greatly resemble each other and are probably the same thing within their pragmatic limitations. In this way, science (especially empirical science) and practice are closely related to each other. Philosophy gives them a framework, a position, and points the way to greater leaps towards improving society. We can only move the world by using an approach that combines all of these.

I'm personally a bit of a philosopher, a bit of a scientist, and a bit of a practitioner, and perhaps that's why I'm not particularly accomplished in any of these three areas. I don't play any of these games often enough, according to the rules in force in their respective reserves. I do this deliberately, since separate silos are less and less appropriate to our current societal position along *the path of humanity*. We have to play a new game if we are to make progress. That's why I step over the neat lines of division and ignore category boundaries. With this book, I'm focusing on improving our societal practices, and I use everything that I deem appropriate, with the attitude of a respectful, strongly reflective pragmatist. This is why the way I work fits best on the scale of *the path of humanity*, since it's

[46] Paul Feyerabend would shake his head in pity hearing this.

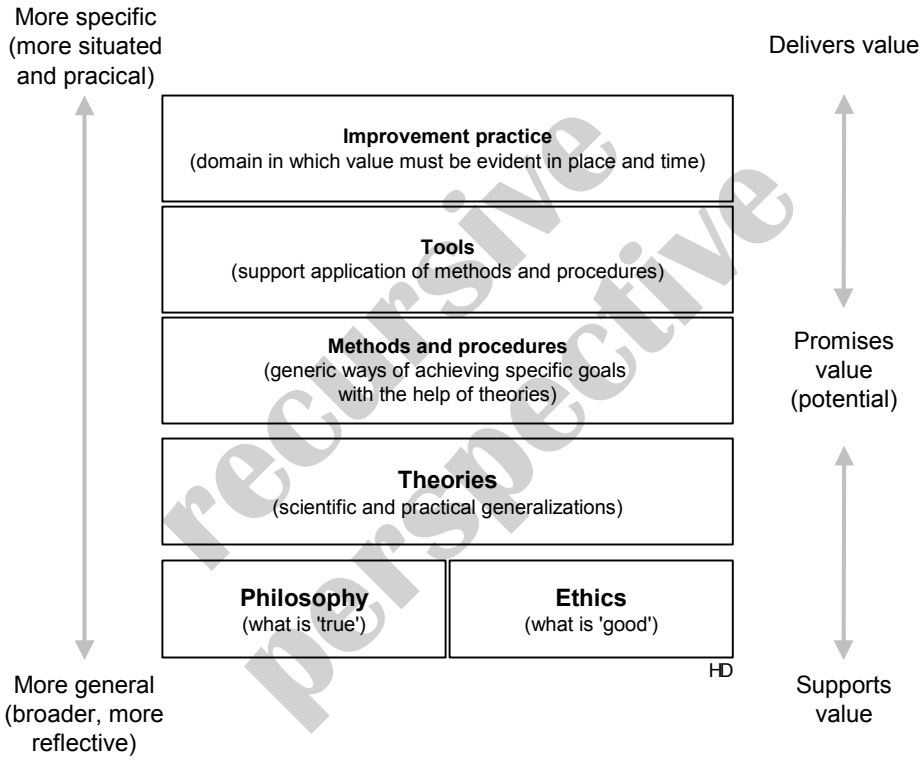
already difficult enough for a specialist individual to write a cogent narrative about this scale.

Of course, there will still be room in the future for pure philosophy, fundamental science, and practice for its own sake. However, what is most urgently needed right now is that we place philosophy and science, along with practice, together within a single methodological framework aimed at improving society.[47]

Ideally, a methodology encompasses the full spectrum from the most basic and broadly valid philosophical principles to daily experiences in practice in a specific place and at a specific time.[48] For example, it contains a *philosophical and ethical basis*, explanatory and method-supporting *theories*, goal-seeking *methods*, supporting *tools*, and a *practical application*. This methodological framework is shown as a diagram on the next page. The elements of the methodological framework have many links with each other. Although the notion of experiential worlds and the object–subject question are placed at the layer of philosophy and ethics in recursive improvement perspective, they occur at *all* levels, and consequently, recursive perspectivism provides a base for *all* layers (see the figure on the next page).

[47] If this book, its companions in the series, and their basis (my dissertation) are worthy of one summary qualification, that is *methodological*. By 'methodology' I mean a coherent and ordered whole comprising a philosophical-ethical orientation, explanatory and method-placing theories, result-oriented methods, method-supporting tools, and a practice of improvement oriented to application. This interpretation was inspired by all three of my dissertation supervisors: Bob Wielinga (who designed a methodology for developing knowledge-based systems and gave me the basic idea of what he called a methodological pyramid), Jacqueline Cramer (who practiced both politics and science), and Wim Harder (director of an institute for applied research). Situating philosophy, science, and practice within a methodological framework of course makes for a remarkable and unmistakable connection with the Society in Perspective series aimed at *societal* improvement. Also see [Dissertation section 1.3 Research Approach] and [Part 1: *Een filosofie van de maatschappelijke praktijk* page 27 Opbouw Samenleving in perspectief] and [Part 4: *Multi-actor procesmanagement* page 21 Text box 'Serie Samenleving in perspectief'].

[48] Examples of the latter are the *haecceitas*, the 'thisness' of Duns Scotus, a late-13th-century cleric and philosopher, who uses it to refer to Aristotle's notion of 'what it is'. These terms, though somewhat cryptic without context, aim to define the distinction between a general concept (a category) and its concrete manifestation (thus its *haecceitas*). Take 'the person' as a category, and Socrates as a concrete, particular manifestation. I'm exploring the limits of the 'this-now-here': the concrete experience that vanishes once it is over, such as Thales who bought a specific olive press in a specific place at a specific time from a specific person.



The methodological framework of this book and this series

A populist usually gets no further than appealing to the gut feelings of one of the group actors in the upper layer of practice, a practitioner covers the top three layers, a scientist feels most comfortable near the theory layer, and a philosopher in the philosophy and ethics layer. However, much can be said for the argument that everyone striving for reflective, structural, and articulable *societal* improvements can outline and organize their activities using one methodological framework or another, even if their accents and colours are different.[49] Or, formulated in a slightly different way: a professional *societal* practice of improvement requires a broad methodological framework.

The methodological framework undermines the idea that primacy in improvement, and thus the last word, is reserved only for *practice* (the three upper layers with the focus at the top), *science* (in the middle, with the focus around theory; since science aims to provide validated theories), or *philosophy* (at the bottom). This idea only pits practitioners, scientists, and philosophers against each other. Each of them knows too little of the others'

[49] See also *The Reflective Practitioner*, Donald Schön.

experiential worlds and pursues their own ends on their own temporal scales in their own part of the methodological framework. It places scientists and philosophers too far outside of normal society, which in my opinion is a highly undesirable situation. From a methodological viewpoint, having the practical, scientific, and philosophical perspectives work closely together is precisely what we urgently need to create a functional practice of societal improvement.[50]

The Society in Perspective series attempts to cover this framework. Originally written in Dutch, Volumes I, IV, and V have been published in Dutch under the series title *Samenleving in perspectief*. Only Volume V, *The Path of Humanity* (published in Dutch as *Het pad van de mensheid*) has thus far been published in English translation. Volume I, *Een filosofie van de maatschappelijke praktijk* (2009, unpublished English translation *A Philosophy of Societal Practice*) aims at the lower left corner (what is true, what do we dare to trust), and introduces recursive perspectivism. Volume II will be about societal ethics (*Een maatschappelijke ethiek;* what is good, what direction should we favour, in other words, the lower-right corner), and Volume III about societal pragmatism (in Dutch *Maatschappelijke pragmatiek*, the question of how it is even possible that we can improve on the basis of ideas about what is true and good, thus connecting the lowest with the highest layer). Volume IV, *Multi-actor procesmanagement in theorie en praktijk* (unpublished English translation *Multi-actor Process Management in Theory and Practice*), was published in 2011 and mainly discusses the top three layers.

This book, *The Path of Humanity*, explores the entire framework, with as a point of departure the wish to improve our society in a targeted way at least to some degree. Although I call it an essay, I certainly don't mean that it is a precursor to an academic book, in the sense that it should ever be labelled as such. It should be seen as a contribution to the immense and valuable task of improving our societies, a task that, in any case, has our continual interest

[50] You may be thinking, 'But what are societal quality and societal value exactly, how do you deal with them ?' Indisputably, there are better and worse societal practices, on all kinds of scales. This ultimately is expressed in the behaviour of individual people, both politically and otherwise. You prove this when, for example, you make an effort to do something, say by joining a political party, or voting in an election. You prove it when you go to the dentist, to work, or to the supermarket, or when you change dentist, job, or supermarket. If you examine the flows of human migration in the world, you will get a first idea of where its countries rank: refugees and economic migrants vote with their feet and leave, and everyone recognizes a *failed state*. A democracy leaves the judgement of better and worse to all the actors taking part in these societal practices, including the scientists and the philosophers, and not to just one actor or some segment of it, nor to some outside oracle.

This sometimes results in painful decision-making processes, especially because our understanding of societal coherence and cooperation and our grip on them are so weak today. However, generally and in the long term, democracy and freedom of movement also result in balance and societal quality, precisely because they make it possible to move about and exercise influence on many different spectra and on many different scales. If only for this, democracy and free movement of people and goods (freedom of ideas and freedom of space) deserve our vote, with consideration for others always indicating the boundary. Time will tell!

(or should). After all, we're improvers by nature. We show this on a small scale all the time, but we can also do it on larger societal scales. It's just the human condition.

2.1.8 The improvement perspective of this book

Recursive perspectivism provides us with a methodological building block that attempts to describe, explain, and guide social and societal action. Writing a book is a societal action par excellence. Thus it makes sense that we also must be able to describe the writing of this book using this methodological building block.
What, then, is the improvement perspective that I am trying to achieve with this book?[51] To explain, I'll draw on the 'improvement dilemma' mentioned earlier. It expresses the somewhat powerless feeling we have when we can see a better world before us but don't know how to make it a reality. Or how it grates when we see all that's wrong around us, or in the news (especially the news; after all, it's newsworthy). Remember the famous photo from the Vietnam War of the girl with napalm burning her body as she runs naked away from the village. Or think of the migrants coming to Europe on dilapidated boats. I'll show the improvement dilemma again below:



Can we improve our world? The improvement dilemma.

I am mostly a positive person, yet I experience this quandary every day. Of course, I try to do what I can, but my reputation as a world improver is not very impressive, certainly no better than the majority of you readers who have got this far in this book. This dilemma grates all the more on me, precisely because I can see clearly that it should be possible to improve the world in theory, but that it happens too seldom in practice (mine included).

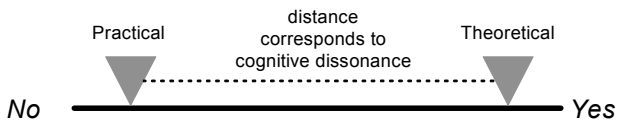
I observe a double standard: I myself do not act the way that I think other people should. I don't even come close. I drive a car; although it's a semi-hybrid, I drive a lot, even though I'm more aware of the dangers of an extreme greenhouse effect scenario than most people. I don't like public transport, because I find it inconvenient (even after trying it a lot) and I don't like the disrespectful way the monopolist transport companies act. I buy myself and my family presents, even though I know that others are in great need of help. I'm not as much of an activist as I could be. To be honest, I sometimes even feel that not a small proportion of the activists are know-it-all-ish, myopic, narrow-minded utopians who love

[51] This is an example of a strange loop: the book describes the notion of improvement perspective, but is itself also the result of an improvement perspective, executed by me. See also Douglas Hofstadter, in *Gödel, Escher, Bach* and other works.

pointing out others' faults. A double standard can degenerate into cynicism, but I have little of that. Nevertheless, I do not experience this double standard as pleasant: it complicates my life and doesn't do much for my self-image either.

A societal dissonance

In my opinion, Festinger put a general and fundamentally human mechanism in the spotlight with his theory. Replace actual environment with *societal practice*, and beliefs and convictions with *societal theory*, and Festinger's ideas also apply excellently to societal improvement on larger scales. The improvement dilemma is a dissonance on the scale of society. And the greater and stronger the distinction between practice and theory, the louder this societal dissonance sounds (see figure on the next page). When it grates on me, I experience, to use Festinger's words, a societal cognitive dissonance.



Can we improve our world? A societal dissonance

In the light of the earlier discussion, the improvement dilemma is an object–subject tension on the scale of society. My audience (the people in the dialogue referred to above in section 2.1.5 of chapter 2) recognize this societal object–subject tension.

People do not like dissonance – *dixit* Festinger – and they eliminate it in astoundingly creative ways. My enormous appreciation for Festinger is partly based on the fact that you can see his theory working so well in practice. Improvement means reducing object–subject tension. And the attempts to eliminate the societal dissonance are thin on the ground.

Here as well, the two basic mechanisms mentioned earlier are open. You can adapt the beliefs to the environment (like getting IKEA furniture), or the environment to the beliefs (like painting the windowsills in your favourite colour). And in societal-scale situations, the former is seen as much simpler.

The conservative pseudosolution

This is why a majority of my audiences interpret the societal dissonance as a conflict between a vague utopian possibility for societal improvement (theory) and a concrete impossibility that is obvious to everyone (practice). They are rational people who are considering the objectivity, the current practice in their environment. 'Maybe it could happen, but most people simply put themselves first', they tell me. And 'That's just the way the world is.' And 'Keep it simple'. And 'You just have to be practical'. What they're actually saying is that Mount St. Peter is good enough for them, or perhaps that it's all they see, and that *the path of humanity* is a delusion. Although they call this attitude realism, it is

conservatism. In what to me is the worst variation on this theme, the response is 'You shouldn't want to improve mainstream society, and you mustn't pay any attention to other people, because it's downright bad for *us*.' Taken to a political level, this statement degenerates into clearly self-serving populism.

For the theoretical doubters, the dissonance can now easily be eliminated. They declare the theoretical possibility, impractical by its very nature since theory and practice are complementary, to be *impossible*. The theoretical 'yes' is shifted to the left, and suddenly it is next to the practical impossibility already there as 'no'. The theoretical improvement hypothesis is rejected as a pipe dream, since after all, we have to be realistic. The result is double no, the conflict is solved, and – wholly in line with Festinger – the dissonance no longer sounds. Conservatism, pseudo-rationalism, realism, populism 'prevails'.



The conservative pseudosolution for the dissonance is antitheoretical: societal improvement may be desirable but is theoretically impossible.

In my opinion, this only looks like a solution, hence I call it the 'conservative pseudosolution'. Only an extremely superficial observer could conclude that shifting theory to the left puts it in line with practice. Nothing could be further from the truth. Shifting to the left does not give us an explicit and worked-out realistic theory that can explain why society cannot be improved. At least, I don't think that statements like 'people are selfish', 'that's just the way the world is', 'things have to be simple', and 'you have to be practical' in any way add up to a theory. They are as blunt as they are ill-considered, and they are astonishingly simple to refute. People are capable of extreme altruism, the world is continually and enormously changing (witness *the path of humanity*), and our societal practices are more than ever supported by formidable theories in all relevant fields and sectors. The conservative pseudosolution makes existing practices the standard. This is contrary to our history up until now, and therefore we must reject it.

The conservative, 'realistic' pseudosolution does indeed resolve the dissonance, but this is because in one blow it strips the theory of substance and power and makes it subservient to practice. It is an anti-intellectual and an antitheoretical fake solution. It results in a society that flaps around in circles, like a bird on the ground with one useless wing. The antitheoretical solution condemns the bird to scratching around on the ground, while it could have taken to the air.

I encounter this antitheoretical and anti-intellectual attitude frequently in my professional practice. 'Let's be practical', say people with a less-well-articulated view of society. Or 'let's stick to the subject' or 'let's keep it concrete.' 'You're making it so complicated' is another

particularly nice one. It may be that I'm practising third-rate psychology here – maybe I just *am* impractical, *can't* stay with the subject, and *think* too abstractly – but I don't think people make these requests to keep it practical, simple, and concrete because it's the way to help us make progress. It's a request not to fuel or revive the societal dissonance. It's a request to stop asking questions that challenge business as usual, not to understand the issue in context because that context is inconvenient to them. It's a request not to articulate the needs of actors we haven't heard until now, and not to shine any light on routes to improve the societal situation (such as that of those poor coffee growers). It's an attempt to nail our feet to the road, while we can – and *must* – walk *the path of humanity*. In short, it's a request for stagnation, a call to exclusivity.

If the theoretical position of improvement disappears, then the societal dissonance is resolved just like that – this much is unmistakably true. If everyone agrees that society just is the way it is, we don't have to work on improving it, and no one can accuse you of doing nothing about it. You're on the top of Mount St. Peter, and not only do you not see any higher peaks around you, realistically speaking they don't even *exist*! You can go back to business as usual and sleep well at night. How restful it is! And what a flagrant contradiction of the dynamic development that we can see on *the path of humanity* and in our own history.

The utopian pseudosolution

Another group, the minority of people I talk to, responds in precisely the opposite way. They see the huge possibilities for improvement on the right end of the scale. The only thing that is necessary is for us not to do the wrong things anymore, and thus for everyone to have good will. They're willing to roll up their sleeves and get to work making the world a better place, which they think will shift the practice to the side of theory. They think that referring to the difficulty of changing societal practice on the left end is negative: you shouldn't talk about that too much, that's negativism. At the risk of making a caricature of well-meaning people who really work very hard, they close their eyes to the 'objective facts' and would prefer to confine themselves to the utopia of their own little practices, away from the big bad world outside.



The utopian pseudosolution to societal dissonance ignores established practice: it focuses on one's own practice and ignores the inertia of mainstream societal practices.

This is also a pseudosolution to societal dissonance, namely the 'utopian pseudosolution' (see the figure above). Practice is pulled over to the right. This seems to resolve the dissonance, but in the same way that the rational solution pays too little attention to theory,

the utopian solution pays too little attention to the nature of the vast majority of established societal practice.

This established societal practice is not at all the result of selfish people making the wrong decisions. It is the result of the actions of clever and passionate people who are trying to improve their situation, since they can really see and influence it. In short, it is the result of many improvement logics together. If people really could envisage a better world and the way to it, they would be on their way already and would have been for some time. As I've said before, we are inveterate improvers; it's the human condition. As soon as a real perspective for improvement comes into view, someone will try it.

I'm slightly more favourable to utopians than I am to conservatives, but I must say this: utopians shut their eyes too much to the inertia and improvement logics of established societal practice, as well as to how deeply embedded these are.

Working on a methodological solution

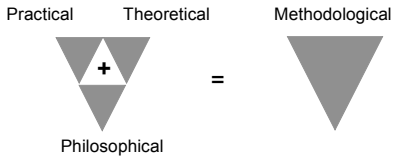
At the beginning of the introduction, this book gets straight to the point about the methodology used in it and in this series:

'My position is neither that of a utopian, say, or a populist, but a strongly reflective pragmatist. The book calls on your will and your ability to look at our entire human development practically, theoretically, and philosophically.'

By now you will understand that I was referring to the methodological framework and the existing dissonance just presented between theory and practice of societal improvement.

The utopian pseudosolution is blind to the stubbornness of current societal practice. Its mirror image, the conservative pseudosolution, is blind to the power of theory and prefers to maintain the status quo.

I personally think that there is only one robust way to really resolve this societal dissonance – by working on a *methodological 'yes'*. This 'yes' entails being philosophically, practically, and theoretically capable of answering 'yes' to the question of whether we can improve societal practices. This is illustrated by the figure on the next page.



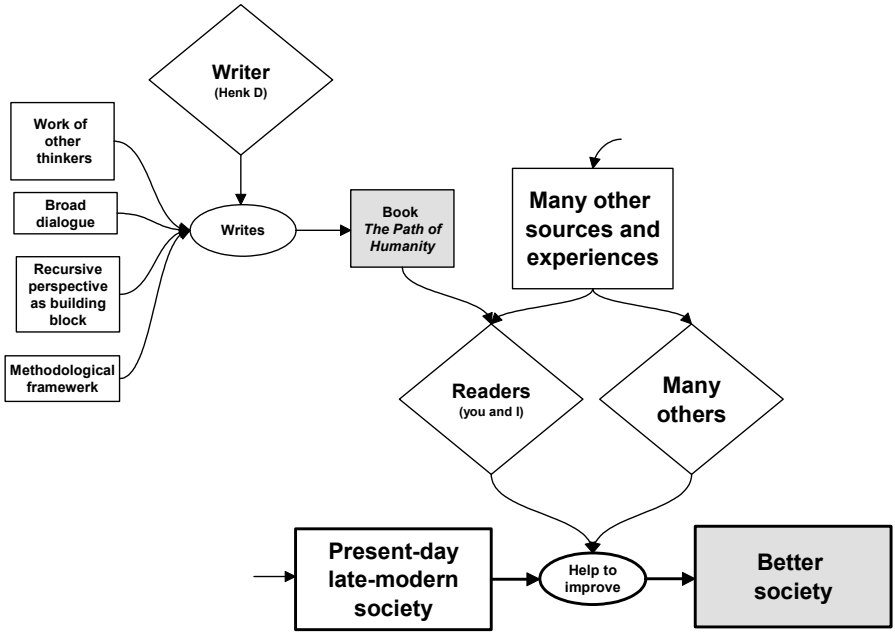
Practice plus theory plus philosophy together add up to methodology

By using a methodological approach, we can robustly resolve the societal dissonance. In concrete terms it means that we will have to flesh out all the elements of a practical, theoretical, and philosophical methodological framework, working together.



The methodological solution to societal dissonance gives a practical, theoretical, and philosophical 'yes' as the answer to the question of whether we can improve our society.

This will require the efforts of many people, and indeed, there are already many people working on it.[52] Although it is an enormous task, I can certainly do my part, and I am doing so, with this series and this book. If I were to outline the rationale for this book in terms of improvement perspectives, it would look like this:



This book aims to make a modest contribution to further improving our society.

[52] One group I am thinking specifically of is the Knowledge Network for System Innovations and Transitions (KSI, www.ksinetwork.nl), a group of scientists I've been involved with for a number of years as a reflective pragmatist. They are passionate people working at the boundaries of theory and practice.

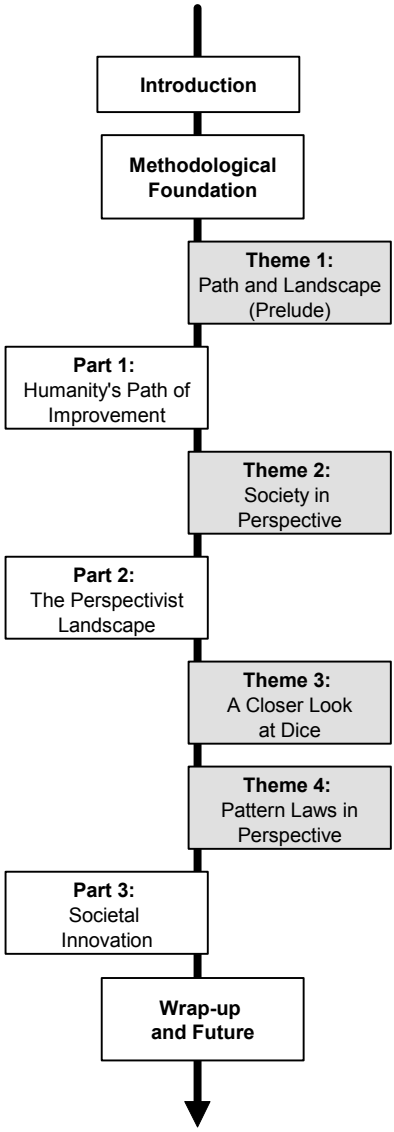
From now on, you may call my rationale optimistic, but hopefully not utopian any longer, because perhaps by now you understand my position in life as a strongly reflective methodological pragmatist.

I have now finished accounting for the methodology. This part is lengthy, but I think that is appropriate, given the subject. It helps us to understand the design and the connections between the following three parts and four themes, which will be introduced as a coherent unit in the next chapter.

2.2 One foundation, three parts, and four themes

In keeping with the preceding methodological foundation, the remainder of this book consists of a prelude (the first theme), three parts, and in addition to the prelude three more themes that go into greater depth. In total, this adds up to a short kick-off and a methodological foundation (that you are almost through reading now), three parts, and four themes (including the prelude).

The prelude (Theme 1) sends quite a firm shot across the bow. It shows a first glimpse of the perspectivist path and landscape. In the three parts, *the path of humanity* will first be outlined (Part 1), then situated in a landscape (Part 2). Then from this foundation, theoretical and practical consequences for our future societal innovation will be derived (Part 3). The themes in between the three parts will explore in depth relevant aspects of recursive perspectivism and clarify how *the path of humanity* is based completely on perspectivist hypotheses. The figure on the next page shows the structure of the entire book.



The structure of the entire book

The structure of the book corresponds to an image for a societal practice that I will use throughout the book, that of a rough diamond with various facets. I look at *the path of humanity* from the viewpoint of recursive perspectivism, and I think it would be helpful if I choose several different viewpoints that shed light on several different facets. At this point we have to call it a diamond in the – very – rough; I'm quite aware that this book is a preliminary perspectivist exploration of *the path of humanity* and that some polishing will still need to be done in the future. Nevertheless, here is the kick-off, here in your hands. Its

various facets show totally different viewpoints, but as a whole, they provide the first more complete picture.
Below I'll give brief summaries of the four themes and the three parts, with the emphasis on the exposition of the book as a whole.

Theme 1: Path and landscape (prelude). Recursive perspectivism offers a remarkable way to view our world and our society. It helps us to see human experience in a new light. To clarify this, the prelude presents two intriguing, even downright mysterious *pattern laws* that have amazed people for many years: Benford's law and, more recently, Zipf's law. They show that there are some very specific patterns of distribution in our world, while there seem to be no mechanisms that can either cause or explain them.

The population numbers of counties and cities of the United States show such an astonishing pattern, while neither the people who live (or move) there nor the companies who have offices there nor the respective government authorities really do anything to drive it. Or take the words in a book: the frequency of occurrence of all the words in a random book usually shows a surprising amount of regularity, an astonishing order while it would be impossible for a writer to write following this 'rule'. A writer is completely unaware of causing this impressive regularity; it's a by-product of writing.

I call Benford's Law and Zipf's Law 'pattern laws'. This is an unconventional name, which I am introducing as an umbrella term. They are examples of a broader category of collective pattern laws, which I suspect covers many natural-scientific, sociological, and psychological laws. *The path of humanity* is also a member of this collection: it is a law of patterns, a particular kind of arrangement, a regularity that we cause unknowingly as a by-product of our combined lives. *The path of humanity* is the vastest pattern law that we can imagine as human beings. It is so vast that we can hardly experience it. Benford's law and Zipf's law are its little brothers.

These pattern laws are special, because they give us an unexpected glimpse of a previously invisible, misunderstood, and unexplored perspectivist improvement landscape. Pattern laws are the logical consequence of the presence of this improvement landscape, based entirely on improvement potentials, and thus on coherent improvement perspective.

This first theme, the prelude Path and Landscape, gets straight to the point since I show some of this mysterious perspectivist improvement landscape straight away. I use both a continuous and a quantum-theoretical interpretation of this recursive perspectivist landscape.

In the *continuous* interpretation, this landscape underpins the common-sense intuition that – in the long term, and in general – it is better to have more perspectives and thus that more perspectives represent more value. And also that we as people can make slow but steady progress on the macro scale.

However, an *average-theoretical* interpretation on the microscale pulls the rug squarely and thoroughly out from under this gently rolling macro picture, because it reveals a rugged mountainous landscape with high peaks that rise unexpectedly before us, and equally unsuspected and nasty deep gorges and pits. And that is much more in line with the way we sometimes experience our lives.

So this prelude gives us a very first glimpse of this quantum-theoretical perspectivist mountain landscape, in which humankind, the improver, finds itself positioned, wearing a blindfold and earplugs. Up to now, people have been unaware of this landscape and have been groping to find their way in the dark.
Plato gave us the tale of a Thracian servant girl who made fun of the ancient Greek astronomer Thales who fell into a well as he was looking up at the stars. I will use this story as a metaphor to show how the Thracian servant girl's short-term practical approach and Thales's long-term consideration *together* form the key to societal improvement. *Alone*, neither Thales nor the Thracian girl can make any difference in terms of progress, improvement, or innovation. The Thracian girl would still be sitting at the edge of the well, laughing, and we would have to find Thales at the bottom of that well, sadly, with his neck broken. But together it's a very different story. 'The lame man helps the blind man' is a proverb that characterizes their potential collaboration, if somewhat sneeringly. Yet sneering at the proverb does this mechanism a great disservice. We should remember that differing faculties, both a sense of direction and a keen sense of one's immediate environment, coordinated by or in a single consciousness, characterize a healthy vibrant being.

This book will go into quite some depth in explaining the deeper nature of pattern laws, with *the path of humanity* as its most prominent exponent. This requires a recursive perspectivist view. Its most significant result is a new light on societal innovation (in Part 3).

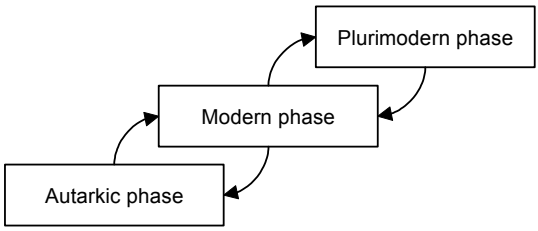
Part 1: Humanity's path of improvement. *Theme* 1 above classifies *the path of humanity* as a pattern law. But what exactly does this path entail? Part 1 describes *the path of humanity* in more detail, explains the societal steps comprising this path, and what would be the appropriate next steps along it.

First, the way that coherence and cooperation are related to societal improvement will be explored. There is a correlation between cooperation and quality, and many think there is even a *causal* relationship, i.e. increasing coherence and cooperation improves the quality of society. This will be briefly illustrated using a *societal balance model*, which has intriguing parallels with statistical thermodynamics and information theory.

Next, we will take a first look at *the path of humanity*. Striding along with seven-league boots on, as it were, we will see how our development as humanity has progressed up to now. For the time being, I will be using broad brush strokes – a roller is perhaps a better metaphor –

and cultural anthropologists, historians, and representatives of many more particular disciplines may furrow their brows. Although I have great respect for these disciplines, what is important to me at this point is the big picture, and it will be put on the canvas with big gestures.

We are on the brink of a possible next step forwards along *the path of humanity*: towards the global society of *Team World.* This move has a huge amount of potential for growth, but right now, there is also a genuine risk of societal decline. Team World is characterized as 'plurimodern': a remarkable spectral (i.e. covering a spectrum) combination of small-scale pluriformity and large-scale modernity, and all the forms in between.



To flesh out this societal development somewhat more, I have drawn up a more detailed description of *the path of humanity*, working with many people from many different sectors of society. I emphasize an autarkic (self-sufficient) phase, a modern phase, and a plurimodern phase. It involves sectors such as building and construction, healthcare, transportation, agriculture, and food. Preliminary sketches have also been made for a number of other sectors, such as energy, teaching and education, defence, and (hardly a coherent sector, but a very important one) societal management. Plurimodernity combines the strengths of autarky (internal coherence and cooperation) and those of modernity (scale and specialization).

We can only take the step to plurimodernity if we increase even further our societal consciousness, our sensitivity to others, and our understanding of and respect for how we exactly create coherence and cooperate with each other. I call this shift the ***plurimodern transformation***. But is a plurimodern transformation even possible? Are we as people actually capable of making it?

Theme 2: Society in perspective. It's time to depict *the path of humanity* as a whole in terms of recursive perspective. To do this properly, however, it is a good idea to first gain a deeper understanding of what this would involve – a recursive perspectivist picture of society. This will be provided with Theme 2.

Our late-modern societies are teeming with actors, each with their own experiential worlds. On the one hand, this offers all kinds of possibilities and opportunities, but on the other hand, it also leads to all kinds of tensions and conflicts. After all, it is difficult to be able to really see so many different actors, and especially to see all their mutual connections and how they work together as well. From a bio-evolutionary standpoint, we're not even geared to see this.

Experiential worlds are nothing other than experiences, in terms of perspective, by actors. Thus you could say that an actor is a label on a specific collection, an adaptive bundle of coherent perspectives. Once an actor consciously makes an improvement, he or she completes one of the improvement perspectives in this bundle. If the improvement is successful, the actor has converted improvement potential into experiential value.

This results in a concept of society in which a societal practice consists of actors interacting with each other, who each live in their own experiential worlds consisting of perspective. Or, in a nutshell: society as a perspectivist multi-actor practice. Thus every actor is characterized by a collection of connected perspective. Actors form an intermediary layer; they bundle perspectives, and in their interactions, they also form the largest societal practices.

That is a different philosophical view of societies than, say, the more conventional mind–matter view, of 'cerebral' people who populate a physical world in different forms of social relationships. Therefore we will explain, from a philosophical perspective, the relationship between the perspectivist multi-actor society and the more conventional dualistic mind–matter or mind–body worldview.

Recursive perspectivism has little use for fixed dualisms like mind and body, time and space, or confrontation and anticipation. It always considers the enormous field *in between* two end points of the spectra that these dualisms create, and it even questions the absolute existence of these end points. It thereby reveals itself as an offshoot from the trunk of both phenomenological and pragmatic philosophy.[53]
Also discussed will be the question of how an actor can have a recognizable identity on the one hand, and on the other hand can change this identity over time. Time and identity also turn out to be a matter of perspective.

Theme 2 concludes with an initial exploration of the intriguing principle of perspectivist balance: the fact that a perspectivist consciousness (and thus humanity too) abhors strongly dissimilar relationships in terms of recursive perspective, and that a consciousness will do anything and everything to put these relationships back into proper balance.

Theme 2 provides a firm understanding of the recursive-perspectivist picture of society, including its philosophical anchors. We are now ready to explain *the path of humanity* completely in terms of perspective and situate it in a perspectivist space.

Part 2: The perspectivist landscape. Recursive perspectivism presents a view of our society based wholly on the human drive, and power, to improve. Part 2 then works out what the

[53] See also Volume I of this series, *Een filosofie van de maatschappelijke praktijk* (unpublished English translation: A Philosophy of Societal Practice).

required plurimodern transformation presented in Part 1 means. This section starts with apes, families, and politics, and then heads towards an understanding of the basic principle of any societal organization: perspectivist societal balance.

We are living in multi-actor practices that are increasingly complex, in which more and more actors are living their *own* truths and realities. Perspective is a basic notion of experience that links things up as if they were Lego pieces (and thus is recursive[54]), and it can therefore create a spectrum of differing experiential worlds, from small to large. Experiential worlds are experienced by actors interacting with each other. This way, a picture emerges of society as a multi-scale, multi-actor practice based entirely on recursive perspective.

Since this all sounds somewhat abstract, we enlist the help of anthropology and game theory. We look at apes, children, and computers, and see the most basic and elementary societal processes at work. The ways they cooperate (the computers as well as the apes and children) teach us something about the enormous power of coherence and cooperation. Of course, now and then fierce competition and conflict have a place, but as value-generating processes, they take second place, far behind coherence and cooperation.

Various aspects of our society will be viewed through a perspectivist lens, including team-building, political currents, and the dominant role of economic thinking in our current era.

If we are talking about cooperation, we are talking about team spirit. Just what is team spirit? Recursive perspectivism provides a clear foundation with which to identify and compare totally different team configurations. This applies to the scale of a family, a football team, and Team World. You can even situate political currents in this way, since they look like societal team configurations. And they differ in team spirit.

Three basic dimensions in team configurations are acknowledged: similarity, pluriformity, and unity. When actors resemble each other, they share perspectives. In extreme cases, we call them a homogeneous group actor; they then become more and more uniform. When actors differ, they have different perspectives. In extreme cases, they are entirely different, sharing nothing, and become more and more pluriform. When actors together are one, they interact through shared perspectives. In extreme cases, we conceive of them as one collective actor: a unit.
There is one conclusion that can be drawn quickly: in all three of the extreme cases, societally speaking, things are far from ideal. It is advisable to find balance, since doing so uses the strengths of all three dimensions and avoids their weaknesses (these strengths and weaknesses will be identified later).
The analysis also gives us a remarkable view of societal chains, the greatest achievement of modernity. Chains have enormous advantages, as they organize things efficiently and on a

[54] Recursive means self-imitating, also on different scales.

large scale. However, they have a distinct disadvantage: in combination with modernity's enormous scales, they can pose a real threat to our society. And they have become a threat too – just look at the rapidly growing problems concerning non-sustainable societal practices. Well-designed, well-monitored, and well-organized chains on limited scales have their particular advantages, but taken to extremes, chains are highly off-balance. Excessive use of chains makes a society very vulnerable and will lead to stagnation or even a regression back down *the path of humanity*.

This also applies to every form of imbalance. In terms of society, we must return to seeking perspectivist balance, since this is what *the path of humanity* has been showing us for many thousands of years already. That path of humanity transcends the human scale: even though we constitute it together, we are certainly not aware of doing so. We also make a big mess of things while en route. Different actors experience different elements of the societal-perspectivist tissue. The recursive-perspectivist image of society makes it possible to still capture this large-scale, unconscious improvement process in frameworks.

Societal improvement is driven by distinct perspectivist principles of balance that have been invisible until now. These balance principles situate *the path of humanity* entirely in a three-dimensional space, a three-dimensional landscape of perspective. They are what ensure that we find our way through this landscape – a perspectivist landscape in which the paths of choice are somewhat established beforehand.

To clarify how we can perceive this balance, we will bridge the relativist gap between objective and subjective experience. The core concept here is experiential value: the value that actors assign to experiencing particular perspectives. Experiential value is actualized improvement potential. It explains social and psychological phenomena such as loss aversion and habituation. It also describes where the path of preference is in the perspectivist space, and why we as humanity are continually drawn back to this path.

Our societies keep seeking perspectivist balance, forming recognizable and even predictable tracks through the perspectivist landscape, subject as we are to the balance principles mentioned above, even though we are only dimly aware of it (actually, we are completely unaware of it on the larger scales). In the long term, we cannot get away from this balance, and we will be forced into it by circumstances. In the end, this balance results in societal structure and societal quality. *The path of humanity*, which so majestically emerges from the course of human history, is nothing other than the product of our unconscious pursuit of balance in the perspectivist landscape, on increasingly larger scales, and thus on the scale of humanity as well.

Nothing is blocking our way to consciously exploring this balance, or consciously seeking it together in the future, and thus harvesting the potentially enormous fruits for society that it provides. We'll also be following *the path of humanity* into the future. This sets the course for a better society and gives us a better grip on it.

Theme 3: A closer look at dice. Invisible improvement landscapes, unconscious balance-seeking processes, paths of preference on a societal scale – doesn't it all sound rather like, well, hocus-pocus? Are we not, as human beings, uniquely free and able to go wherever we want to? With all this free will, is our future not inherently unpredictable? As a child of the Enlightenment, these were my first thoughts while thinking through the consequences of recursive perspectivism.

However, it is important to keep in mind the fact that recursive perspectivism says *only the minimum* about the individual nature of perspectives or the short-term choices we make. It can only say something about statistical averages and large-scale, long-term structural balances. Recursive perspectivism says little to nothing about how we create the *content* of our paths, in the *short* term.

Therefore, I dare to predict that in the distant future, we will have developed a plurimodern society, recognizable by its perspectivist structure, even if this book follows Hume's books in the short term obscurity. This does not alter the fact that if we are not able to steer ourselves to develop towards pluriformity and institutionalize it, there may be world wars between now and then. However, I can extrapolate somewhat as well as you can as to how we will flesh out the details of how we feed and house ourselves, move about, and everything else. But about the *real* long term, well, I haven't got a clue. How we will define the fine points of our societies is something for the future.

To help us understand those aspects of the perspectivist balance process that are mainly structural and configurational, Theme 3 will discuss dice. Rolling dice over and over is very similar to experiencing a long stream of perspectives. The result of any roll of a dice is completely unpredictable; all you can say is that it will be somewhere between 1 and 6. Yet the longer the series of rolls, the closer the average moves more or less towards 3.5. And the number of times that 2 or 3 or 6 is thrown will be closer and closer to the same (precisely why the average shifts towards 3.5). If we plot the throws on a graph, we can see clear paths emerge in an a priori landscape, just as they do in recursive perspectivism.

Similarly, recursive perspectivism interprets the processes in a perspectivist consciousness. Of course, the dots on the dice have not been preordained. However, the fact that they can generate or destroy value, and that they require effort or even support effort, can nevertheless be laid down in bandwidths (for example, see Benford's law and its nine segments further on). As far as content goes, recursive perspectivism makes minimal assumptions, but when it comes to structure, it outlines a perspectivist space with robust statistical properties. In the short term, we as possessors of a perspectivist consciousness are free and capable, and on the increasingly larger scale and longer term, statistics inevitably does its job of creating structure.
As responsible individual human beings, in the short term we are uniquely free and able to go wherever we want, whenever we want, and subject to all sorts of chance events, and now and then even to destabilizing new experiences. Just as inevitably, though, in the longer

term we all walk the same road (to quote Keynes, 'in the long run we are all dead'). One possibility does not exclude the other – on the contrary, one desperately needs the other. It is the law of small numbers, or that of large numbers, and the applicability of statistics that make the difference, as can be expected of quantum-theoretical principles. These statistics only work on sets of related entities, and that is precisely where perspective as a quantized building block provides a homologous underlayer of human experience.

Theme 4: Pattern laws in perspective. Benford's law and Zipf's law, introduced in the Prelude (Theme 1), will be further discussed in this part. These laws show us order even in domains where we neither assume nor expect this at all. We do not understand where the order described by these laws comes from. Impressive, enigmatic, and utterly mysterious – that's what these pattern laws are.

The first natural scientists also encountered highly stable and orderly empirical patterns with their (then) new methods of experimentation and observation. This is why we can even speak of a scientific tradition or a scientific practice today. This order was also perceived as impressive back then. Natural scientists were content to describe it rather than explain it, and they often expressed this order in mathematical terms. Isaac Newton, still widely known for his law of gravity, was truly a great master. He understood empirical research as a way to find the mathematical order of nature. Many in the 16th and 17th centuries suspected the hand of God. The underlying idea was that if nature was so well ordered, it must have been authored and designed. The philosopher Baruch Spinoza even called God equal to nature.[55]

Our environment shows us huge and well-ordered patterns, that much is certain. According to the dualists, this orderliness is an a priori characteristic of this environment, and they attribute it to the deeper nature of the material world. To me, the philosopher Immanuel Kant drove the first wedge into this dogmatic dualist position. However, not until when I was working as a knowledge analyst in my early twenties did I begin to see how strange this idea actually is. A knowledge analyst works with experts, trying to articulate and structure their views and ways of reasoning, so that others (called laypeople, which, of course, raises the status of your work as a knowledge analyst) can use them. And it's just when you immerse yourself in the expertise of 'hands-on experts' that you understand how naïve the idea is that we, as subjective knowing observers, should be able to take in an a priori present and objective environment. What we experience does not come in bite-sized pieces. A top expert, who has acquired knowledge through a rugged process of experience, can look at 'the same' situation as a layperson and see a *totally different situation and order* than the latter.

[55] Religious people see this remark as proof of Spinoza's religious convictions, while agnostics and atheists see it as a euphemistic way of him to distance himself from faith.

In the 1930s, Harvard philologist George Zipf studied James Joyce's book *Ulysses* (from 1922). He discovered an extremely regular pattern in the frequency of the compound words in *Ulysses*. And not only that: this pattern shows up in all books (and in many other domains). This gives a completely different meaning to 'reading the book of nature'. Do we write the order that we perceive in our environment ourselves? That is a Kantian position. Personally, I think that a perspectivist consciousness creates and maintains both a self-awareness and an environmental awareness (and an awareness of everything in between).

Recursive perspectivism rejects a priori distinctions between an *environment* and a *self*. However, we can only understand a 'self' as subject as something separate from, discrete but connected with an 'environment' as object. This is why recursive perspectivism recognizes the enormous pragmatic value of distinguishing an environment and a self *at a given moment*, based on experiences *from the past*, and anticipating ambitions (intentions, objectives) *for the future*. Even I will step aside, in the spirit of the great philosopher David Hume, if a truck is headed for me. In such a situation, I have absolutely no problem distinguishing a self from an environment in a shared and connected action context, since it improves my life in this case.
Misunderstood pattern laws like those of Benford and Zipf, as well as *the path of humanity*, indirectly show the perspectivist basic structure of the process of human experience. It is precisely when a consciousness deals both effectively and efficiently with perspectives, in the sense of generating the most value for the least amount of effort, that the result is the pattern laws such as those of Benford and Zipf and *the path of humanity*. Theme 4 will therefore go into pattern laws in greater depth. It explains how pattern laws emerge from a consistent search by a perspectivist consciousness for coherent harmonic arrangements in networks of perspective. A harmonic relationship (harmonic in a mathematical sense) leads to discrete inversely proportional patterns that explain the workings of Zipf's law. And in complex situations, discrete inverse proportionalities can be tackled excellently using continuous inverse proportionalities. This explains the workings of Benford's law.

The role played by prime numbers and the fundamental theorem of arithmetic has been largely neglected until now. They are decisive for the improvement potential shown by various perspectivist configurations. The patterns found by Benford and Zipf and *the path of humanity* are nothing other than expressions of the fact that a perspectivist consciousness seeks configurations with the most improvement potential (and thus experiential value).

In line with this observation, we dive deeply into the analysis of perspectivist configurations. A *perspectivist analysis* examines both the structural characteristics and the actual patterns of quantities of n perspectives. Such an analysis brings many mathematical concepts to the fore. To be honest, that wasn't comforting to me, since I do not feel myself to be even a gifted amateur mathematician, so I'm skating on (for me) rather thin ice here. However, I continued, keeping in mind John Stuart Mill and Schrödinger, and quickly found myself back between binomial patterns, Gauss curves, and Pascal's Triangle. I saw deep relationships between the structure and content of prime factorizations. Strong

analogies with quantum mechanics surfaced: I'll name two here, wave–particle dualities and uncertainty relationships. Last but not least, I encountered the Riemann hypothesis, and I will explain further on why I think it is true. I am too little of a mathematician to be able to judge whether the route that I am about to take holds water as a complete proof of the Riemann hypothesis, and leave it to professional mathematicians to make pronouncements about it. But I found the relationships between recursive perspectivism and the Riemann hypothesis to be remarkable.

The above makes it possible for me to present a perspectivist *societal quantum theory*, the most remarkable step for the purposes of this book. This theory explains why layers develop in societal practices – layers like those shown by *the path of humanity* – and why these layers are sometimes so persistent. There is a strong analogy with how electrons position themselves in specific, well-defined energy orbitals (shells) of an atom. In my opinion, this is because societal development phenomena and atomic-model phenomena are both based on the same quantum-theoretical and perspectivist hypotheses. After all, the basic hypothesis of this book and series is that we experience recursive perspective, and do so based on perspectivist consciousness.

Patterns like the laws of Zipf and Benford and *the path of humanity*, as well as the many inversely proportional natural-science formulas that have been empirically established, i.e. pattern laws, thus provide a first foundation for the recursive perspectivist hypothesis. They are all based on the recursive manipulation and experiencing of perspective by a consciousness.

Part 3: Societal innovation then ultimately seeks to set a purposeful course for society. The perspectivist landscape (described above in Part 2) is used to enable us to progress further along *the path of humanity* (Part 1) with greater focus and consciousness. We will equip ourselves with some pragmatic working principles for following *the path of humanity* towards better societal quality. This section will also discuss societal navigation in concrete terms.

Recursive perspectivism reveals a huge societal landscape of opportunities and potential. The flip side of these possibilities is that it's easy to get lost in them. The irregular nature of *the path of humanity* so far shows that we do indeed get lost, and regularly too. The continuous rise and decline of social welfare, the outbreaks of world wars, and the excesses of unilateral fascist, communist, and liberal political orders speak for themselves.

This section will therefore examine in more detail how a societal consciousness – our sense of society – can situate and orient itself in this broad societal landscape. As part of the plurimodern transformation discussed in Part 1, we must greatly increase our sensitivity to other actors. This will deepen our sense of where we are in the societal space, of whether or not we are in balance as a society, and where we can find this balance. The a priori structure of the perspectivist improvement landscape gives us one very significant advantage: if we

follow *the path*, sooner or later we'll find a spot where society is better. This is not some utopian whim or a matter of blind faith, but a consequence of the perspectivist hypothesis, inherent in the perspectivist landscape.

This results in the presentation of a conclusive set of six innovative value orientations, each with its very own culture, work principles, and character. They find their way in the innovation or improvement space and help us to find balance. Each of the six makes it possible to choose a particular course in the three-dimensional societal landscape. They are:

1. Process optimization
2. Utilization optimization
3. Team improvement
4. Product/service innovation
5. Multiplication/upscaling
6. Societal broadening

These orientations function as the basic forms of innovation, of improvement during change, on any and every societal scale. Together, they cover methods/techniques (1 and 4), people (3 and 6) and resources (materials, means, 2 and 5. They also collectively cover optimizing exploitation (1, 2, and 3) and ground-breaking exploration (4, 5, and 6). In varying combinations, they offer societal practices at any scale a foothold to help them innovate, whether they be companies, governments, or complex societal practices.

Combined and coherently, these six innovative value orientations make it possible to find the perspectivist balance again and again on a more complex scale, and thus to create even more societal value. Once there is balance, we have a Value Cube (the sides are more or less of the same magnitude). Depending on the nature of the underlying processes I also call this an Improvement Cube or Innovation Cube.

Besides the value orientations, this section presents 'the Backbone': a layered framework, inspired by *the path of humanity*, that helps us to tackle very large improvement processes requiring the involvement of many actors (parties) in a more or less structured way. The Backbone assumes that people take different positions in complex societal contexts, they belong to different social strata, and they will thus react and contribute differently to processes of societal change. Pluriformity is seen as a strength and not a liability. Societal layers are identified and connected. This helps in approaching even the largest societal improvement processes, such as those involving the climate problem, even if it does not turn out to fix everything at once. We will have to make efforts, on average, to create value, as we always have.

Lastly, I will discuss what are called 'Proficiency levels' in societal improvement. If we intend to introduce a major societal improvement, whether it involves a problem-driven activity (such as the climate problem) or an opportunity-driven one (such as innovation policy), we can do so in several ways, from small-scale and personal to multi-scale and

professional. *Proficiency levels* describe five levels of competence in societal improvement, drawing more and more on consequences from the concepts in this book: 'Beginner', 'Advanced Beginner', 'Beginning Performer', 'Proficient Performer', and 'Expert'. The aim of these levels is to make it easier to see what a societal innovation looks like as far as its preconditions are concerned, and where additional preconditions must be fleshed out.

Volume IV of this Society in Perspective series, *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation), filled the societal improver's tool chest with illustrious names like 'The coffee list', 'The camel', 'The PAIR analysis', 'Multi-actor models', and 'Relational analysis' (see IV-D *Basismethoden voor Multi-Actor Procesmanagement*). Using them in combination with the six innovation methods of the Innovation Cube, the Backbone, and the Proficiency levels, it will become possible for people to work together to improve our society more by means of focused societal innovation, and thus consciously moving further along *the path of humanity*. This applies to societal practices at any scale.

Wrap-up and prelude to the future, the last part, ends with a general exploration of the implications for various societal partners. The prescription turns out to be amazingly simple, and is described by the term plurimodern transformation: find coherence and cooperation, and go exploring the future together. The most important key? Know yourself, and get to know 'the other' better.

3

Theme I: Path and Landscape (Prelude)

3.1 Of Micro and Macro

'I never promised you a rose garden'
Hannah Green, 1964

This book revolves around multi-actor practices, actors, and improvement perspectives. Improvement perspectives describe the steps actors take to make improvements. Based on the particular details of the object–subject tensions experienced by these actors, improvement perspectives – on average and in large quantities – have recognizable properties (such as effort and value). They can be seen as building blocks, forming the components of societal practices. These societal practices align themselves more and more with the contours of a mysterious and until-now hidden perspectivist structural landscape, especially as they become somewhat more complex.

In this prelude to Part I of this book, I'll get straight to the point by giving a first glimpse of the perspectivist structural landscape in which humanity is finding its way through society. To do so, I use an argument taken from an old tale by Plato[56] in which I use both the panoramic macroscopic viewpoints of the visionary ancient Greek philosopher Thales and the extremely practical micro-viewpoint of a Thracian servant girl to shed some light on the characteristics of the path that we are walking together.

3.1.1 A first glimpse of the perspectivist landscape

It's usually easy to see a single composite improvement perspective in isolation. Eating an ice cream cone or accepting a new job is easy to understand as a perspective (i.e. you wanted some ice cream, then you got an ice cream cone, and now you are eating it). Having multiple coherent perspectives is still a familiar situation, as illustrated by the multi-actor models shown earlier (section 2.1.6 of chapter 2). For example, we wait for the bus to come because we want to go somewhere, and we expect that the bus driver will take us there at the scheduled times. Our society exists by the grace of these kinds of coherent agreements, assumptions, and expectations. Our society can therefore very easily be conceived of as consisting of recursively coherent improvement perspective.

However, to comprehend the structure of *really large* amounts of recursive coherent perspective, you need a good idea of how to look. One preliminary idea is that increasing numbers of improvement perspectives in coherence and cooperation results in progress, and more and more improvements. This general relationship is roughly what happens on

[56] Plato, Theaetetus

the macroscale. However, things can be totally different in particular situations on the microscale, as I will explain below. The relationship between the number of coherent perspectives on the one hand and improvement potential and value creation on the other is of a quantum-theoretical nature. This often makes it very quirky and apparently chaotic on smaller scales.

Introduction of improvement potential and experiential value

The term 'improvement potential' appears in many places in this book, as does the closely related concept of 'experiential value'. Both revolve around creating and experiencing value. An improvement perspective is aimed at generating value that is experienced by an actor, and thus it entails a certain amount of improvement potential. An improvement perspective has improvement potential, which is reflected as experiential value when this potential is used. Buying and enjoying an ice cream cone is an example of a pleasant prospect (improvement potential), that is experienced (experiential value) if and when this perspective is actually acted on.

Value is actually almost never *exactly* proportional to the number of perspectives. The particular configuration of the perspectives strongly determines the average value of the perspectives concerned. Thus, although you can say something about the average value per perspective that goes along with using a given number of perspectives, it will depend partly but significantly on the particular configuration (coherence, structure) of these perspectives. I discovered this while writing my dissertation and will go into it in even greater depth in this book.

However, for the sake of convenience, let us focus, for the moment, on the fact that, if you know nothing about the configuration, recursive perspectivism links an average value to perspectives. Linking an average value to random perspectives is unusual. A specific value is usually linked to specific perspectives: you buy an expensive car, or get rid of an old clunker, or you're preoccupied because someone you care a lot about is sad.

Recursive perspectivism instead assumes a value that can be statistically expected – an average value for every perspective. In individual cases, this can result in something very different for each concrete perspective, and you'll be way off the mark. But it's when the number of perspectives increases that this works better and better, because deviations upwards and downwards cancel each other out (they annihilate each other). This is true even if we consistently improve and learn, which, of course, is a utopian dream, since we all have our ups and downs, whether as individuals, as groups, or as entire societies.

What I think lies behind this average value is an adaptive mechanism that is as phenomenal as it is simple. We try to explain a perspective that stands out as positive (we specify and describe it in detail). We discard a perspective that only produces very little value, or we throw it on a heap with other less interesting perspectives, resulting in a new perspective. In these kinds of ways, a consciousness works continually on the condition of its perspectives, separately and in coherence, striving as it were for ever-higher average value

per perspective. The improvement potentials quickly move closer towards equalling the experiential values of the perspectives in question.

Improvement potential is thus the value that a given number of perspectives in a particular configuration on average promises to give. It is the value that you (a conscious being, an actor) on average can *expect* from it, before you actually use it.

Experiential value is the value produced that is *really experienced* by a consciousness or an actor undergoing or experiencing perspectives, thus by using perspectives. What one experiences is, after all, concrete and manifest.

Speaking on average, over the somewhat longer term, the improvement potential *previous to* the experience will be equal, or at least strongly correlated, to experiential value *during* the experience. However, this is only statistically true, so individual cases may be very different. Then a conscious being will be disappointed or even defeated, or even pleasantly surprised.

In general and on the macroscale, an increase in the number of perspectives results in improvement (just look at *the path of humanity*), but in many individual cases, growth of the number of perspectives actually results in regression. These cases are well defined as far as perspectivist microstructure goes. Although this may seem complicated at first glance, it's also something that we all intuitively recognize; remember the proverb 'Two's company, three's a crowd.' Sometimes a circle of friends or a team at work functions well at a given size, and adding more people only reduces the quality, producing decline. In an emergency situation, one manager in a crisis centre yelling 'everyone out now!' will do the job. More would be less, in other words, a case of 'too many cooks spoiling the broth'. Putting an apartment building in an idyllic mountain village will inevitably destroy some of the village's attractive characteristics. And the huge streams of refugees coming to Europe from the Middle East and Africa are worrisome to even the most well-meaning European citizens in the short term, whether or not the latter are sympathetic to the refugees' plight.

We are used to understanding and explaining these kinds of phenomena in terms of their *content*, because that's closer to our conscious experience of them. But there is also a *structural* side to them, a side that we have not understood well up to now due to our preoccupation with content. Seen from this structural viewpoint, these structural characteristics are inherent in the perspectivist landscape.

Perspectivist landscapes are not easy to comprehend. They are based on number theory, on quantum-theoretical assumptions, and on prime numbers. However, they provide both exceptional panoramas and an explanation of the societal paths we walk. I also think that perspectivist landscapes explain the many mysterious pattern laws that govern our world and our societies, such as Benford's law and Zipf's law (they will be described in more detail in this prelude, and given a perspectivist explanation further along in the book). In my

opinion, *the path of humanity* is a pattern law itself, the most formidable one that we can know. To understand the pattern law of *the path of humanity*, it is particularly worthwhile to clarify the matter of perspectivist landscapes. This book will make a start.

This prelude aims to offer an initial understanding of why we as humanity should even follow particular structural paths at all, and why we should do so while we are actually unaware, or hardly aware, of them. It gives a first glimpse of where they are, and it also will make it easier to understand why following this kind of path does not promise a smooth journey upwards, but is necessarily accompanied by jerks, jumps, and regression – why societal development inevitably is a bumpy ride. It also will explain why innovators of society ought to take this into consideration. After all, it always makes sense to adapt the way you move along the path and modify your equipment if the path is full of bumps, potholes, or even ravines.

To make this all more comprehensible, I'll contrast a classical, continuous macroroute with a probabilistic,[57] quantum-theoretical microroute.

3.1.2 One big mountain or many peaks and valleys?

Coherent perspectives follow structures that resemble a landscape. Societal practices are near the peaks in this landscape, because that is where the most societal value and societal quality is generated.[58] Societal development, *even unintended, unconscious autonomous development*, finds the peaks by following paths and leaving recognizable tracks in this landscape. In the process, societal practices also regularly regress, and then clamber back up again. Usually, the new effort goes faster because now they know more about the path they have followed, but it can also mean they now aim for a lower 'minor peak' because the previous one has become out of reach.

The perspectivist landscape can be seen in several different ways. On the continuous macroscale, it is one long smooth slope upwards, to increasingly further societal improvement as more and more perspectives are involved in coherence and cooperation. On the discrete microscale, however, the landscape consists of many peaks and valleys, including unexpectedly sharp peaks and deep rifts.

[57] Probabilistic: based on probability theory.

[58] In general, things we distinguish as entities are found near peaks in this landscape. The fact that there are peaks and valleys in the perspectivist landscape is why we distinguish discrete things from each other, and not one large continuum. Take the different pieces of furniture in your living room, the different words in a book, or the different species of living things, or in general the diversity of kinds and things around us and in our history. According to recursive perspectivism, the world is inherently discrete, and the peaks in the perspectivist landscape are what we prefer. This explains, for example, why we hardly ever find the missing links between successive evolutionary steps in evolutionary theory. We go quickly from peak to peak in the perspectivist landscape, and tend to hang around the peaks. Why should we hang around in a valley when the quality is worse there?

This distinction between macroscales and microscales is in line with the different ways that societal utopians and the societal conservatives (or the realists, as conservatives call themselves) look at the world. The utopian and the conservative always remind me of Plato's story of Thales and the Thracian servant girl. The philosopher Thales, looking up to study the stars overhead, forgets to look where he is going, trips, and falls into a well. The Thracian girl bursts out laughing at the philosopher's lack of sense. Thales sees the wider landscape and possible improvements at the largest scales, while the girl sees the well in front of her feet. Of course, they both have a point.

The utopian (Thales) sees mainly the larger and wider contours of the macrolandscape. He wants to be in the higher position he sees shimmering in the distance, and he neither knows nor cares much about the gaps and obstacles on his path. He just sets out, often bashing his nose on something or even breaking his neck. Now and then he's successful and reaches a higher peak. If we only listened to the utopians, metaphorically speaking our wells would be full of people with broken necks.

The conservative (the servant girl – Plato was not very politically correct) sees mostly the ordinary obstacles and gaps right in front of him or her, on the microscale. Conservatives focus on the environment immediately around them, ignoring the wider surroundings and rarely move from their place. They are extremely cautious and not very ambitious, or as they would say, they're 'realistic'. And how can you say they're wrong, at least if you call yourself 'realistic' too? However, realists miss out on the opportunities of the many higher peaks in the distance. If it were up to the conservatives, we'd still be hunter-gatherers, and we would never have followed the course of *the path of humanity*.

Often, when optimistic well-meaning people decide to just get out and climb that one big continuous mountain, they have a very bad experience. Then they conclude, sometimes bitterly, that the world around us is not fair. Well now, who among us has managed to grow older without getting any scars? With your nose up to the canvas, you would indeed come to the conclusion that societal improvement may be possible in theory but impossible in practice. Cynicism, the ultimate and rigid continuous object–subject tension, rears its head. Persistent cynicism quickly results in lowering the bar of what you think is possible, and curbing your ambitions. All too often, we see an optimist become a cynic and end up a pessimist. Being aware of this pattern is good for your well-being.

By contrast, recursive perspectivism has a number of very unusual characteristics. One of them is that it can reveal a landscape that had until now carefully kept itself hidden. The perspectivist landscape shows not the content, but the potential coherent structures, the configuration of improvement perspectives, the building blocks that together form our societal practices. It's precisely this discrete perspectivist structural landscape that has many peaks, gorges, and valleys. Whether you're looking at a person situated in a particular place and time in a particular role, a human life, a particular societal practice, or the entire

path of humanity, in theory they are all structurally networks of coherent improvement perspective.[59]

As a traveller seeking the peaks, you'd better know where the gorges and valleys are in the landscape, so that they won't come as unpleasant or even outright dangerous surprises. *You can send scouts ahead, then bridge the gaps together.* This book is my wholehearted plea for a much more active course of societal innovation, one that is also more concerned about the losers– since every societal change has its winners and losers – than we do now. The fact that we treat our losers so miserably makes the conservative even more conservative. It organizes resistance where we should be walking the path together. It keeps us chained to the well.

Knowing this perspectivist landscape will absolutely not stop those natural accidents of cosmic whimsy that send us spinning away or now and then give us a good shove in the right direction. Accidents, individual illnesses, a good harvest, meeting your life partner – as microphenomena they remain largely unpredictable and elusive as they were before. However, an understanding of the path and landscape does arm us better as subjective people dealing with an objective environment in all its capriciousness. This perspectivist landscape plays its part on all scales, but especially on the more complex scales is when it reveals its structures in the form of pattern laws, provides support and structure, and enables us to benefit from it as intentional human beings.

This book therefore allows the reflective pragmatist to take the floor quite often. Reflective pragmatists unite Thales' reflection and the wider view with the Thracian servant girl's short-term pragmatism. They look far away from themselves, while being keenly aware of the situation right at their feet at the same time. They link dreams and deeds. As humans, we are eminently capable of being reflective pragmatists. Together, we all benefit from it.

This book will unveil parts of the perspectivist landscape from a reflective pragmatist perspective. It will help us to better understand why *the path of humanity* arose, and why it looks the way it does. *The path of humanity* is anything but a random winding path. *It follows a mountain ridge of relatively higher and higher peaks and deeper and deeper valleys in an a priori perspectivist landscape, and in terms of perspective, these peaks correspond to possible stages of development of our societal configurations.* Seen from close up, the path of our societal development looks chaotic and desolate. Only from farther away can we see the path leading to ever-higher peaks in a perspectivist landscape, combining the view of Thales with that of the Thracian servant girl. The perspectivist landscape is a partial but strong determinant of how we can improve things with each other, precisely at these larger scales.

[59] In complex situations, statistics will do its job of averaging things out, a point used abundantly throughout this book!

3.1.3 Pattern laws

People suspect intuitively that this perspectivist landscape exists. If we experience a problem or see an opportunity and we know 'in what direction to look', then we are experiencing this very landscape, we know what direction to take to ascend. We also see very concrete manifestations of the existence of this landscape. For example, if we look at characteristics of Western cities, then it turns out that cities strongly resemble each other as to characteristics such as the number of dentists or petrol stations per capita, the distribution of income, or the amount of crime or electrical cable. Of course, there are regional and national differences, but these kinds of patterns apply to large segments of our societies, and because they do, they are astonishing and impressive.

Perhaps now you're thinking 'There's nothing so special there; everyone needs a dentist and a car, don't we?' Or, if you think more in terms of wishes and needs instead of means, 'We all need clean, healthy teeth and mobility, don't we?' The crucial point here is that no great Western planner is planning the number of dentists or petrol consumption. The number of dentists per capita follows a pattern without any manipulation at the scale of the Western world. If you look at the small, detailed scale, then the occurrence of dental problems is actually rather randomly distributed and even the number of dentists per inhabitant is variable. If you look at the large and general scale, then clear patterns emerge. It is not true that large-scale order arises from small-scale order, or that large-scale disorder arises from small-scale disorder. Large-scale order actually arises from small-scale disorder, and large-scale disorder from small-scale order!

You may find the distribution of dentists fairly straightforward. But there's a much more unusual pattern law: Benford's law.[60] In 1881 an astronomer, Simon Newcomb, noticed that his logarithm books showed more wear at the pages with entries starting with 1 than at the pages with entries starting with 2, more at the 2 than the 3, and so forth. At the time, these books were indispensable tools for engineers. Apparently, engineers looked up lower numbers in the logarithm books much more often than higher ones. In 1938 Frank Benford rediscovered this pattern of wear. He then looked at a much wider range of phenomena, such as population tables of American cities, heights of mountains, street addresses, atomic weights of elements, the surface area of rivers, sports statistics, and many more sources, and found that the same percentages recurred. In approximately 30% of the cases the first digit was a 1, in approximately 18% of the cases a 2, in approximately 13% it was a 3, in approximately 10% it was a 4, continuing to in approximately 5% of the cases where the first digit was a 9 (0 is not included, as it was rarely in first place). This distribution is shown in the table below. This phenomenon now bears his name: Benford's law. It is an intriguing empirical pattern whose origins are shrouded in mist. Why on earth should mountains conform to the same pattern as street addresses? You will find Benford's pattern even if you

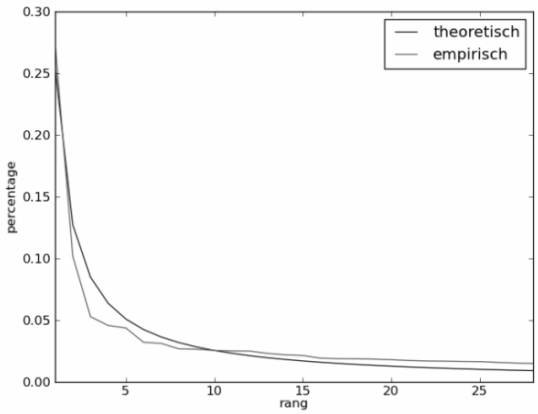
[60] I use the word *pattern law* as a general category for broadly identifiable statistical patterns that at first glance are unexpected, such as Benford's law, Zipf's law, and the ultimate, *the path of humanity*.

sort enough of the numbers that randomly occur on the front pages of random newspapers. You can test this yourself: the larger and broader the sample – of whatever you choose – the more inevitable this pattern is. Here as well, without any management guiding it, across all these kinds of numerical data, there is a pattern. And why is it precisely *this* pattern? It is completely astonishing.

first number	1	2	3	4	5	6	7	8	9
%	30.1	17.6	12.5	9.7	7.9	6.7	5.8	5.1	4.6

Benford's law: the proportions among the numbers up to 10 as the first digit of numbers from non-prestructured sources.

Zipf's law is another of these mysterious pattern laws. George Kingsley Zipf (1902-1950) was a professor of philology (languages and letters) at Harvard University, who discovered this next intriguing, widely applicable pattern law. Zipf's law describes how an enormous diversity in data, such as the words in books, the population of the largest US cities, and the population of the largest countries in the world are all governed by a particular relationship. The frequency and rank of words in a book are inversely proportional, and the populations of cities and countries are inversely proportional to their rank. Below is an example showing this pattern for the cities in France.



Zipf's law for the 28 largest cities in France. The smooth line shows the theory (inverse proportionality), the wavy line practice (source: University of Ghent).

An inverse proportionality between two quantities x and y is characterized by the formula c=x·y with c as a constant. Let's say c = 100. If the ranking x runs from 1 to n and only allows whole numbers, then the following are possibilities for x and y: (1, 100), (2, 50), …, (5, 20), etc. As the x increases, the y must decrease, and vice versa, according to the inversely proportional relationship. That's how an inversely proportional relationship works.

Zipf's law is just as tricky to explain as Benford's law. It is especially puzzling that the frequency of words in books and the sizes of cities can be captured in distinctly discrete inversely proportional macropatterns, while there is no conscious effort by anyone to bring them in line in this way at the microscale. Why they do this is a huge mystery. Zipf himself suspected a relationship with the principle of least effort.[61]

What I personally find so intriguing about these phenomena and pattern laws is that although we often consciously make small-scale improvements that are hugely subject to chance and variations, all of these partly conscious, partly coincidental small improvements in coherence with each other still result in clear patterns at larger scales. At these huge scales, there really is no explicit, collective human consciousness at work, no strategic, political, or any other kind of conscious guidance forming these patterns. In a seemingly miraculous way, the largest macro patterns (the pattern laws) appear from repeated random micropatterns with large and sometimes enormous variances. I heartily agree with the following quote from Zipf:

'For statistics are hateful to the human mind; they are painfully definite for the group without being particularly definite for the individual.'

Pattern laws are based on the perspectivist landscape

We do not understand pattern laws like those of Benford and Zipf. I think this is because we look for their origins in an objective environment around us, since this is where these empirical patterns become manifest (says the dualist). However, I say, while feeling the spirit of Immanuel Kant in my presence as I hold a copy of his *Critique of Pure Reason*, the origins of these patterns are not at all in an objective environment that is already around us. There is absolutely no point in postulating an a priori objective environment, and then only looking for order in it.

I think that these and other pattern laws, including *the path of humanity*, are based on the contours of the perspectivist landscape that has been hiding until now, and on the action of a perspectivist consciousness. An understanding of pattern laws requires another Copernican revolution. Nicolaus Copernicus revolutionized our understanding of our place

[61] I think it revolves around the relationship between effort and value, which becomes proportional in improvement perspective, but more about that later.

in the universe.[62] Kant stated that it was not an *a priori* environment, but a priori cognitive categories that gave the world structure. He called this new insight a second Copernican revolution. The perspectivist understanding requires yet another Copernican revolution, as experiential worlds, be it cognitive, material, or a complex and hybrid mixture, follow the contours of an *a priori* perspectivist space.

Pattern laws thus have a recursive perspectivist foundation. The action of a perspectivist consciousness encompassing both object (awareness of environment) and subject (awareness of self) is the source of these patterns. Our consciousness models these patterns by generating perspective, already optimizing value and minimizing effort, though we are unaware of it. This is because we move about in a landscape of perspectivist structures, and of possible perspectivist coherence, a landscape that is already (a priori) present. How we flesh out this landscape on the microscale and exactly which route to take is up to us. However, the macrostructure of this landscape is fixed, and it's just this structure that ensures preferred paths and positions, which are accompanied by the mysterious pattern laws.

The naive dualistic premise was (and still is for most people) that the environment is just there beforehand, and that we should get to know it during our lives to enrich our experience. Immanuel Kant weighed in and concluded that it are precisely our *a priori* cognitive categories that give structure and meaning to things. According to Kant, the world outside of our experience, '*Das Ding (die Dinge) an sich*' as he called it, is certainly present, but will always be impossible for us to experience. Let me call this the antithesis. Recursive perspectivism assumes that awareness of environment and awareness of self, of object and subject, are two components of one and the same recursive perspectivist game, in one great synthesis.[63]

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[62] Immanuel Kant, 1781, *Kritiek der reinen Vernunft*. Kant posited that that which is known (the objective things) conforms to that which knows it (the subject). According to Kant the thing in the environment conforms to the sense that observes, thus object conforms to subject. He himself called this a second Copernican revolution (the first one being initiated by Copernicus himself). Nicolaus Copernicus posited that instead of the Sun revolving around the Earth, the Earth revolves around the Sun. Our cognitive power thus determines what can be known, and how it can be known. The revolutionary thing about Kant is that he usually assumes that the objective world is already present, and that we only need look around us properly to perceive it. Kant's famous *Dinge an sich*, thus reality before we observe it or know it, is for us impenetrable and incomprehensible, literally unknown. I personally think that both occur: sometimes object conforms to subject, and sometimes subject to object. The object–subject relationship is, I think, never absolute, and always bilateral.

[63] This synthetic position, philosophically speaking, has strongly *idealistic* traits, were it not for the fact that, insofar as I understand idealism, idealism is actually closely related to spiritual spheres, and thereby actually opposite to materialism. I know too little about idealism, so I'll let professional philosophers make any additional pronouncements about it. Personally I situate recursive perspectivism between materialism and mentalism, and I see the two as the extreme and unreachable outer limits. See also Volume I of this Society in Perpective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation).

Why, then, do I think that pattern laws are based on recursive perspectivism? Because just like Zipf's patterns, the perspectivist balances also lead to discrete inverse proportionalities. And these inverse proportionalities in turn lead to Benford's pattern. Additionally, they play a key role in *the path of humanity*. I will substantiate this later in the book; here in the prelude, I will explain where this mysterious inverse proportionality comes from.

Probabilistic inevitability

In individual cases and in the short term and on the small scale, we are almost unaware of the perspectivist landscape directing us. We have our nose right up to the canvas and are painting with a fine brush. The concrete intentions, thus the particular perspectives of individual actors, are dominant. As I have just depicted them, when in coherence, they take the form of multi-actor models.

However, once there are many cases involving the long term and the larger scale, this perspectivist landscape starts to set the tone, and we conform to its contours. The patterns no longer let themselves be restrained by the uniquely situated person wielding the fine brush. If you travel around, you cannot ignore the landscape. It's as if you're looking at winding roads in a mountainous landscape: they are usually on logical routes. But as I've said, we aren't seeing the perspectivist landscape yet.

Although the landscape is not deterministic,[64] it does lead to likely paths in terms of probability. As the number of steps steadily increases, this path becomes more and more inevitable. This is like the way the average of an increasing number of rolls of a dice moves inevitably but not exactly predictably towards 3.5. Although the result of each individual roll is completely up to chance, the totality of rolls takes a clearly recognizable and inevitable path. *The path of humanity* is an example of a very similar phenomenon, and the most complex example on the largest scale.

On the smaller scale we feel we have free choice and free will, subject to some degree of chance, and on the larger scale, we unconsciously behave as if we're all on a leash together. On the largest scale of all, *the path of humanity* rises before us majestically. We follow the highest mountain ridge in the perspectivist landscape, doing the best we can to stick to the path but now and then straying. It is a manifestation of a probabilistic pattern law on the largest scale we can know.[65] What one individual wants or experiences won't perceptibly tip the scale.

[64] Deterministic: inevitably leading to a specific outcome due to causal processes.

[65] Probabilistic: does not revolve around absolute truths, but probabilities. With large numbers of events, like the average of many rolls of a dice, pronouncements can be made in terms of likelihood, but nothing is absolutely certain.

3.2 Two interpretations of the landscape

The utopian and the 'realist', Thales and the Thracian servant girl, each see a different landscape of object–subject tensions. This coincides with a continuous macro-interpretation and a discrete micro-interpretation of the improvement landscape. Both interpretations are based on recognizing object–subject tensions, and how a perspectivist consciousness works (more about this later in the book).

Below I will first present the continuous interpretation of object–subject tension, followed by the discrete perspectivist interpretation.[66] The continuous interpretation shows the global improvement landscape on the macroscale. It is visionary, assuming that there is more or less one smooth qualitative societal peak that we can all climb together. So get on your way, says the utopian. In this view, there is an emphasis on the direction, and many small steps make one large one.

The discrete interpretation is quantum-theoretical in nature, and unlike the continuous interpretation, it shows that on the microscale there are many unexpected peaks and valleys, as well as the location of hidden gorges and canyons. It makes it clear that sooner or later many small steps upwards lead to obstacles, or even a treacherous abyss. So stay where you are, says the conservative.

3.2.1 Do many small steps *really* make one large one?

Both interpretations have a point. There's always an improvement on the horizon, and you can always stumble into a hole. That produces a very important result straight away. Many small steps (to improvement) make one large one, as the saying goes. That sounds so obvious that it can't be denied. Yet recursive perspectivism refutes this proverb. The a priori perspectivist landscape is very hilly on the microscale. You can get to the top of your own little hill with little steps, but you can't get any further.[67] You're stuck on the Holterberg (a famous Dutch hilltop, all of 57 meters high).

[66] For the 'hard science' types among us: the continuous interpretation follows a field-theoretical approach, the discrete interpretation follows a quantum-theoretical approach.

[67] In transition theory this phenomenon of economic and socioeconomic gridlock is also called lock-in. See e.g. Kemp, René, Rotmans, Jan and Loorbach, Derk (2007) 'Assessing the Dutch Energy Transition Policy: How Does it Deal with Dilemmas of Managing Transitions?', *Journal of Environmental Policy & Planning*, 9: 3, 315-331. Recursive perspectivism offers a structural quantum-theoretical (and thus probabilistic) perspectivist explanation for the principle of lock-in.

Thus the argument of the incrementalist is invalid.[68] Many small steps undeniably do make one big climb, but because of its many microscale peaks and valleys, the perspectivist landscape rarely allows it. Therefore the incrementalist misses the mark.

We certainly have to climb the peaks right around us, but we will also need to look ahead together at the broader horizon, and prepare to take larger leaps to bypass obstacles and gorges. Many of these attempts will fail, and I say this not only from experience, but because that is the micronature of the landscape. We can only reach the much higher peaks by consciously and carefully seeking and approaching them without getting hurt. (How we can do this is the subject of Part 3.)

Below is an explanation of both interpretations of the landscape: the continuous field interpretation on the macroscale and the discrete quantum-theoretical interpretation on the microscale.

3.2.2 The continuous field interpretation: one long mountain ridge

For the utopian, *the path of humanity* is a virtually smooth rising path. It only requires that we all agree about it, that is, that we want to reach the top together. Hey ho, all together now! We'll just keep removing all the object–subject tensions as they occur, creating more and more societal value. We know the difference between good and bad perfectly well, after all, and if there is a difference of opinion, everyone can speak for themselves. If we keep improving together, keep joining forces more and more, and we'll scale this tall societal peak almost without effort. Up one long slope we climb, in ever-greater coherence and cooperation, towards an optimal society.

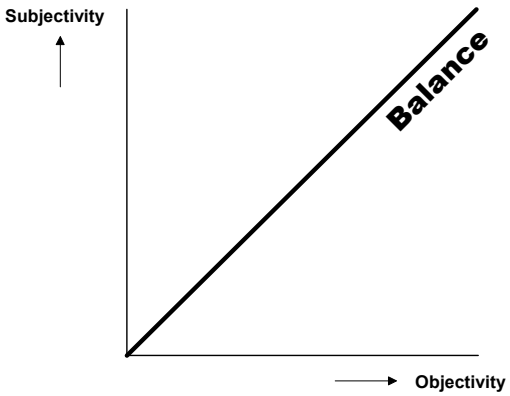
It is an ancient myth, the dream of the utopian. If only we all could… This idea is in the Bible, in the story of the tower of Babel. People wanted to build a tower together that reached to heaven. United, they got to work. But they were unsuccessful. God prevented it by confounding their languages. Since they could no longer understand each other, coherence and cooperation went out the window, making it impossible to finish the tower. The symbolism in this great story is laid on thickly: you can dream of everyone being united in harmony, but it's not going to happen. The story of the tower of Babel makes short shrift of it, in essence outlining the improvement dilemma mentioned earlier. Pieter Bruegel the Elder painted several magnificent paintings of this tower.

Nevertheless, let us give the floor to the utopian for a minute. After all, it's in our nature to improve; it's the human condition. Improvements are hugely attractive. The tower of Babel may not have been finished, but it was nevertheless imposing in its time, and the very idea of it got people started building it. And, as *the path of humanity* shows, people have built

[68] Increment = small step up; incrementalist = someone who wants to take many small steps upwards in a row.

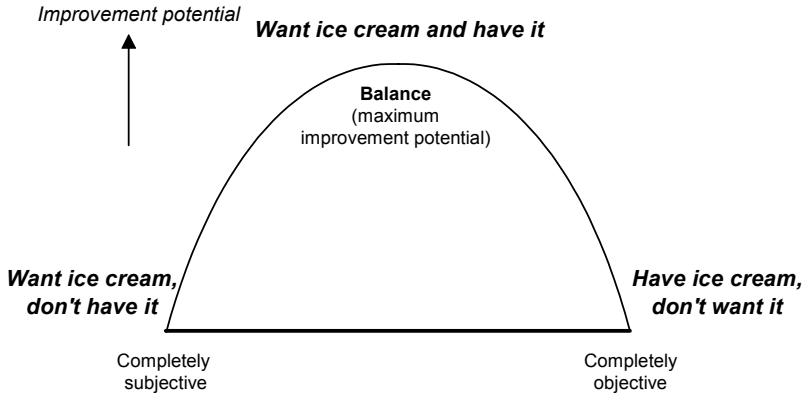
subsequent towers in general higher and higher. Their heights neatly follow our ragged route along this path, as you might expect. The height of our towers shows a fluctuating but, on average, rising pattern over time, correlating with *the path of humanity*.

Earlier I stated that the highest improvement potential can be found where objectivity and subjectivity are in balance, and the object–subject tension is thus the highest. This is on the balance axis (see figure).



The most power for improvement is on the balance axis.

To understand this better, remember the ice cream cone. If an ice cream cone is within your reach (object), but you're not interested in it (subject), the power of improvement is terribly low. You can have it (objective), but you don't want it (subjective). Conversely, if you really want an ice cream cone (subject), but there is no ice cream anywhere in sight (object), the power of improvement is also terribly low. You want it (subjective), but you can't have it (objective). If there is an ice cream cone nearby (object) *and* you want it (subject), right then is when the power of improvement is the greatest. That is precisely at the balance point. You want it and you can have it too! If you only feel a little bit like it, or if the ice cream cone is quite far away, then the power is somewhere in between.



The maximum improvement potential is at the balance point, where objectivity and subjectivity are equal.

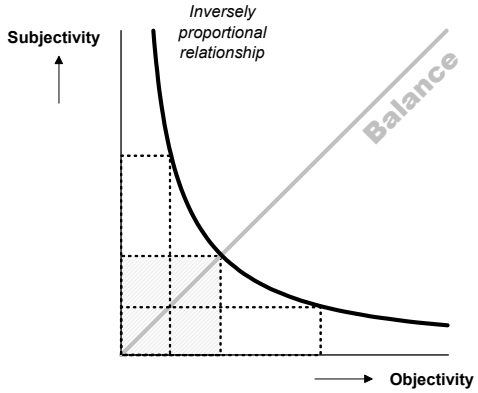
If one of the two (objectivity or subjectivity) is low, then there won't be much intentional improvement. If both are high, this creates the highest improvement potential, in other words, the most power to improve. This applies on all scales, for all amounts of coherent recursive perspective: to wanting ice cream cones, as well as to taking the next societal step from our loudly creaking late-modern world to our new and improved plurimodern society in the future. The desire for a plurimodern society (the need that is felt and the view of the possibilities) grows cautiously, but objective changes are only experienced bit by bit.

Larger scales involve more component improvement perspectives. *Thus I indicate the scale of societal practices in terms of numbers of improvement perspectives in coherence and cooperation.* However, on all scales, it is the balance that delivers the most improving power. On the balance axis, objectivity and subjectivity are directly proportional: if the objectivity (o) increases by a factor, then the subjectivity (s) increases by an equal factor. Put into a formula, this direct proportionality looks like this:

$o = c \cdot s$ with $c = 1$, or: $o = s$

If we move off the balance axis while maintaining a constant amount of improvement perspective, either the subjectivity will become greater and the objectivity less, or the objectivity will become greater and the subjectivity less. The farther away we are from the balance axis, the smaller the power of improvement, and the closer we are to the balance axis (the more in balance) the better. The higher we are up this balance axis, the greater the scale and thus the total improvement power, and the improvement potential. The utopian still seeks the diagonal, and follows it to as high a position as possible, and with this combination thinks that by improving, he/she will have automatically come out at a position further and further to the upper right, at the horizons of the balance axis.

The essence of the *continuous field interpretation* of improvement is now that we can seamlessly divide an available amount of improvement perspective (as the building material of societies) over objectivity and subjectivity,[69] in any proportion desired.[70] Objectivity and subjectivity are equal all along the balance axis, making a square in the figure below. The amount of available improvement perspective corresponds to the surface area of this square.



The possible distributions of a given amount of perspective are depicted with an inverse proportionality

The same amount, i.e. the same surface area, can also be made into a rectangle, as long as length and breadth increase and decrease proportionally. In the figure above, the square and the two rectangles all have the same surface area, and thus have an equal amount of improvement perspective available. The surface area is equal to the proportion of objectivity times the proportion of subjectivity. For the surface area of the square, all the points that satisfy this comparison are shown with the curved line. The number of points on this curved line is infinite because of the continuity.

[69] For philosophically inclined readers: this makes a Spinozan notion of improvement perspective. Spinoza suspected that a single substance had to be at the foundation of the notions of mind and matter, of attention and things (the two essences of duality *res cogitans* or thinking and *res extensa* or the 'extended thing' – matter – according to Descartes, one of the most outspoken mind-matter dualists). I call this single substance recursive improvement perspective.

[70] For many complex and composite systems comprising very many improvement perspectives, this assumption of continuity seems absolutely plausible. For example, if you have two large enough glasses you can divide a litre of water into an infinite number of divisions, can't you? Yet, the discrete, quantum-theoretical interpretation will make the misconception underlying it clear.

The strong relationship between subjectivity and objectivity (the curved line) involves exactly the inverse proportionality I just mentioned, which is such a solid foundation of the many pattern laws:

$$o \cdot s = c$$

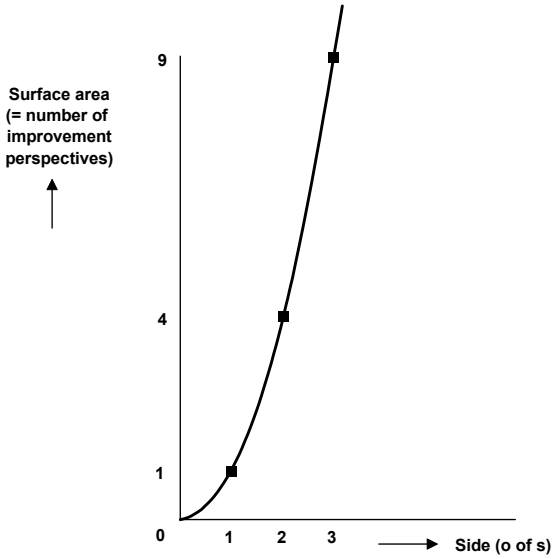
in which o = proportion of objectivity, s = proportion of subjectivity and c (constant) = surface area = the available amount of improvement perspective. We will see much more of this inverse proportionality in this book.

In continuous inverse proportionality, o can increase infinitely as long as s is small enough to compensate for it, and vice versa. This is because, at least according to the continuous interpretation – the *number* of squares comprising the surface area can be made infinitely large as long as these squares themselves can be made extremely small. This is expressed in the presence of two limits at the horizons of the axes: as o gets larger, s moves closer to zero, and as s gets larger, o tends to move closer to zero. But they will never reach the axes, since objectivity requires subjectivity, and vice versa.[71]

Now, as you follow the balance axis higher and higher, objectivity and subjectivity increase equally, and the relationship between o and s (equal along the balance axis) and the available amount of improvement perspective (surface area) is quadratic. The table below shows a number of points. If you plot this relationship, you get the continuous graph below the table:

Objectivity	*Subjectivity*	*Area = available amount of perspective*
0.5	0.5	0.25
1	1	1
√3	√3	3
2	2	4
3	3	9
√10	√10	10

[71] These two lines are asymptotes. The inversely proportional curved line vertically approaches the subjectivity axis, and horizontally approaches the objectivity axis, but of course they will never meet. The subjectivity and objectivity illusions appear here: the famous mind-matter dualism. Dualism sees only the extremes of the entire societal spectrum.



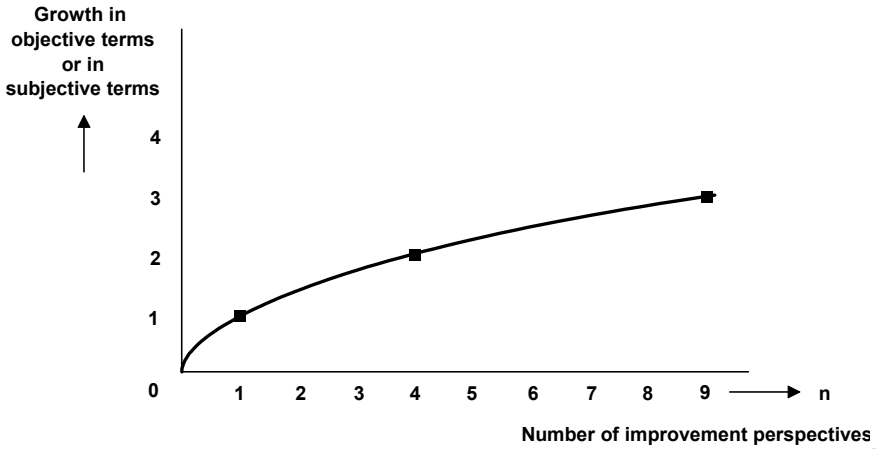
The area of the square in the previous graph along the balance axis has a quadratic relationship to the proportion of objectivity or subjectivity (since the sides of a square are of equal length).

At positions farther away from the balance axis too, the area is equal to o·s. But average improvement potential decreases per perspective as you move farther away from the balance axis. This is why the balance axis is the most interesting path in the continuous interpretation.

The continuous interpretation conceives of societal improvement as one large slope of improvement that we ascend together. We seek the ridge, where subjectivity and objectivity are in balance, and follow it upwards. If we change direction and ascend along another axis, then this one will generally be less than optimal in terms of improvement potential, since objectivity and subjectivity are not in balance. However, this axis will ascend as well. The higher we get together, the better it will be. This is the tower of Babel that we build together – the utopian's ultimate dream – and it is exactly what the quadratic graph depicts. It's right along the balance axis where the highest average improvement potential is created for each perspective. If we could go up precisely along the balance axis, we would be able to see the course of the balance of the graph above.

The path of humanity: an accelerating ascent

The figure below shows the same relationship as above but now tilted and the axes have different names. Along the horizontal axis, the number of improvement perspectives that we use in coherence and cooperation increases. Societal development causes this coherence and cooperation to increase. We use an increasing number of coherent improvement perspectives to achieve maximum improvement.



Each individual improvement perspective added has less of an effect on average, as the graph shows. Thus the average improvement per perspective decreases.

If the coherence in improvement perspective were to develop linearly *over time*, our societal development would slow down as a consequence. This is precisely the opposite of what we see: although our societal development may have its ups and downs, in general, it is actually getting faster and faster (in Newtonian time).

To understand this, it's important to establish that the horizontal axis only counts the number of coherent perspectives. It is not a time axis, so it says nothing about the speed with which this process takes place. Development accelerates over time because as coherence and cooperation increase, the *advantages* of coherence and cooperation increase. This is a self-reinforcing process. The more we use perspective in coherence, the more capable we are of using *even more* perspectives in *even more* coherence. The perspectivist leaps on average get bigger and bigger, and this is precisely why the net effect actually increases over *time*.[72]

We can see this by having another look at the three societal foundations[73] listed earlier in the methodological basis:

[72] The quadratic figures on the previous page plot objective and subjective growth not over time, but rather against the number of coherent perspectives. By contrast, *The path of humanity* does plot the number of coherent perspectives over time. Time, in terms of perspective, is nothing more than the expression of the temporal order between perspectives. See the section on 'Tijd en ruimte' (Time and Space) in Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation), as well as other sections about time in that book.
[73] This can be seen precisely for individual perspectives. They can all be the same, they can all be different, and they can together form one whole.

> Actors are all **the same**; this is why we can put ourselves 'in each other's shoes' and understand each other.
>
> Actors are all **different**; this is precisely why we can set our own course, mean something for each other, and give something to each other.
>
> Actors together are **a single entity**, which is precisely why we can attain a societal quality and power that we cannot as individual actors in isolation.

Because the experiential world of actors is made up wholly of perspectives (perspectives are recursive), we can immediately replace the term actor with perspective, and keep the same foundations. I'll go over the principles of acceleration of these three societal foundations, which cannot exist independently of each other but in fact imply each other.

First, because actors are all **the same**, we can quickly take over improvement perspectives invented by another actor. One distinction between natural (non-intentional) and human (intentional) development, as observed by many in the past (including Toynbee, and Tomasello of the ratchet effect), is that people can quickly take over attractive perspectives from each other. The benefits of successful coincidences or (preferably) experiments spread this way enormously. The more actors and perspectives cooperate in parallel, the faster it goes. Homogeneity of scale thus implies speed of perspectivist improvement.

Second, since actors are all **different**, they all are trying out different things. This enormously increases both the number of directions in which they seek improvement and the ways in which they do so. The development and spread of new technologies, such as making stone tools, using fire, or working on quantum computers is accelerated if people experiment with them in different places and in different ways. This considerably increases the chances of taking a significant step or even a leap of improvement. Thus heterogeneous scale also implies speed of perspectivist improvement.

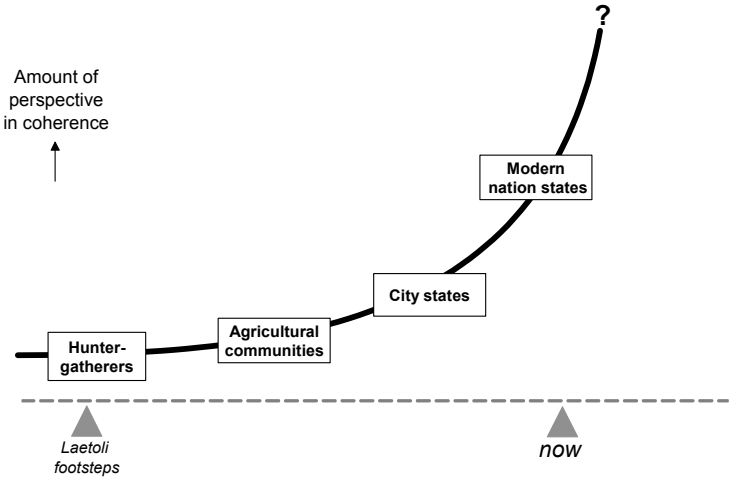
Third, since perspectives together **are one whole**, the building blocks that people experiment with (the second dimension) and transmit (the first dimension) can be much larger. This is, in essence, a configurational effect, since the fragments that can be manipulated are much larger. Compare it to building a wall using smaller bricks versus large ones. Or buying a cake versus buying the ingredients and an oven. Or think about how car manufacturers work on a large scale, exchanging ideas about the chassis, engines, and many other parts. Then building blocks are complete development organizations: hardware and humanware, matter and mind mixed together (the radical actor thesis, which will be introduced and described in section 5.1.3). Thus, having larger building blocks also implies a higher speed of perspectivist improvement.

All in all, we have three scale effects, each different in nature, which together act to accelerate the improvement in societal development in time.

I will discuss this more in part 2, but for now, let me mention that these three fundamentally different acceleration mechanisms have an intriguing relationship with each other: if one of them is dominant over the others, it curbs the total acceleration. For example, if homogeneity (all the same) takes the lead, then the actors cannot be as different from each other (all different), or form one large experimenting improvement organization (one entity). If heterogeneity dominates, this will be at the expense of homogeneity and unity. And if unity dominates, then it will be at the expense of the homogeneity and heterogeneity of the components. It may not surprise you to know that I think (explained in Part 2 and later) that:

- the relationship between these three societal foundations, expressed as perspective, is exactly inversely proportional ($n=x \cdot y \cdot z$);
- the balanced position, in which homogeneity, heterogeneity and unity are present in equal amounts – strictly statistically speaking – gives the best odds of a quality society;
- deviating from this balance – strictly statistically – results in a decrease in societal quality conforming to the harmonic series.

The result of these points is *the path of humanity*, and you can also see the accelerating movement in *the path of humanity*. Unmistakably, successive forms of society such as hunter-gatherers (dozens of people), sedentary societies (hundreds to thousands), city-states (tens of thousands to hundreds of thousands), nation states (dozens of millions to hundreds of millions) and global society (ten billion people) are characterized by the use of *ever-more* coherent improvement perspectives, and thus *more and more* cooperating actors. The numbers of people in one societal coherence (unity), the number of members in a group actor such as chemists or farmers (the same), and the number of differing group actors, such as seed producers, agricultural machine manufacturers, food producers, retailers, or consumers (all different) increase, and if these three elements get out of balance, their society does too.



The path of humanity over time: societal development corresponds to the amount of coherent perspective, and it is growing faster and faster.

Apparently, societies feel better at certain points than at others, choosing to hang around a summit once they've reached it. Societies do not grow gradually and steadily from one phase to the next. They stay where they are for a long time as if they see a hurdle up ahead, and then at some point they race to it.

There may be jerks, setbacks, and stable periods, but on average, our development is getting faster and faster. A given type of hand axe from the early hunter-gatherers was state of the art for about 60,000 years, the latest smartphone for just a couple. Hunter-gatherers had regular contact with about 20 other people in a small community, and sporadic (certainly compared with us, relatively speaking) contact with other groups. Today we communicate constantly, sometimes with billions of people all over the world.

We are builders, we are improvers, we cohere, we cooperate, and we do so as actors in terms of perspective. But we also have had huge declines. The Sumerian cities and the Roman Empire rose and fell. This is timeless and scaleless. We suspect that in theory, further societal improvement is possible, but practice gets in the way time and time again. Practice shows again and again that one long smooth road to the peak is a utopian exception. We can still take a few perspectivist steps in a row towards improvement, to a nearby hilltop. But like the odds of having a coin come up heads every time it's flipped, we can't keep on experiencing our prosperity and improvement steadily growing, either as individuals or as humanity. Our lives usually have their ups and downs. Cities develop in the same way, with periods of growth as well as stagnation. Share prices skyrocket and tumble, the levels of support acting as the peaks and valleys. Economic development usually has its spurts and slowdowns. *The path of humanity* also has had plenty of jerks, leaps forward, regressions, and periods of relative stagnation. We can rearrange the chairs on

the decks of the Titanic, but we don't see the icebergs under the water. And now and then we all head straight into a glacier crevasse.

This is why most people think that the exact course of a human life (on the smaller scale) or *the path of humanity* (on the largest scale) depends greatly on chance and that it cannot be steered. The same applies to societal development. We shouldn't expect to create a better society, because then we would be blind to the dominant influence of chance and the unexpected.

Now I'm the last person to claim that chance has *no* major influence. The question is what conclusions we draw from it. The most conventional wisdom is: chance plays a huge part, so let's just be modest and be content with what we have. Let's stay close to the peaks in our own environment; although we may not be sharing them with others, they're the ones we know. We do feel that things ought to be better somehow, but practice is too stubborn. If we feel forgiving, we call that rationalism, and it leads to a certain conservatism. In bad times it becomes populism. Just be normal! Don't go tilting at windmills! Just go up to your own little peak, the peak that you know will always be near you, with the people you know, and once you're on the top, stay there!

There is another very different way to look at this. We try to arm ourselves against chance and the whims of the cosmos in our lives by learning to understand our environment better. We bend and tame the unpredictable objective world around us as best as we can using our subjectivity. This objective environment is not there beforehand; we create it with our consciousness. We do so materially. We build houses as actors, and we grow food as actors.

But we also create our environment mentally. We learn to experience what is stable and useful (or dangerous) to us as objectivity. And these are only the extremes. That is the essence of humans as subjective improvers in an objective world. Improvement perspective is our weapon, and our identities are as actors. Precisely because of this, the tension is the greatest when objectivity and subjectivity are in balance. It is precisely because of this that there is a balance axis. And this balance axis requires that we reach as high as possible and now and then give subjectivity a bit more room. Then we can look – and see – farther away. Then, for example, as humanity we can set up the United Nations, even though we know that this institution is not perfect yet. Then we get further along our path. That might sound optimistic. For some, it may even seem utopian. However, it is definitely not. It is reflectively pragmatic. If the conservative alternative had any effect, we'd still be hunter-gatherers. We would be chained to the well.

3.2.3 The discrete quantum-theoretical interpretation

The continuous field interpretation of the perspectivist improvement landscape states that the number of available improvement perspectives can be divided evenly (i.e. over a continuum) into any desired proportions of objectivity and subjectivity. With any amount

of improvement perspective, you can get precisely onto the balance axis and follow an optimal path of growth.

However, continuity is not the nature of improvement perspectives. On the contrary, they are essentially building blocks, and blocks are by nature not continuous, but discrete. If you've ever seen a bricklayer making a wall, then you know that there are always gaps at the edges of his work. In a similar but even more extreme way, you rarely come out in balance with perspectives. And although improvement perspectives certainly can be combined – like the steps in fixing a flat bike tyre, or the many smaller perspectives in coherence and cooperation that make up a manufacturing process, concrete perspectives cannot be arbitrarily split exactly in two with impunity. You can't 'half' cycle to a shop to buy a few oranges. A half a bike, a half a person, or even a half an orange, as a unity of ordered sections and a peel, do not exist in this coherence.
This causes a number of remarkable conditions. A discrete, quantum-theoretical interpretation of the object–subject balance is precisely what makes it clear why the tower of Babel was never finished, why we don't just all charge towards the highest societal quality, and why so often, in practice, the idealists striving for a better world run into walls and have to sit around licking their wounds, even when they seem to theoretically be in the right and are working so hard. If you look quantum-theoretically at that even path upwards we just looked at, it turns out to reveal some dangerous peaks and pits.

Inspiration from Planck
In the late 19th century, the German physicist Max Planck, the father of quantum theory, tried to explain why a fire emitted different colours of light at different temperatures.[74] If a fire was radiating many levels of energy mixed together, it was thought, it should be white (light containing a mixture of all wavelengths, like sunlight, is white). He had what was an exceptionally irrational explanation in his time, and was not completely happy since he also had problems with the consequences: the radiation of energy was, he said, not continuous, but occurred in fixed temperature- dependent packets of energy called quanta (hence the term 'quantum theory'). This was an ingenious explanation of the temperature-dependent colour differences in the fire – the temperature explains the size of the packets of energy, which in turn determines the colour of light emitted – and it paved the way for quantum mechanics: a fascinating branch of physics that studies the very smallest subatomic particles, which at present is mainly studied by theoretical physicists.

This move of Planck's is especially inspiring. In the same way that Planck stated that the transfer of energy is not a continuum but consists of temperature-dependent fixed packets of energy, recursive perspectivism states that all of our societal practices are not continuous but discrete: they also consist of small packets, bundles, little building blocks'[75]

[74] In fact he was thinking about a black body, a physical concept, but for the sake of the argument we'll treat it as the same here.
[75] In essence, thus, 'the whole of our societal practices' means everything we experience.

After all, in the discrete interpretation, the figure with the balance axis is constructed out of improvement perspectives. Different improvement perspectives in coherence form societal practices (see also the multi-actor models described earlier).

I will now follow in Planck's footsteps and assume that perspectives are fixed building blocks, and that objectivity and subjectivity are not continuous quantities, but that they occur in packets or quanta, allocated to improvement perspectives. In doing so I have quantized the nature of the object–subject field. I would like to emphasize that the story below aims to clarify the way object–subject balance works in a quantum-theoretical sense, and that I do so using small amounts of perspectives. Our societal practices sometimes involve staggering quantities of perspective. I personally don't believe much in a physical basis of societal competence, but if the number of people and the number of neurons in the brain of just one person is anything to go on, then we really are talking about huge quantities. The idea that we can start to experience from within a single perspective is purely for the sake of explanation. In any situation, we are always societally situated beforehand in huge networks of recursive perspective. My illustrations don't even come close to reality! However, on larger scales, the principles explained below work completely analogously to the way they function on very small scales.

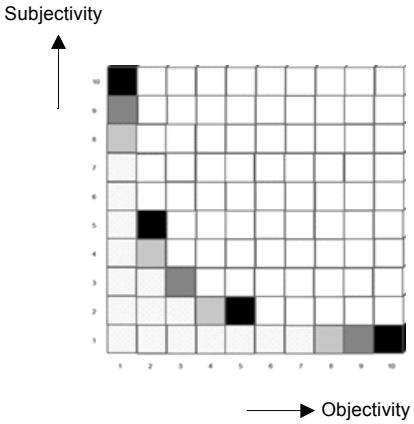
There are now two things at work. I will discuss these two points first separately, then in coherence with each other. The first is that only particular positions in the object–subject plane are available for a whole number of n available perspectives. The second is that the decrease in improvement potential mentioned earlier, further away from the balance axis, does not decrease continually but changes in discrete and distinct steps, depending on the position in the field and thus on the number (n) of available perspectives. This is similar to how the size of energy packets, and thus the colour of the light, changes with the temperature of a fire in a hearth. In the case of *the path of humanity*, this results in an erratic and difficult-to-walk path with, so far, unpredictable peaks and unexpected gorges in improvement perspective. Recursive perspectivism makes them visible.

The first point: available positions

The quantization of societal competence in perspectives is accompanied by a phenomenon typical of a quantum-theoretical approach. The inversely proportional relationship just explained is now no longer continuous but discrete. This makes some combinations of objectivity and subjectivity possible and others impossible. This can be explained as follows. Imagine I have n=10 improvement perspectives available (as I just said, I work with small numbers of perspectives for illustrative purposes). A first observation is that I can only distribute these 10 perspectives over object and subject in the object–subject plane by dividing them among a number, established a priori, of 'whole' ways:

(10,1) since 10 x 1 = 10
(5,2) since 5 x 2 = 10
(2,5) since 2 x 5 = 10
(1,10) since 1 x 10 = 10

All other continuous possibilities are now no longer possible, since they are not quantized. Each n has its own possible distributions over objectivity and subjectivity. The possible positions for n=10 are displayed below as the four positions in black:



The black squares are the possible positions for n=10. The positions one shade lighter are for n=9, and those one more shade lighter for n=8.

The first central observation is that in short, we see that only very particular positions are possible for every n perspectives. An optimal balance position with 10 perspectives is absolutely not among the possibilities. In two dimensions, this is only possible with quadratic amounts of perspective: n is 1x1=1, 2x2=4, 3x3=9, 4x4=16, 5x5=25, etc.

The balance position for 10 perspectives would assume that both objectivity and subjectivity would be √10 ≈ 3.16, since 3.16 x 3.16 ≈10. But only *whole* perspectives exist in a discrete perspectivist world. There is as little chance of a very hot wood fire producing red flames (hot fires have blue flames), as there is of 10 perspectives generating one balance position. Nine perspectives *can* do this in two dimensions: 3 x 3 = 9. Eight perspectives cannot: the position closest to the two-dimensional diagonal is 4 x 2 = 8 (and of course its mirror image 2 x 4). In three dimensions, incidentally, 2 x 2 x 2 shows up as a balance, but more about that later. The possible positions for n=9 and n=8 are filled in with increasingly lighter greys in the figure above. This also enables us to see an approximated continuous inverse proportionality arising in the object–subject field more clearly. The squares in various shades of grey approximate the inversely proportional curve very well, but this will also be discussed later in the book.

Now of course our experiential worlds, and certainly our multi-actor societal practices, consist of innumerably many more perspectives than 10. The relevant point here is that the quantizing of the object–subject field results in possible and impossible positions, *and this holds true for every n, no matter how high*. This also applies to our entire societies. For huge amounts of perspective, this will produce a better and better approximation of the inversely proportional relationship.

In summary, for every n perspectives, there are only specific places available in the object–subject plane, and these are at the discrete positions of the inversely proportional line. There is only a balance position available if n is a square of a whole number.

The more balance, the better

Objectivity and subjectivity need each other: neither ever occurs in an absolute form, that is, one without the other. This lies outside of the power of a consciousness.[76] An improvement perspective is always both objective and subjective: it exists by the grace of object–subject tension. And the further we move away from the diagonal (the balance axis), the lower the improvement potential becomes.

In the *continuous* interpretation (see above), one individual improvement perspective can be *virtually* all objective or *virtually* all subjective (never completely, since they are asymptotes), as well as all the combinations in between. The most improvement potential has a composite improvement perspective that is in balance, i.e. close to the diagonal balance axis. Then the will and the way are optimal, as I put it in a previous book.[77] The weakest is the composite improvement perspective that is the farthest from the balance axis, near the x or y axis. All the values in between them also occur. In the continuous interpretation, if you have the number of improvement perspectives go from 1 to n, then for every value of n there is a perfect balance position.[78]

If we divide the same n=10 perspectives over objective and subjective, the outermost of the possible distributions (10, 1) and (1, 10), are at the outermost black squares at the upper left and lower right corners in the figure above. If we went to (20, 1/2) or (100, 1/10) or (1000, 1/100), then the product is still 10, but there are no more whole perspectives. The same applies to (√10, √10), the balance position.

The closer the position of a composite perspective approaches a perfect square (the maximum symmetry in two dimensions), the greater its improvement potential will be on average, given the number of perspectives n.[79] The farther off the symmetry is from a square, the lower its improvement potential. In the case of n=10, the positions with the best balance are (5, 2) and (2, 5) – not wonderful, but they are the best. The worst are (10, 1) and (1, 10). These are all the available possibilities for n=10.

[76] This applies in general to perspectivist dimensions: their limits exclude the other and they blend into each other spectrally but discretely. In essence this makes the axes in the balance axis diagram, where objectivity or subjectivity are 0, both indefinite. For the origin, both objectivity and subjectivity are 0 and thus indefinite.

[77] See Henk Diepenmaat, *Multi-actor procesmanagement, een praktische introductie*, published by Leren voor Duurzame Ontwikkeling, 2009.

[78] Square roots can of course be irrational, such as √2.

[79] Seen from the origin.

In a nutshell, this leads to the following rule of thumb: the less square the area is (the less square the symmetry), the less the improvement potential. This expresses the idea that, given a particular quantity of perspectives n, there is – strictly on average – an optimum for that quantity as close as possible to the balance point.

We are subject to perspectivist harmony

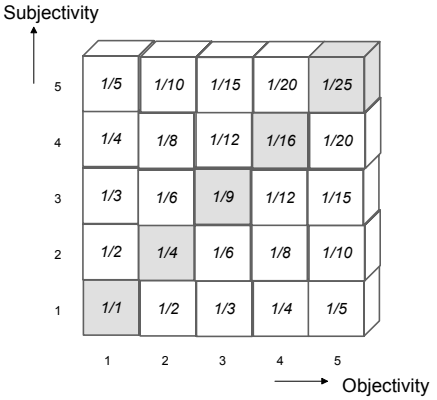
I can now express this quantitatively by using an assumption. This assumption is that the average added *improvement potential* before the use or experiencing of a perspective (and thus also the average added *experiential value* after actualizing the perspective) per perspective *added* to a *composite* perspective, in *any* straight axis direction, decreases following the harmonic progression.

Again, this is an average assumption. The harmonic progression is 1/1, 1/2, 1/3, 1/4, 1/5, and so forth. I will explain the exact foundation underlying this further along in this book, and I will also make much use of this foundation in this book.[80] Here I will make do with the admittedly very general rationale that creating more and more value with more and more objects (people or materials or what have you) turns out to be more and more complicated in practice. The subjectivity begins to fade. And the reverse is also true: more and more subjectivity makes it impossible to keep creating value: the objectivity lags behind, or disappears entirely. The best odds of creating value are provided by the object–subject balance, on all scales.[81]

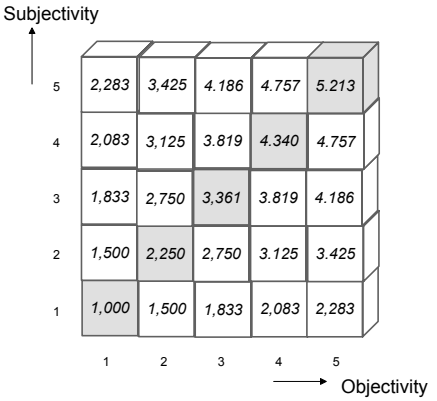
If we let this harmonic assumption loose on the object–subject plane, we get the following three figures (see below). At the top is the combined harmonic effect along the two axes. We normalize the improvement potential of the point (1,1) at 1 (to be precise: 1/1). Along the single axes, we see the single harmonic effect: each successively added perspective adds 1/2, 1/3, 1/4, 1/5, etc. In the plane, we have to combine these two harmonic effects: for example, the perspective composed of four partial perspectives (2,2) is at both distance 2 on the objectivity axis and distance 2 on the subjectivity axis. Therefore we divide in half twice (1 x 1/2 x 1/2), which gives us 1/4.

[80] See section 6.6 of chapter 6, The relativist bridge: experiential value.

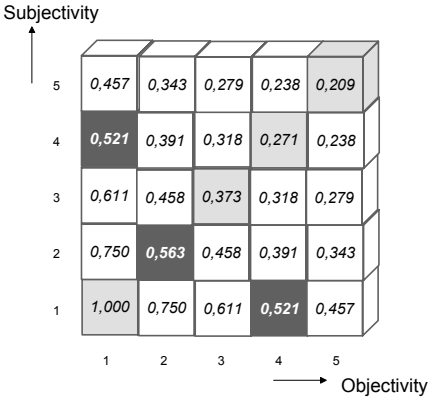
[81] A well-known rule of thumb, deeply rooted in experience, is the law of increasing and decreasing returns. In an economic sense, this law goes as follows. If we add units of a given production factor, the output will usually rise inordinately, but after reaching a given balance point it will fall inordinately (and ultimately even collapse). Let's say you hire more and more employees in a café, or keep adding coffee machines. Up to a certain balance point this will have a positive effect on output, but sooner or later you reach the balance point, and even with a very large café you will go over it and the business will collapse. This very phenomenon is explained by the perspectivist mountain landscape: up to the ridge there is improvement, but if you go farther then you go downhill. The balance axis gives the optimum for every quantity of perspective.



Improvement potential per perspective
(according to double harmonic series)



Improvement potential per composite perspective
(sum of the constituent perspectives)



Average improvement potential per composite perspective
(sum divided by number of constituent perspectives)

The figure in the centre shows the summed improvement potentials of the individual perspectives that form a composite improvement perspective. Take the composite improvement perspective (2,2). It consists of four improvement perspectives, the blocks (1,1), (1,2), (2,1), and (2,2). We add up the individual improvement potentials of the component perspectives, shown in the top figure, together. This gives us 2.250 for (2,2). What we see is a mountain ridge arising in the perspectivist landscape, running precisely along the diagonal. Balance pays off, speaking on average. For every arbitrary amount of perspective, the best balance position produces the most improvement potential.

If we would like to walk the shortest way upwards (the way of the utopian) starting from the origin, thus using more and more of the available coherent perspectives, it seems smart to follow the diagonal as closely as we can. The wide view of the utopian, of the astronomer Thales, is at work here. I think that this ridge places the law of diminishing returns on a recursive perspectivist foundation. As soon as we find ourselves off the balance axis and, after adding a production factor, we move again towards this ridge and thus towards a better balance, we have increasing returns. But as soon as we go beyond the balance point, we have decreasing returns. Thus the question is: where are we in the landscape, and which way should we go? This determines whether we have increasing or diminishing returns on average.

The figure at the bottom shows the average improvement potential for each position per constituent perspective, for the composite (coherent) perspective. The total of a position from the central figure is thus divided by the number of perspectives comprising this position. For example, for the composite perspective (2,2), composed of four individual perspectives, this gives 2.250/4 = 0.563. (I am using rounded decimal values, but in fact this is a purely fractional value.)

In the following explanation, I use strictly pragmatic arguments for efficiency, based on perspective. The centre and bottom figures show why the conservative is not wild about taking the next steps at a certain point. They also show why the self-assured realists' common-sense adage 'many little steps add up to one big one!' doesn't hold water, or in fact, is blatantly incorrect and misleading. Let me explain.

Suppose the Thracian servant girl is sitting on the edge of her well, at the origin of the plane (1,1). She is searching for improvement, inasmuch as her limited and short-sighted vision allows it, and looks at the perspectivist landscape one perspectivist step immediately around her. This is all she sees. Her ambitions extend only one little perspectivist step away. Two routes therefore grab her interest, they result in the highest improvement potential per perspective: the dreamy route along the subjectivity axis, and the realistic route along the objectivity axis. She does not see the third route, the diagonal route to (2, 2) at all: it requires a leap of three perspectives. She decides to follow the realistic route along the objectivity axis: from (1,1) via (2,1) and (3,1) to (4,1). She ends at (4,1) and to do so she uses a total of 4 perspectives. She actualizes an improvement potential of 4 x 0.521 = 2.083, more

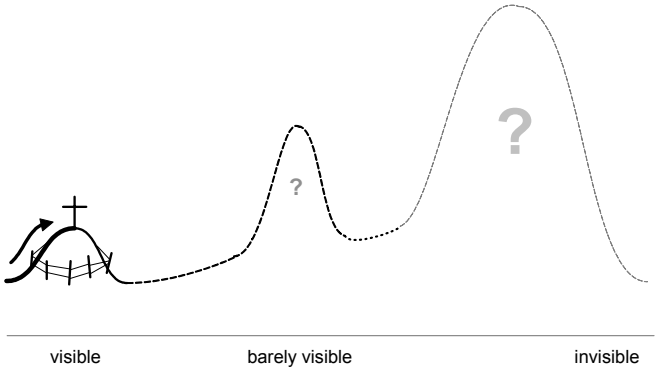
than twice the distance of her position by the well. Every successive step from here gives her less added value, in line with the harmonic progression, an all-too-familiar law of economics. This is because she is getting more and more off balance.

What the Thracian servant girl, now at position (4,1), does not see is that there is a much better position in the perspectivist landscape, assuming 4 available perspectives. At this tiny scale, adding one perspective at a time, that position (2,2) is literally out of sight for her. She should also use four perspectives, but here the actualized improvement potential is 4 x 0.563 = 2.250.[82] This illustrates how a too-limited view results in a suboptimal route.

If she continues (what else can she do?), her condition will be simply disastrous. But she has little choice, given her short-sightedness and the predilection for little steps that goes along with it. The step to (5,1) is the next best for her. If she gets to (9,1), the situation will repeat itself (here too, there is recursivity). She realizes an improvement potential of 1/1 + 1/2 + 1/3 + … + 1/9 = 2.829 (outside of the figure). With 9 perspectives, she could also have taken (3,3), which would have realized (speaking on average) an improvement potential of 3.361. She's already missed the chances that (3, 2) and (4, 2) offer. She is in what economists call a lock-in in more substantive terms: she has chosen a route in the perspectivist landscape, and almost cannot escape it. She'll only do so through chance or some disaster, and this is exactly why we follow *the path of humanity* on large scales and in the very long term, even though we do so largely unawares.

Assuming only 4 perspectives, the following is true. The illusory myopic route along the subjectivity axis necessarily ends at (4,1). The conservative myopic 'realistic' route along the objectivity axis necessarily ends at (1,4). The optimal balance position, which is at (2,2), is not reached due to this short-sightedness. These three positions are shaded dark grey in the bottom figure of the three above. These different positions show the perspectivist counterpart to the earlier and more metaphorical conceptual figure (shown again below).

[82] These are rounded. In principle, the values are exact and rational in the mathematical sense.



Again: Rationality creates its own handicaps, and its own cage.

It doesn't require a lot of empathy to see the negative aspects of our late-modern society as emergent effects of a large group of Thracian servant girls, having taken a wrong turn together, deep in the perspectivist landscape but far from the balance axis. We have lost the way and are charging on in all our short-sightedness. It reminds me of the way we are dealing with our climate and our deteriorating biosphere, our less-well-off fellow humans, and our natural resources. Fortunately, more and more people are starting to wake up to this situation and the way to the higher peaks is becoming clearer. Of course, the growing interest in a sustainable society has not just appeared out of thin air. It's come about because the landscape becomes lower and lower, as possibilities for further improvement become fewer and fewer this far from the balance axis. It's thus easier to look around, and there is more and more enthusiasm to do so. Then you'd have to be blind not to see the higher peaks in the direction of the balance axis.
The path of humanity so far supports the optimist here: the past suggests that this route is navigable now and will be in the future, certainly if we all consciously take it together. We have to help the Thracian servant girls in business, politics, public administration, and the consumer market to see their limitations. I'm not only talking about the corporate scandals with Enron, Lehman, Vestia, and Volkswagen, or the many political corruption scandals, or the people who throw their rubbish in the forest near my house. These are examples of flagrantly antisocial and quite consciously amoral behaviour. However, every person wants to ascend the feasible higher peaks in the perspectivist landscape. It's just in our nature; we like to improve things.

By now, *we* may be laughing at the Thracian servant girl, who hasn't the faintest idea of the existence of the wider perspectivist landscape around her, and the better opportunities that occur there, but we mustn't forget that *she* had to laugh at Thales. For the time being, he's still lying at the bottom of the well. Many people who are more conservative minded point to this as evidence that going farther ahead – change – can be dangerous. There are traps and pitfalls hidden all over the landscape.

The perspectivist landscape offers a remarkable view, even of these pitfalls. Suppose that we have a limited idea of societal development as steadily allowing the number of improvement perspectives that we use in coherence to increase. With this strict interpretation, I'm leaving aside another important improvement engine for the moment, that of societal reconfiguration (for example, the development from position (10,1) to (5,2), both 10 perspectives but (5,2) in much better balance). I will allow the number of perspectives n to rise from n=1 to an arbitrary high whole number, by increments of 1. Then I calculate the maximum improvement potential for every value of n, choosing the value that belongs to the position that is the most quadratically symmetrical. For example, for n=10 this is the value that belongs to the positions (5,2) and (2,5), which although far from forming a perfect square come the closest, and not to the most asymmetrical (10,1) and (1,10). For n=9 this is the value of (3,3). For n=8 this is the values of (4,2) and (2,4), since symmetrical values such as those of (4,2) and (2,4), are equal (as above).

Thus we are following a very remarkable path through the perspectivist landscape. We keep adding one perspective, n rises by 1, and we see which of the possible positions at this n has the best quadratic symmetry and thus speaking on average the most improvement potential. This improvement potential is then calculated. For the first 70 perspectives this produces the following picture:

n	positie	potentieel	potentieel/n	potentieel
1	**(1 1)**	**1.0**	**1.0**	**>xxxxxxxxxx**
2	(1 2)	1.5	0.75	xxxxxxxxxxxxxxx
3	(1 3)	1.8333334	0.6111111	xxxxxxxxxxxxxxxxxx
4	**(2 2)**	**2.25**	**0.5625**	**>xxxxxxxxxxxxxxxxxxxxxx**
5	(1 5)	2.2833333	0.45666665	xxxxxxxxxxxxxxxxxxxxxxx
6	(2 3)	2.75	0.45833334	xxxxxxxxxxxxxxxxxxxxxxxxxxx
7	(1 7)	2.5928571	0.37040815	xxxxxxxxxxxxxxxxxxxxxxxx
8	(2 4)	3.125	0.390625	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9	**(3 3)**	**3.3611112**	**0.3734568**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
10	(2 5)	3.425	0.3425	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
11	(1 11)	3.0198774	0.2745343	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
12	(3 4)	3.8194444	0.31828704	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
13	(1 13)	3.1801338	0.24462567	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
14	(2 7)	3.8892858	0.27780613	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
15	(3 5)	4.186111	0.27907407	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
16	**(4 4)**	**4.3402777**	**0.27126735**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
17	(1 17)	3.4395525	0.20232663	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
18	(3 6)	4.491667	0.24953705	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
19	(1 19)	3.5477397	0.18672314	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
20	(4 5)	4.7569447	0.23784724	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
21	(3 7)	4.7535715	0.22636054	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
22	(2 11)	4.529816	0.20590073	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
23	(1 23)	3.7342916	0.1623605	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
24	(4 6)	5.1041665	0.2126736	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
25	**(5 5)**	**5.213611**	**0.20854445**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
26	(2 13)	4.7702007	0.18346927	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
27	(3 9)	5.186442	0.19209044	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
28	(4 7)	5.401786	0.19292092	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
29	(1 29)	3.9616537	0.13660875	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
30	(5 6)	5.5941668	0.18647222	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
31	(1 31)	4.027245	0.12991112	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
32	(4 8)	5.6622024	0.17694382	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
33	(3 11)	5.536442	0.16777097	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
34	(2 17)	5.159329	0.15174496	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
35	(5 7)	5.920357	0.16915306	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
36	**(6 6)**	**6.0025**	**0.16673611**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
37	(1 37)	4.2015862	0.113556385	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
38	(2 19)	5.3216095	0.14004235	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
39	(3 13)	5.830245	0.14949346	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
40	(5 8)	6.205774	0.15514435	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
41	(1 41)	4.302933	0.10494959	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
42	(6 7)	6.3525	0.15125	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
43	(1 43)	4.3499985	0.101162754	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
44	(4 11)	6.291411	0.14298661	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
45	(5 9)	6.4594774	0.14354394	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
46	(2 23)	5.601437	0.121770374	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
47	(1 47)	4.437964	0.09442476	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
48	(6 8)	6.65875	0.13872395	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
49	**(7 7)**	**6.722908**	**0.1372022**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
50	(5 10)	6.687811	0.13375622	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
51	(3 17)	6.305846	0.12364405	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
52	(4 13)	6.6252785	0.1274092	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
53	(1 53)	4.556912	0.08597947	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
54	(6 9)	6.930972	0.12835133	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
55	(5 11)	6.8953867	0.12537067	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
56	(7 8)	7.047015	0.12583956	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
57	(3 19)	6.5041895	0.114108585	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
58	(2 29)	5.9424806	0.10245656	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
59	(1 59)	4.6632037	0.07903735	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
60	(6 10)	7.175972	0.119599536	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
61	(1 61)	4.696264	0.07698793	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
62	(2 31)	6.040868	0.09743335	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
63	(7 9)	7.3351107	0.11643033	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
64	**(8 8)**	**7.3867474**	**0.11541793**	**>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**
65	(5 13)	7.2613053	0.11171239	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
66	(6 11)	7.3986993	0.1121015	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
67	(1 67)	4.7893524	0.071482874	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
68	(4 17)	7.1657343	0.10537845	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
69	(3 23)	6.846201	0.099220306	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
70	(7 10)	7.594396	0.108491376	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

The lines in bold type for n=1, 4, 9, 16, etc. indicate the course of the continuous mountain ridge over the quadratic points (1,1), (2,2), (3,3), (4,4), etc. The quantum effects, the peaks, and the gorges in between them in the perspectivist landscape are graphically well expressed this way, making it clear how misleading the continuous interpretation (the utopian interpretation) as one smooth path is.
(Translation from Dutch: positie = position, potentieel = potential)

The second point: stepwise changes in improvement potential

This leads to the second point. Gone is the smooth, continually rising ridge in the continuous interpretation. The quantum-theoretical interpretation reveals a jagged and chaotic course. The distance from the diagonal correlates negatively to the improvement potential. In concrete terms, this means that the quantum-theoretical interpretation reveals a perspectivist improvement landscape with many peaks and valleys, through which we seek our path to ever-higher peaks.

These discrete structural peaks and valleys are invisible seen from a continuous interpretation. They explain why, for example, certain societal practices are viable and others are not. I think they declare in general, and I am touching on a profound philosophical issue here, why there are species of animals and types of things in our world instead of one vast continuum.[83] Think of elephants and giraffes, or villages and cities, or different chemical elements, or musical keys, or different types of galaxies. Species are found around one and the same structural peak. There is variation within species because there are more places available near such a peak. However, one species is distinguished from another because the individuals are focused on another peak.

In other words, what we see here is a first glimpse of the quantum-theoretical nature of the perspectivist structural landscape, a landscape that weaves the fabric of our lives without our knowing it. It's a first glimpse of the interplay between content and structure. The best possibility of making progress is to explore together where the following stepping stones in the turbulent river are, and then to jump to them together.

Now we can better understand why Thales fell into the well. It's because he was looking too far into the distance, and couldn't take in what was right in front of his feet. This is something that Thales shares with the utopians among us. With the best of intentions, they trip and fall into the well. However, this does not at all mean that the Thracian servant girl is right. If her lack of vision were advantageous, then we would have been sitting at the

[83] This is why there is no long series of 'in-between animals', for example between elephants and giraffes, or intermediate forms of furniture between tables and chairs. We think we understand this with tables and chairs, since we have no functional activities in between sitting and using a table. With elephants and giraffes we speak of ecological niches. We could have behavioural niches with tables and chairs. However, we haven't the faintest idea why these niches should exist at all, and this is why evolutionary 'explanations' are highly tautological. Why shouldn't the niches form themselves around the species? Co-evolution keeps the possibility of bilaterality open, but has a high level of arbitrariness. The peaks of the quantum-theoretical perspectivist structural landscape shed an intriguing first light precisely on these very more profound reasons why there are species, things, and niches. Think about the 'missing links' in evolutionary theory, and the reason why there are even biological species at all. Evolutionary theory tries everything out based on random processes in a perspectivist landscape, and finds the ever-higher peaks (survival of the fittest-in-its-niche). We humans, equipped with consciousness, should be able to do this more cleverly than just at *random*, shouldn't we?

edge of the same well for hundreds of thousands of years; we would still be hunter-gatherers (why should we even have got that far?) and there would be no path of humanity. When Thales and the Thracian girl walk hand in hand, they have the best prospects before them. The 'theory guy' helps the 'practice girl', or the wise one helps the pretty one, the lame helps the blind, whatever you want to call it, and vice versa. As a society, it's best to use both approaches in coherence. The extremes will not help you.

The difference between the gradual, steady development in the continuous interpretation and the jerky course of the quantum-theoretical interpretation plays out on even the very largest of scales. This morning I saw a headline in the paper saying that there was a threat of a general stagnation of the world economy. It drew my attention (bad news sells: one full point for the reporter). The story was about the International Monetary Fund (IMF), the United Nations' global guardian of monetary cooperation and economic growth. On the eve of the 2015 annual meeting of the IMF and the World Bank, that year in Lima, they made pessimistic pronouncements about the world economy (already a less catchy headline). Their chief economist discussed the semi-annual World Economic Outlook. The currently low growth could decrease even more, they say, and lead to stagnation. The worrying trends allegedly causing it are decreasing growth in China, the collapse of the prices of raw materials, and the expected rise in American interest rates.

There is always something going on with our economy, sometimes good, sometimes bad, and sometimes indeterminate. But the chief economist summed up the difference between the desire for continuous improvement and the bumpy road of practice clearly and succinctly:

> 'The Holy Grail of robust and synchronized global expansion remains elusive.'

I think that this economist is coming from an intuitive realization of the difference between the ideal of continually growing economic development, and the situation in practice, which for him is chaotic economic development.[84] He is clearly talking about the difference between the continuous and the quantum-theoretical interpretations described above. This presumed chaos of practice is based on a recursive perspectivist landscape that we are only understanding now. I have tried to give a first glimpse of it, and will expand upon it later in this book. Equipped with the understanding of this landscape, we can make enormous strides.

[84] The economy is always a model of a bumpy road. Economists love to talk about cycles or waves: commodity price cycles and ship building cycles in sectors (see Dutch economist and founding father of econometrics Jan Tinbergen), economic cycles in national economies and economic power blocs, and Kondratieff cycles in international manufacturing. Other examples and terms are Kuznets, Juglar, and Kitchin cycles. I think that these cycles are meaningful in equilibrium situations, because I think they are based on the perspectivist landscape, involving oscillations around a balance point on a given perspectivist scale, but on a path of growth or shrinkage they inevitably confront the intrinsic properties of the perspectivist landscape.

3.3 This was the first glimpse

'We'll keep on going, every time we stop
We'll keep on going, until we're together'
Ramses Shaffy

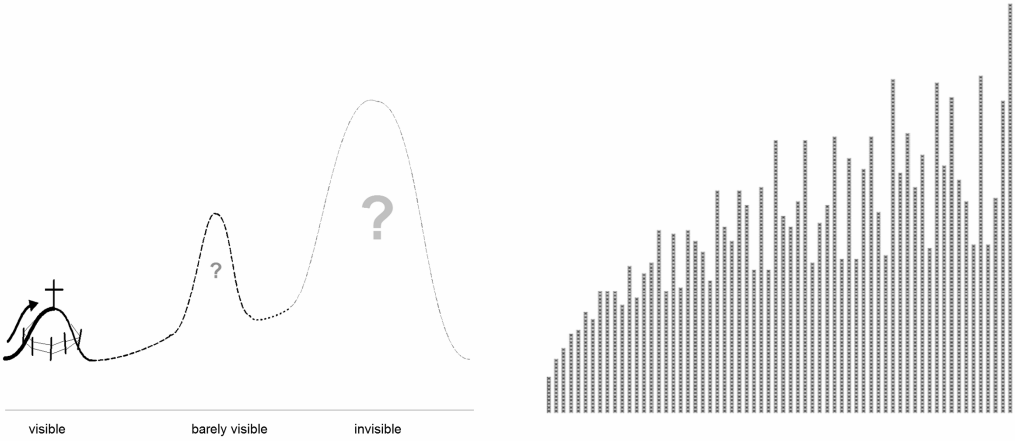
This prelude has given us a first glimpse behind the veil that masks the relationship between a number of improvement perspectives n and the possible improvement potentials that correspond to it on average. The thought or the rule of thumb that more perspectives in coherence will lead to progress and improvement may hold in general, but definitely not in all specific cases, as the graphs that have been presented show. The rule of thumb holds up in many cases, but it does not apply to every case. The relationship between the number of perspectives and improvement potential is quantum-theoretical in nature, and because of this, it is apparently chaotic and especially subject to fluctuations. The graphs show a first glimpse of an intriguing landscape. They make it clear that we can surely go forward a considerable distance (Thales), but also that it would be best to do that while paying attention to our immediate surroundings (the Thracian servant girl).

You could summarize the relationship between the number of improvement perspectives n and improvement potential as follows. In general, there is a correlation between the societal quality and the number of perspectives n that are applied in coherence. But every specific number of n improvement perspectives has its own quantum-theoretical optimum. And quantities of perspective n that lie close together can have optima that are far removed from each other.

Furthermore, there are always positions that are more optimal when steadily increasing the number of perspectives in coherence. But applying more perspectives in coherence is by no means always better. The result depends entirely on the landscape. You could just as well end up stumbling into a deep pit. The specific network structure and the actual organization of a number of improvement perspectives n in coherence has much more influence on the improvement potential than this number of n perspectives alone. I expect that further researching these relationships of coherence and cooperation and making use of them will reveal as yet unsuspected levels of societal quality.

Also, it may be true in theory that many small upward steps make one large one, but in practice, this kite does not fly, unfortunately. That is because the possible number of steps upwards is limited by the intrinsic *a priori* properties of the perspectivist landscape. In general, it is in fact true that many steps upwards make up one large leap upwards, but it is

seldom the case that you can actually take these steps.[85] An incrementalist works from the position of a very limited truth; with him you can get to the top of the highest hill in the direct neighbourhood. You can forget about getting to know the Alps, the Himalayas, or the Rockies – much less sending a rocket to the moon. There are steep peaks, to be sure, but also treacherous pits that can get in our way and into which we can tumble. There are structural patterns in the landscape that lead to preferential paths through it. At specific places, interesting peaks have come about that are interesting because of their significance for society. Sometimes we will have to be clever about how we approach these; compare this with the way that a road with hairpin turns can sometimes be the best way for us to proceed upwards. But also keep in mind how the Thracian servant girl was led astray: she forgot to take a broad view of her surroundings and was thus condemned to simply muddle along. It is therefore best to be ambitious in our explorations of society and our experimentation with it. We can send our scouts out ahead in societal experiments to get a thorough knowledge of the lay of the land. And once we find the higher peaks in this way, we know approximately where they lie – along the diagonals. We can then proceed to climb them together.



The conceptual and the quantum-theoretical perspectivist representations of the development of society

As n increases, the differences in improvement potential become more and more prominent. The distances between the gaps and the peaks become greater, the deepest pits

[85] We therefore have no experience with Kant's antinomies and this is probably also the reason that they cause major problems. In my own words, they have to do respectively with (1) the finite versus the infinite nature of space and time, (2) the composite nature versus the unity of phenomena, (3) free will versus predetermination, and (4) purpose versus chance – see his *Critique of Pure Reason*. In terms of recursive perspectivism, each antinomy has to do with the endpoints or limits of a perspectivist spectrum. You cannot experience *both* of them.

and the highest peaks become more isolated, and specific ratio patterns turn up, such as the quadratic series 2 4 8 16 32 64 128 etc. The good news is that it definitely has to do with patterns. The patterns explain at high values of n the mysterious pattern laws such as those of Benford and Zipf that we recognize everywhere around us at a variety of scales. The patterns of peaks make it clear after all that scale-independent phenomena are emerging. A lot more can be said about this, but with this book, I will take the first steps towards further examining and explaining these landscapes and pattern laws.

The most important reason for us to explore perspectivist landscapes even further is that they help us to better understand and more adequately follow the ultimate path of improvement of society, the path of humanity. That is not so much a path of centrally imposed substantive preferences, dealing with substance, contents, but primarily a path of perspectivist societal structure. It is therefore important to broaden the substantive preoccupations of leaders – and in fact of everyone – with structural preoccupations. The three main parts of this book will be about exactly that. In Part I, I will further describe *the path of humanity* in qualitative terms. In Part II, I will place it entirely in a three-dimensional perspectivist space, embraced by what I consider to be the three fundamental perspectivist dimensions:[86] all the same (similarity), all different (pluriformity), and together one whole (unity). A central role is played by the notion of perspectivist balance: *the path of humanity* seeks this balance. In

Part 3, we will consider various matters that have to do with the nature of the landscape and that help bolster progress along *the path of humanity*. These include six recognizable societal innovation methods and a perspectivist Backbone (that we must show as a society). Together they make it possible to navigate purposefully in the landscape and to make progress as a society, always seeking balance.

In this way, we all get a sharper view of societal innovation and of a better society. That is useful, and it is necessary.

And that said, this prelude is concluded. I may well have raised more questions than I have provided clarity, so let's go on to Part I now.

[86] And in fact of all matters that we can be conscious of.

4

Part I: Humanity's Path of Improvement

4.1 Observations from the dialogues

This first section examines *The Path of Humanity*. It opens with findings from the dialogues that I have led for years in lectures and workshops. We set out with a bit of self-reflection: my own inner dialogue. My life is experienced, to the extent that I understand it, as a colourful stream of anticipation and confrontation, of nice and unpleasant, good and bad incidents, with a certain amount of coherence and a certain amount of predictability. The same is true for most people, I would assume, even for those who find themselves in much worse circumstances than my own. For every person, there exists potentially a spectrum of experiences ranging from extremely positive to very negative, and often most experiences fall somewhere in the middle range.

In some circles, it is perhaps fashionable these days to be very pessimistic, but I cannot be strongly negative about our present juncture and about the direction that we are all headed. We have had both prophets of doom and pure optimists in every era of history, and each group fails to recognize and acknowledge the other end of the spectrum. They have their place, but they are less than half human. Following this line of reasoning, improving the world is, in my opinion, not necessarily an inevitable reaction to the most unpleasant experiences, though in part that is, of course, the case. To a much greater extent, it is an orientation in life that consistently aims to increase and broaden the proportion of pleasant experiences, at the expense of the unpleasant ones. And the key to this is coherence and cooperation.

We constantly experience a balance between pleasant and unpleasant experiences, but by shifting the proportion of the two, we also shift this balance in the direction of positive experiences. That shift of balance is what we experience as improvement. Once this improvement has been achieved, we experience our lives from the position of this new balance. At every point in time, at every place, and in every situation, improving the world is thus in order. The proportion of pleasant experiences increases because of it, at least in the event of success, and even when we therefore no longer find those experiences to be as positive as before (after all, one gets used to everything, but perhaps here lies a root of the importance of a sense of history that is not mentioned nearly often enough): who could object to it?

Because people are connected with each other and interdependent in all sorts of ways, for me most of our positive and negative experiences have to do with *the way that people interact with each other*. So this is not about stubbing your little to when no one else is around, but rather about social interactions – social contacts and social experiences. The fact that these are everyday occurrences does not make them unimportant. Look at our chains of production and consumption, our political systems, how we wage wars, a successful pop festival, the rise and fall of civilizations, our healthcare and education, or family life. Even after a natural disaster like a tsunami, or when the plague broke out in the Middle Ages, or even when a child stubs a toe, how people interact with each other makes a huge difference.

Therefore, for me, the way that people get along with each other is at the centre of every discussion about what we consider to be a better world and how we get there. Whatever adversity nature may dump on us, I experience that misfortune as indiscriminate, and I can therefore accept it much more easily than something unpleasant that another person does to me. And vice versa, I can enjoy a good relationship, cooperative venture, or inclusive overture much more intensely than something good that comes my way by accident.

I think that this also holds most of the time for most of my fellow humans. There are so many more people of good will than people of bad will. But because of all sorts of circumstances, this enormous potential is expressed only sparsely and with difficulty. We don't see the higher distant peaks, and therefore we climb our own nearby hills instead, or we hang on grimly to sinking high ground. Here lies a huge source of further societal improvement. We only have to see it (literally, by taking a broader view) and get to work together, keeping an eye out for the obstacles that we will undoubtedly have to avoid.

So much for my inner dialogue. Not surprisingly, I think that sincerely taking the interests and possibilities of others into account in your own thoughts and actions is the most positive attitude. You may find such an attitude perfectly normal, even a bit self-evident. Well, some of my conversation partners have very different ideas about this! Therefore I will now switch from introspection to general observations drawn from those years of dialogue with my audiences and workshop participants. Those observations are of an extremely subjective nature, and by definition you will not be able to replicate them. Here I can only present the essence of them. Thus I am not being scientific here, but I value these observations greatly, more than for example the answers to a scientific questionnaire, because the dialogue is generally pursued with great openness, with much effort and engagement, in spirited interaction, and by various groups. This has involved many dozens of meetings with many hundreds or even thousands of people over a period of several decades.

In what follows, I focus on recent years, but the tenor of this is not all that very different from the years before. It was 2011, and the European financial crisis was raging. On the table in front of me was a map of Europe in a Dutch newspaper, the Volkskrant of 25 November 2011. The map indicated the percentage of residents of each country who think that people only watch out for their own interests – or loosely paraphrased, whether people are selfish. It is an intriguing map, and I reproduce it below. The Netherlands, Switzerland, Denmark, and Norway are examples of countries where one thinks that people are *not* only out for themselves, and thus *also* have consideration for others. Portugal, Greece, Cyprus, and Bulgaria see people as a bit more selfish. It is a portrait of an era, and I cannot free myself from the impression that now, as I write this in 2015 in the middle of the refugee crisis, Dutch people are a bit less concerned with others. Furthermore, I understand that succession of crises somewhat better now, considering the prelude earlier in this book. But in 2011 I decided to use the map to lend further support to the ongoing dialogue with my audiences. Wisdom, unlike concrete and validated knowledge, is not to be gained from

scientific journals, but rather from broad dialogue and cooperation, from many different sources, and sometimes thus also from the newspaper.



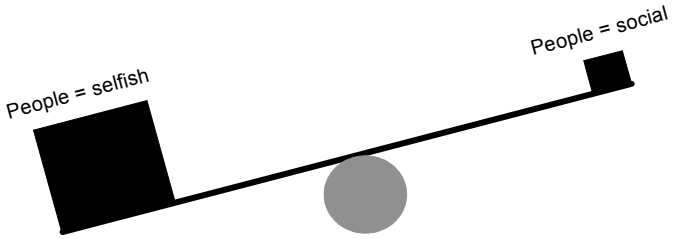
Where in Europe are people watching out mostly for their own interest?
[Dutch caption: The Dutch are not the louts of the EU]

Thus since 2011, I show the map above to those present at my lectures, workshops, classes, and conversations. This leads every time to hefty discussions on various levels. I want to share with you a number of my observations from these discussions. Below I call the layers in the discussion *polling, stirring it up, and fine-tuning*. That then leads to a model of society, a central hypothesis, and a mechanism for societal improvement.

4.1.1 Polling

A first layer in the discussions is centred on *polling*: what opinions do those involved in the discussion have about the issue. Are people watching out mainly for their own interest, or also for the interests of others? I ask them to respond, for example by a show of hands. We do this before they have seen the map. My audiences are not only much more intelligent and influential than the average European, but also much more sceptical; that was at time surprising (and unsettling). In general more (many more) than half of those present are of

the opinion that people think mostly about their own interest. It even happens now and then that *all* of those present hold that opinion (these are often mediors and seniors from the business world and government agencies).



Are people selfish or social?

The idea that humans are by their very nature quite selfish is apparently broadly accepted among the well-educated and right-minded people in my audiences, and their life experiences certainly do not help to change their minds about this. In fact, what I regularly determine is that older people are even less optimistic. That is food for thought about the central question and direction of this essay.

4.1.2 Stirring it up

We now go to the second level of these discussions, *stirring it up*. Once the group has been confronted with the map, some uneasiness arises. After all, my audiences are on average a bit less positive about the social qualities of their fellow humans than the average European, and definitely less so than the average Dutch person (at least according to the map). Positions are taken (and I do put them somewhat on the spot). The most radical of those present are generally of the opinion that humans are *intrinsically* inclined towards selfishness. The other radical position, which on the contrary presupposes an extreme orientation with respect to the others, is much less common: humans are actually quite altruistic.

The stronger the choice of the position that most people are mainly out for themselves, the more fiercely this is also considered to be an inescapable fact. Furthermore, they themselves are not like that. “I may not like it either, but that’s just the way it is” is what I then hear. The figures on the map are even contested outright by this group: “Where did you get that map?” and “Those people are not honest, and they give answers that suit their policies!”

Closely tied with this position is the opinion that it therefore is not at all smart of you if you *do* take others into account. “Of course that would be better, but …” Because your services will not be reciprocated, you will simply be short-changing yourself; it will be a one-way deal. In an egoistic world, it is inevitable that you will watch out, above all, for yourself. This opinion is widely shared.

If you look logically[87] at this radically egoistical position, then a dizzying and especially ominous picture arises. This comes about because you intensify the presumed egoistic character of society by acting selfishly because of it. The assumption is constantly confirmed more strongly by the behaviour that results from it. If you are of the opinion that it is best in an egoistic society to care only for yourself, then the result of living in a society that you experience as egoistic is an awful spiral leading towards an even more egoistic society. I call this the selfishness trap. I often think that as of 2015 the Netherlands, enveloped as it is in financial, economic, and refugee crises, has landed in a selfishness trap. Populists think this is wonderful and wallow in these developments that are particularly undesirable for society and ratchet them up one more notch. But they have not understood the lessons of *The Path of Humanity*.

When taken to extremes, the selfishness trap leads to a rough world. You empty your car's ashtray at the side of the street, you curse a slow old codger on his bike as you roar off in your heavily-polluting old clunker, you buy the cheapest factory-farm chicken, or you sell shady investment plans. As a board member of a semi-government agency, you jack up your own salary every chance you get; as a chicken farmer, you give your hens extra antibiotics without regard for the side effects; as a builder, you engage in building fraud; you fence a stolen bike; you spray-paint "my country first" on the front of the house where asylum seekers live who have just fled from a war; you cheat on your taxes. As a municipality, you make a profit from political manoeuvring concerning land values. As a country, you keep interest low to the detriment of people with savings and of old age pensioners, then you inflate away the debts. As an auto manufacturer, you fiddle with the motor control software to fake lower emissions. As a hospital employee, you pad the insurance declarations. As an employee of the tax authority, you offer huge tax discounts to entice multinationals to set up their headquarters in your country. In short, you invariably go after the solution that is the cheapest, the easiest, and the most profitable *for yourself*. And through this attitude, you screw your fellow man with every move you make. But you do not let any of this bother you too much. Perhaps the world could be better than it is, but this is simply the way the system works. After all, it has human nature at its core, and you are just falling in line and going along with the way that things are. Cynicism, a perpetual state of object–subject tension, is the consequence for those of us with more of a conscience. If we want to escape from this constant cynical tension, then our only option under the limiting condition of the selfishness trap is to numb ourselves, restricting our field of view.

Is this too negative for you? The examples mentioned here are simply taken from the newspaper. For that matter, this shows that such abuses are newsworthy, that a lot of us get worked up about them, and that in the long run things will run their course. As well-established individuals, we can ignore societal balance for the moment, but in the long and at the larger scale it will not ignore *us*. Fortunately, integral humanity is not entirely and

[87] To be exact, syllogistic logic that goes back to Aristotle.

intrinsically and constantly egoistic. In any case, competitive processes are founded on a certain degree of selfishness, and they do sometimes bring out the best that we have to offer. Take for example the complex interplay of competition and innovation. How we should deal with the losers is an aspect of our societal task that we do not yet understand all that well. But if we, for example, look at how failed states arise, then we really see the selfishness trap at work in a truly frightening way.

Of course the radical opposition – the minority of intrinsically socially-oriented people on the right side of the diagram above – also involves itself in the debate. In their view, human beings are also intrinsically oriented towards the interests of others. The more radically one believes that humans are intrinsically social, the more fiercely one blames deviant, selfish, and antisocial behaviour on the integral context of humanity, including its history. After all, they have something to explain, these supporters of the intrinsically social position, in light of what we see happening all around us. "People do want to act differently, but their environment just doesn't allow them to," is what I then hear.

There are relationships between the two radical positions and political movements. But a socialist is not necessarily social, nor is a neoliberal necessarily out for his own interest. Socialists are often bulging with self-interest, and some neoliberals are sincerely convinced that society as a whole would be much better if everyone would above all be allowed to make his own choices. According to many neoliberals, the result of institutionalizing care for others is – certainly at modern scales – exceedingly awful. Who among us cannot name at least one distressing example of this? Although the extremes – egoism and altruism – are definitely recognizable, in practice it is often, in fact, a delicate and complex balance. That brings us, after **polling** and **stirring it up**, to the third layer, **fine-tuning**.

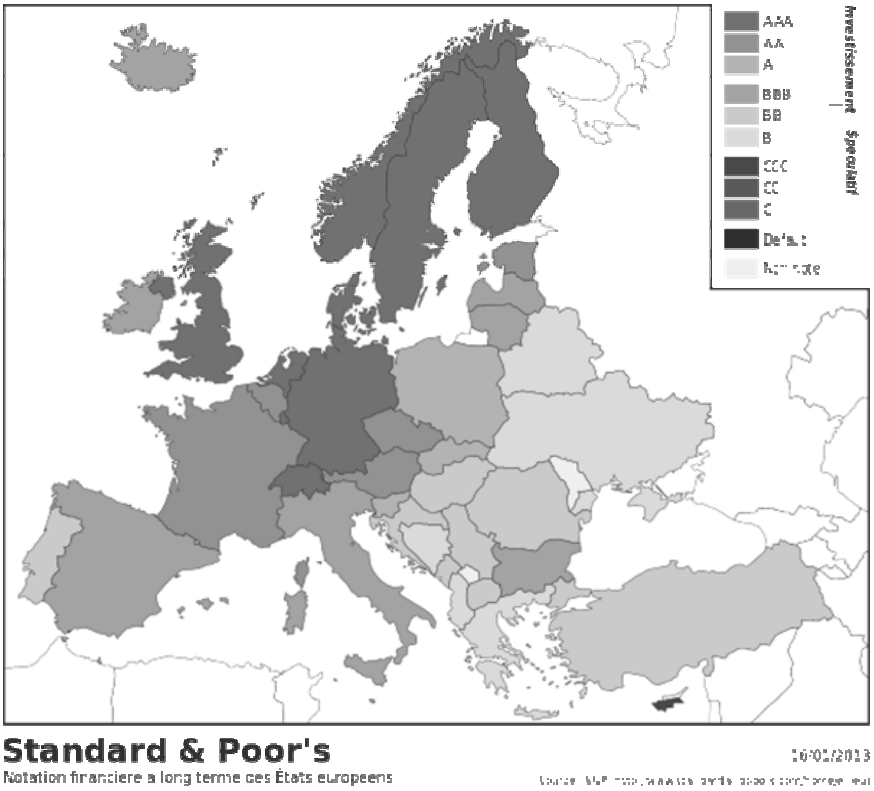
4.1.3 Fine-tuning

Discussions about the extremes (that humans are intrinsically egoistic or intrinsically oriented towards others) can become quite heated, but generally, that does not last very long. When the dust settles, we have arrived at the third level: *fine-tuning*.

The discussion about the map of Europe leads inevitably to the observation that the countries where people give *more* attention to the interests of others (solidarity is relatively high; take for example the Netherlands, Switzerland, Denmark, and Norway) seem to be faring better than those where that is *less* the case (as in Greece, Cyprus, and Bulgaria). By far the majority of the members of my audiences is firmly convinced that to a certain extent honouring and respecting the interests of others correlates *positively* with a better society. A very deep intuition is involved here. Many assume a causal relationship: they expect that as the concern that people have for each other increases, prosperity and well-being will also rise. Note that concern for each other implies that people care both for themselves *and* for others. In this phase of the discussion, we enter, albeit reluctantly, the middle area of the balance. We are seeking nuances.

I find that conviction actually somewhat surprising, since a large part of those same persons hold the opinion that people generally think primarily about their own interest (see *polling* above). What it comes down to is that there is a broad consensus among well-educated, experienced, and influential people that society is much better off when we respect and honour each other's interests. But apparently it is not evident according to these same people that we actually do this: the selfish attitude of self-interest overrules. We do not have the capacity or the ability to care for one another. I will come back to this later.

Furthermore, if you look closely, the intuitive correlation between concern for each other (solidarity, social behaviour) and prosperity and well-being is actually well supported by statistics. The map below shows the Standard and Poor's long-term creditworthiness of European countries (AAA is the highest value and C the lowest, Default indicates bankruptcy; see also the table farther down). The long-term creditworthiness can be seen as an indicator of the structural prosperity of a country. You can be the judge of the degree of correctness of this indicator, but the huge correlation with the previous map will not escape you. Iceland and Cyprus lower the striking correlation a bit, as their creditworthiness falls behind their mutual-concern figure (high for Iceland, medium for Cyprus). Certainly the circumstances of the recent extreme financial crisis have played a great role in the two countries: according to this line of reasoning, they are out of balance. It would not surprise me if here too cynicism shows its ugly face, and Iceland and Cyprus, meanwhile, also score somewhat lower on concern for each other (which strengthens the correlation once again). Or the alternative: that their prosperity rises.



Which European countries have the best long-term creditworthiness?

A similar consideration applies to well-being. We can consider the degree to which one is satisfied with one's own life to be a rough indication of well-being.

The table below shows the correlation between indicators of concern for each other, prosperity, and well-being for most European countries. The high-scoring countries are dark grey, the low-scoring countries light grey. The correlations are strong. Of course, it can also be the case that greater well-being leads to greater concern for each other. But the thought that there is a causal connection between concern for each other on the one hand and prosperity and well-being on the other hand matches our deepest intuitions. There is a reason why, when raising our children, we tell them to think about others. Many religions disseminate this idea, and we help each other get through adversity. The world is better because of this; surely that is self-evident?

Country	Egoism (2011)	Concern (100 minus Egoism)	S&P LT rating (Jan 2013)	Degree of satisfaction with one's own life (2008)
Austria	25-34	70	AA (80)	73
Belgium	25-34	70	A (70)	74
Bulgaria	>54	40	BBB (60)	54
Cyprus	45-54	60	CCC (30)	65
Czech Republic	35-44	60	AA (80)	70
Denmark	<15	90	AAA (90)	82
Estonia	25-34	70	AA (80)	63
Finland	15-24	80	AAA (90)	75
France	25-34	70	A (70)	68
Germany	25-34	70	AAA (90)	68
Great Britain	15-24	80	AAA (90)	72
Greece	>54	40	B (40)	66
Hungary	35-44	60	AA (80)	59
Iceland	<15	90	BBB (60)	78
Ireland	15-24	80	BBB (60)	76
Italy	35-44	60	BBB (60)	68
Latvia	25-34	70	BBB (60)	60
Lithuania	45-54	50	BBB (60)	61
Luxembourg	25-34	70	AAA (90)	77
Netherlands	<15	90	AAA (90)	78
Norway	<15	90	AAA (90)	79
Poland	35-44	60	A (70)	69
Portugal	>54	40	BB (50)	65
Romania	45-54	50	BB (50)	64
Slovakia	35-44	60	A (70)	70
Slovenia	35-44	60	A (70)	73
Spain	25-34	70	BBB (60)	70
Sweden	25-34	70	AAA (90)	74
Switzerland	15-24	80	AAA (90)	78

Concern for each other, creditworthiness, and satisfaction correlate highly.

There are also global figures available from the World Bank concerning trust. People in various countries were asked to agree or disagree with the statement "You can trust most people." I read about this in the *Financiële Dagblad* newspaper of 12 December 2015 in an article by Mathijs Bouwman. Of those polled, 3% of the Philippines agreed with this statement, 27% of the Italians, 35% of the Americans 60% of the Swedes, 66% of the Dutch, and 74% of the Norwegians. These figures are consistent with those in the table above.

But among Dutch people, this trust is declining, according to a report by the Social and Cultural Planning Bureau. According to Bouwman, 48% of the Dutch persons polled gave a positive reaction to the statement "You cannot be careful enough in your dealings with people." Ten years ago that was 43%. Thus around ten percent more people hold this opinion now relative to a decade ago.

Bouwman sees this as a negative development, and I am fully in agreement with him about this. For it is often the case that regions and countries where there is a lot of mutual trust between people are more prosperous, but is this a correlation or a causal relationship? Put differently, are people prosperous because they trust each other, or do they trust each other because they are prosperous – or do prosperity and trust fall together purely by chance? Personally, I support the causality hypothesis that trust leads to prosperity. In individual cases, this will turn out not to be so, but certainly in statistical terms, this is an appropriate position in my opinion. Bouwman writes that two French economists managed in 2010 to provide scientific support for the causality assumption.[88] To do this, they looked at the level of trust of the descendants of immigrants in the US. The reasoning behind this is that trust is culturally determined and carries over for several generations. This makes it possible to test causality. If the descendants of poor Swedes who went to the US at the start of the last century have a higher trust score than descendants of poor Italians, and if Sweden's economy has grown more in the last 100 years than that of Italy, then this is an indication of a positive causal relationship between trust and prosperity. And this relationship comes through with flying colours.

[88] Yann Algan and Pierre Cahuc, 'Inherited Trust and Growth', *American Economic Review*, December 2010.

4.2 The balance model

'Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence.'
Kenneth Arrow (1972)

There are thus all sorts of reasons to assume that more concern for each other leads to a better world. At least my audiences hold that opinion broadly, and the figures above also suggest the same position. And yet the same people see human beings as primarily egoistic. That seems totally incongruous.

The opposing concepts *selfish* and *socially-oriented* require a clear definition. I take selfishness to mean orientation towards one's own interests, while a social orientation is one that is directed towards the interests of others. In daily life, someone who is excessively selfish is a social lout: he serves his own interests disproportionately, and others suffer because of this. Someone who is excessively socially oriented often short-changes himself, and others benefit from this (shortly I will discuss this *altruistic trap*, the opposite of the *selfishness trap*). This leads to a particularly noxious conclusion: from a rational viewpoint, it is better to be selfish when faced with a choice between selfishness and altruism. But what about the balance point then? Thinking about this balance point and about the various experiences that people can have concerning where it lies have led me to a further clarification of a number of ideas that have long lain dormant with me and that I want to share with you. The outcome is a preliminary balance model. First I will lay the groundwork for it.

4.2.1 Types and degrees of selfishness

'For the one who's hiding from the world
The one who thinks it's never getting better
For the one who feels like he's alone
You should know that we are all together'
Ramses Shaffy: Sing, Fight, Cry, Pray, Laugh, Work, and Admire

Members of my audiences – and here I generalize – presume that concern for each other does lead to prosperity and well-being, but they think that we cannot sustain it. But suppose that their societal field of view was to extend farther and deeper than that of the average person. In other words, that they possessed a higher societal intelligence than the average fellow human. That idea is not at all far-fetched; after all, I've already said that the sampling of people with whom I carry on these dialogues is loaded with professionals, managers and leaders who are broadly and highly educated and/or experienced. What if

most people simply have a more limited societal field of view, do not see the interests of others and the relationships between their own interests and those of others all that sharply, and therefore more often unconsciously make decisions that are highly suboptimal for society? This idea breaks open the rather monolithic label 'selfish' and leads to three variants that are by their nature entirely distinct: a conscious variant, a cynical variant, and an unaware variant of selfishness[89]:

Characteristics	*Degree of perception of societal interests*	*Basic intention*	*Actions*	*Example*
Conscious egoist	Medium to high	Selfish	Deliberately selfish	Illegally giving high doses of antibiotics to hens; manipulating auto emissions under test conditions
Cynical egoist	Medium to high	Social	Selfish with latent reluctance	Knowingly buying chicken from factory farms (lower price)
Unaware egoist	Low	Social	Unconsciously selfish	Buying cheap chicken

Types and degrees of selfishness

We could beat around the bush here, but the conscious egoist is in societal terms simply a bad person. He drags us backwards on the path of humanity. It is not especially relevant whether or not he does this within the limits of what the law allows (that which is legal and that which is socially desirable correlate poorly up to a certain level). The law adds only a thin veneer to human relationships.

Now I think that the number of conscious egoists in the human race is not all that great. In my experience, the proportion of cynical egoists and unaware egoists is much greater. You could, of course, reproach the cynical egoist for a lack of personal courage and integrity, and the unaware egoist for a lack of interest in his social surroundings, but what if that simply is not possible for them at this time? These two attitudes are not that strange. For whistleblowers things generally end very badly, and someone's social intelligence does not

[89] Of course there are other combinations, and social pedants exist as well, but here I limit myself to the variants most relevant to this discussion.

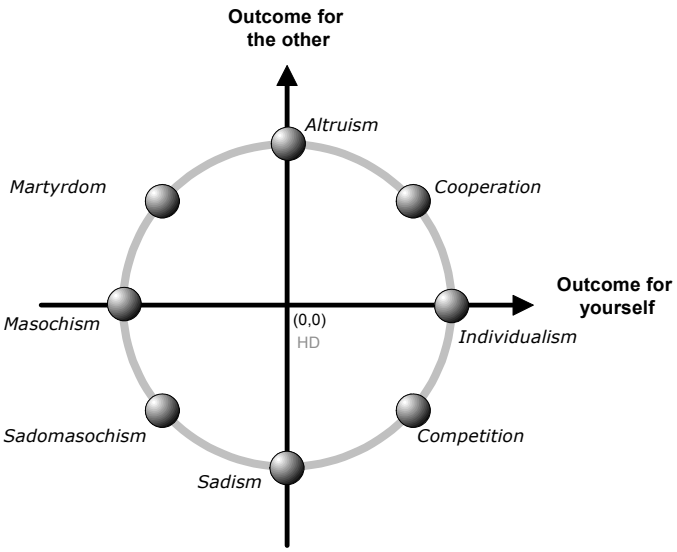
automatically increase by calling him antisocial. Our late-modern society is highly complex, and it easily gives rise to cynical and unaware egoism.

The advantage gained by distinguishing the types of egoists is that not every person who acts selfishly is also consciously and inevitably selfish by nature. The selfishness trap is thus not an unavoidable fate, and the world can in fact definitely be improved. Not only is there hope; there is also a lot of potential. Furthermore, the path of humanity shows nothing different from this; every time we fail, we bounce back again.

The social value orientation ring

There is something amiss with the rigid manner in which we have thus far had to choose between humans as social beings or as selfish beings, as can be seen in the table above. The viewpoint often rightly enters the dialogue that this is not at all so black-and-white and static. Sometimes we choose our own interest, and sometimes we also have the interests of someone else in mind. The combination of the two is particularly obvious: by thinking of others you are often also better off yourself. Then you are selectively social, thinking of both yourself and the other person, in varying proportions.

In the early 1970s, social psychologists Griesinger and Livingston had already developed a model that combines and clarifies these two tendencies: the social value orientation ring (see the diagram below).[90]

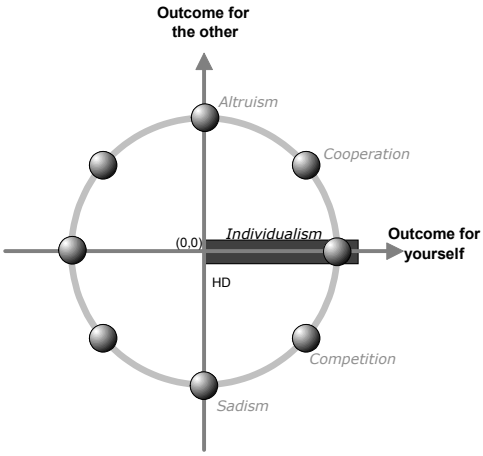


Social value orientation ring according to Griesinger and Livingston.

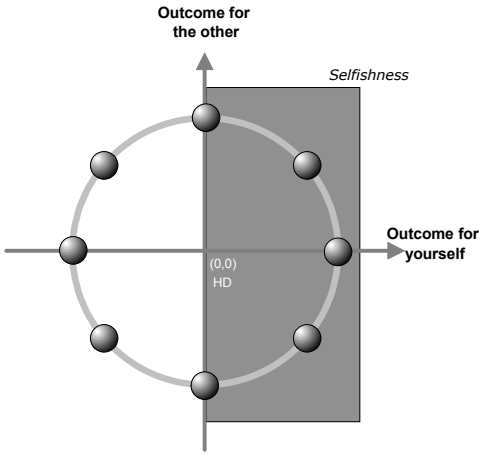
[90] Griesinger and Livingston (1973), 'Toward a model of interpersonal motivation in experimental games', *Behavioral Science* 18 (3): 173–188

Selfishness is not to be found on this ring. After all, it is a characteristic of an egoist that he does *not* allow for the interests of another person: he does not invest in it, nor does the outcome for the other person interest him. The egoist is only aiming for the best outcome for himself, on the horizontal axis. In the strict sense, a selfish act can also turn out well for another person, but that does not matter to an egoist. The selfish act is only negative in its consequences if the outcome for others comes out negatively by accident. However, the selfish act is always reprehensible, exactly because he unknowingly (unaware egoist), cynically (cynical egoist), or even manipulatively (conscious egoist, with a psychopath as an extreme form) deals with the interests of others to achieve his own goals.

An individualistic act (see the diagram below) is thus very different from a selfish act; if you have made a good allowance for the other, then it is entirely morally responsible to engage in an individualistic act. That act then simply does not affect the interest of others in a sense that is positive or negative for them. In terms of the social value orientation ring, the difference between individualistic and selfish acts looks like this in my opinion:



An ***individualistic act*** serves one's self-interest, but it does not consciously cause results for others. An individualistic act is therefore easy to localize, just like the others and like one of the hands of a clock.



A ***selfish act*** serves one's self-interest, but it has totally arbitrary results for others. The selfish act is unpredictable with respect to its outcome for others and therefore cannot be localized beforehand; it is entropic and distributed in the right half of the ring..

Precisely because the egoist does not have to share and does not take others into account, he can in principle take all the loot for himself, independent of the fate of the other person. He can score the max at anything. But of course that trick can only be used once: you are sure to watch out if you work together with an egoist a second time. In the end, an egoist is on his own. For exactly this reason, conscious and cynical egoists are often sneaky, because if you are left on your own, you miss out on the advantages and the full force of the path of humanity. The unconscious egoist in particular will shout from the rooftops that all the refugees have to get lost. He sincerely believes that this is entirely his good right. He has

understood absolutely nothing of the path of humanity. Still, this path is open to him and his cynical associate. Only the conscious egoist is obstinate and perhaps not to be saved.

The Societal Balance Model

> *'The likelihood that a system will be found in a specific state is proportional to the number of ways in which this system can be arranged at microscopic scale (from within) while it appears to be the same at macroscopic scale (from outside).'*
>
> Boltzmann's hypothesis, 1877 (in my own words)

The discussion of the difference between an individualistic act and a selfish act suggests an interesting thought experiment. Imagine an average society in which people begin to act purely selfishly more and more often. In social terms, they become extremely short-sighted, and thus ultimately completely *asocial*, in the literal sense of the word: they disregard other people and their interests. In the end, all relationships fall apart: nations, cities, friendships, family ties, and even parent–child relationships. As selfishness becomes more and more dominant (as is possible in a thought experiment, but we also see this in a real society), the integral society disintegrates and perishes. The selfishness trap discussed earlier is involved here. With an average society as a starting point, maximizing and dogmatizing selfishness leads to a societal hell from a social point of view. The only tears remaining are crocodile tears – a thoroughly solitary creature.

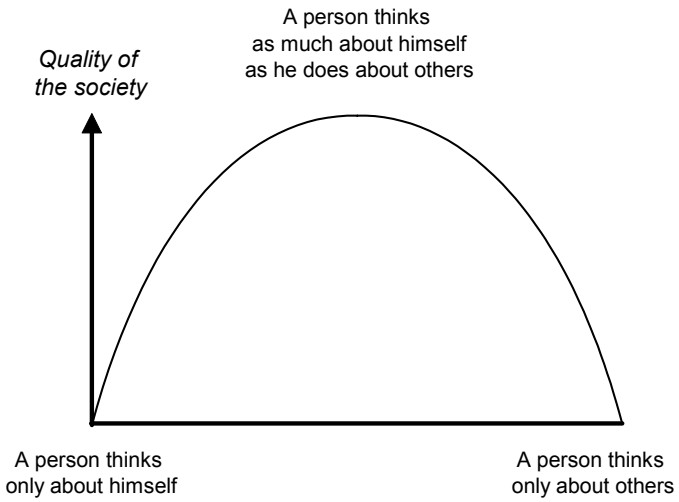
And now turn this line of reasoning completely around: people think more often and more absolutely of those around them and their interests. An extreme consequence of this is that you get run over by a car while you are helping your elderly neighbour to cross the street. And conversely, if the needs of others totally determine what is good for you to do (and that is the ultimate outcome of this half of the thought experiment), you no longer live in a society but in a hell from a liberal point of view. Here too, the society falls apart under the pressure of all this meddlesome and altruistic frenzy.

At both extremes, the world is progressively worse off, because on both sides the society is doomed as a complex of human interactions in which individuals and groups live their lives together, pursue their interests, and satisfy their needs.

It therefore seems plausible to propose a kind of societal optimum at which selfishness and altruism, or in more neutral terms, attention for yourself *and* attention for others,[91] are optimally in balance, thus uniting the best of the two concepts. The figure below shows this idea conceptually. I call this model the **balance model of societal quality**.[92]

[91] An intriguing consequence of thinking entirely of and for another person is that you become that other person.

[92] Later I also encountered the Laffer Curve.

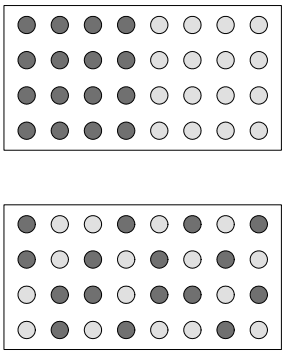


The balance model of societal quality
(or simply: the Societal Balance Model)

4.2.2 Entropic analogies of the Societal Balance Model

This Societal Balance Model strongly resembles the course of configurational entropy in the situation in chemistry when two (ideal) gases are mixed. Entropy is a concept that is closely connected with probability. In a rough approximation, you could describe entropy as the degree of disorder (the lack of order) in a system.

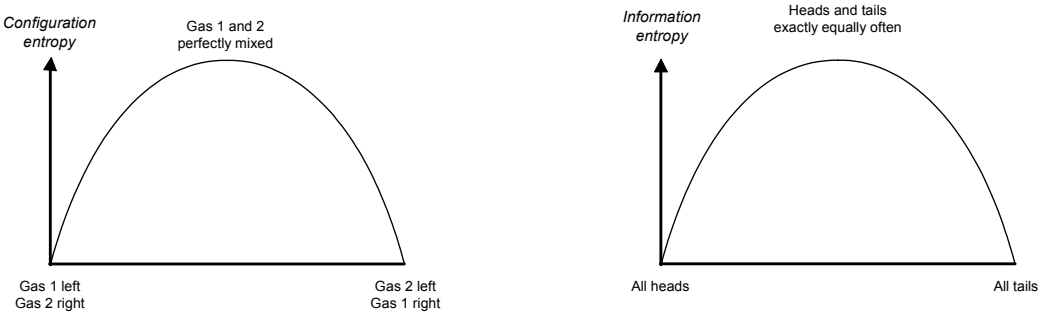
Take two gases and let them mix in a space. The mixing can be perfect or less than perfect (see the figure below to get an idea of this). The least perfect mixture is when all particles of one gas are in the left half of the space and all particles of the other gas in the right half of the space. There are two variants of this: the variant with the dark balls on the left and the light balls on the right, and the variant with the dark balls on the right and the light balls on the left. The most perfect mixture is when all particles are totally scrambled. There are as many particles of either gas on either side. The balance mixture is in the lower half of the figure below.



Schematic representation of the least perfect mixture (orderly, above) and a superb mixture (disorderly, below) of two ideal gases. There are many more disordered configurations than ordered configurations.

This Societal Balance Model also strongly resembles the course of information entropy according to Shannon in the case of a random process with two possible outcomes, for example flipping a coin, with the two possibilities heads or tails.[93] Information can be seen as a measure of the reduction of uncertainty, as seen from the viewpoint of the receiver of this information. Entropy can then be regarded as the degree of uncertainty. Entropy is the greatest when the odds of each outcome are exactly the same: exactly half. When the odds of heads and the odds of tails are exactly equal, you have the greatest possible uncertainty about the outcome of the next toss. If the odds of getting heads were to be 100 times as great as the odds of tails, the uncertainty – the entropy – would be much lower. You would then be quite certain that the next toss would come out heads. In this case you can understand the information entropy as the degree of uncertainty about what outcome you will get with the next toss of a coin. Once again: the more uncertain, the more disordered.

[93] Claude Shannon, 'A mathematical theory of communication', part 6, Choice, Uncertainty and Entropy, *The Bell System Technical Journal*, Vol. 27, pp 379–423, 623–656, July and October 1948. My putting this reference here is the consequence of an ongoing discussion of a number of years with Joost Quakernaat about 'experiencing as information', for which my heartfelt thanks. My conclusion at this time is that sending or receiving information is a variant of perspectivist experiencing (as is perceiving).



The balance model of mixing two gases (left) and of tossing a coin (right). The approximate formulas for this, in which the natural logarithm appears, are well known. The free energy is the lowest at 1/2 for two fractions, and 1/n for n fractions.

In a more exact interpretation, entropy is the likelihood of a state. In statistical terms, entropy has to do with the relationship between macroconfigurations and microconfigurations. When a macroconfiguration can be established with a greater number of microconfigurations, this macroconfiguration has a greater entropy. That may sound abstract, and it calls for further explanation.

It is easy to see that with a coin there is only one way to toss *all* heads or *all* tails (two alternative macrostructures, extreme left and extreme right), but that there are many more ways (combinations) to toss roughly half heads and half tails (macrostructures near the middle). And that number quickly increases as the number of tosses becomes greater. Below are examples for two and four tosses.

```
h                    h t                    t
h                    t h                    t
```

With two tosses, there is only one way to get only heads (left) or only tails (right), and there are two configurations that are 50% likely (in the middle. The pattern is 1:2:1.

```
h      t h h h      h t h t h t      h t t t      t
h      h t h h      h t t h t h      t h t t      t
h      h h t h      t h t h h t      t t h t      t
h      h h h t      t h h t t h      t t t h      t
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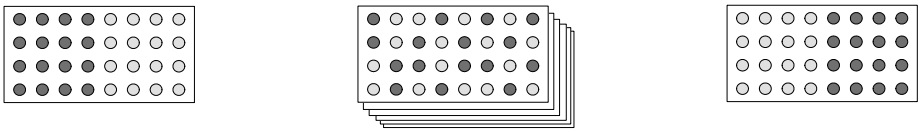
With four tosses, there is also only one way to get only heads (left) or only tails (right); this always remains the same, but there are four configurations with 25% heads or 25% tails, and even six configurations with 50% likelihood (in the middle). The pattern is 1:4:6:4:1.

Here we see the combinatorial pattern turn up that is known as Pascal's Triangle, named after French mathematician Blaise Pascal (1623–1662). It displays the binomial coefficients: for two tosses we see the ratio 1:2:1 (row 2), for three tosses we have 1:3:3:1 (row 3), and for four tosses 1:4:6:4:1 (row 4). Below is Pascal's Triangle up to the eighth row:

```
                    … 1 …       row 0
                  … 1   1 …       row 1
                … 1   2   1 …       row 2
              … 1   3   3   1 …       row 3
            … 1   4   6   4   1 …       row 4
          … 1   5   10  10   5   1 …       row 5
        … 1   6   15   20   15   6   1 …       row 6
      … 1   7   21   35   35   21   7   1 …       row 7
    … 1   8   28   56   70   56   28   8   1 …       row 8
```

Pascal's Triangle up to the eighth row

An analogous situation holds for mixing two gases: there is only one way to have gas 1 on the left and gas 2 on the right, and only one way for exactly the opposite configuration, while there are many, many ways to have equal numbers of particles of each gas on either side (see the figure below; the pile in the middle would be much higher than is illustrated here).



Possible configurations for an equal amount of two gases in a room. The completely mixed variant in the middle has by far the most configurations.

This explains why in the long run we can expect as many heads as tails when we toss a coin, or as many threes as sixes when we roll a dice, or a thorough mixture of two gases. There are simply many more microconfigurations that can make up this macroconfiguration. But it also explains why perfume scent from a bottle of perfume will seek out the free airspace in a room, allowing us to smell it soon after the top is removed. This is – according to statistical thermodynamics – purely a matter of entropy. There are vastly more configurations in which perfume particles can be present in the room, than those in which all the perfume molecules are in the opened bottle. This is why the perfume diffuses into the room from the bottle.

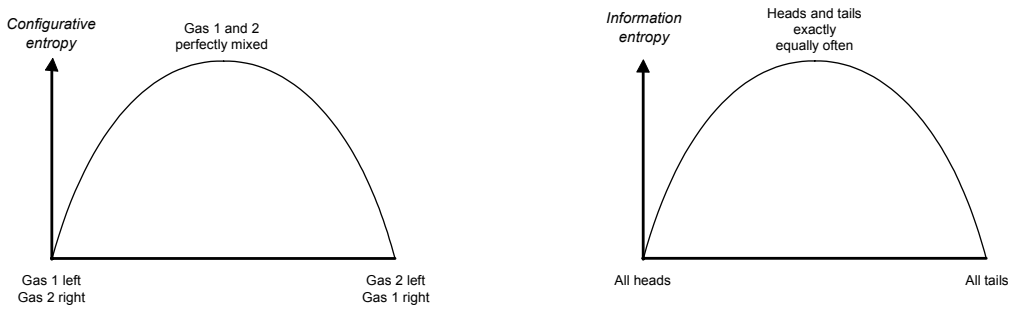
Perhaps you have never stopped to think about it, but strictly theoretically it is also possible that all the perfume molecules in the room will diffuse straight into a small perfume bottle. After all, that too is a possible configuration. The great physicist Boltzmann did consider

this. He understood that, because there are actually enormously (enormously!) more configurations with perfume molecules in the room than there are with perfume molecules in the bottle, in practice this will never happen. It *is* possible for the perfume vapour to collect back in the bottle, but that is a purely theoretical possibility. In practice, no one will ever see this happen. Just like no one will ever see a six thrown 100,000 times in a row with a dice – I would bet my life on it, for the odds are $(1/6)^{100,000}$. To help you get a picture of this: $(1/6)^5$ is already 0.0001286, thus around one in 10,000 odds. And a litre of air at room temperature contains $6{\times}10^{23}$ gas particles (a six with 23 zeroes). Thus, in a room, there is a truly huge number of gas particles, and the number of possible configurations is even many, many times greater – a number that is nothing short of bizarre.

Entropy is generally calculated based on the logarithm (the natural logarithm ln, pronounced "el en") of the number of ways (the number of possible configurations):

entropy of the macrostate = ln (number of microstates)

Entropy is the greatest at one-half (1/2) for two equal fractions, such as two gases or heads and tails (and at 1/n for n equal fractions, such as 1/6 for a throw of one dice). It is the lowest, i.e. 0, at the two extremes (for after all there is only one way to toss all heads or all tails, and the natural logarithm of one is zero, ln 1 = 0). As the number of tosses or gas particles increases, the curve takes shape and changes from discrete to pseudo-continuous.



The entropic balance model of mixing gases (left) and tossing a coin (right)

This principle holds true for every value of n, although the distributions will of course then be different. As n increases, the entropy curve develops. To a rough approximation, the odds of 50% heads and 50% tails are the greatest.

I say 'rough' here because, with every number of tosses n that we register, the number of *possible* proportions is known exactly, but it can never become continuous. Due to quantizing, certain proportions between heads and tails are possible and others are not. Take for example any odd number of tosses: an exact 50-50 split is then impossible (this

possibility is nonexistent, entropy is then undefined, ln 0 gives an error). In fact, the curve of the balance model (whether in chemistry, information theory, or society) creates what at a glance might appear to be a continuous line that consists of a well-defined number of possible positions. In statistical terms, this distribution will be approached more and more closely as you increase the number of repetitions of a rising but fixed number of tosses. With a huge number of repetitions and a very large n, you could almost bet your life on it (but of course you never know …). But such a curve cannot ever really become continuous. A continuity assumption is at work here that the Thracian servant girl would know how to respond to. We are the butt of her scornful laughter.

An analogous entropic line of reasoning applies to the mixture of two gases, and it was already known much earlier. That was the achievement of the great physicist Boltzmann, the man who inspired Shannon to formulate his information theorem.[94] There is only one way to have all gas particles A on the left side and all gas particles B on the right, or vice versa (see the figure already discussed). There are many more ways to have just as many A particles as B particles, both left and right. Therefore an unequal distribution flattens out, purely on the basis of the statistical possibilities of the numbers of configurations.

When Boltzmann presented his entropy concept based on particles in the late 1860s, the reaction was often critical and even hostile. This was a time when the existence of atoms was still highly speculative. There was also constructive criticism: it appeared that Boltzmann's theories were invariant with time. The bottle of perfume that dispersed in the air surrounding it was taken as an example in the debate. One of Boltzmann's critics claimed that it seems as though the perfume molecules, one they were dispersed in the air, ought to go back *into* the bottle just as easily. That was totally at odds with the theories of thermodynamics (the second law states that disorder in fact increases) and all our experience with bottles of perfume. It must have been in reaction to this criticism that Boltzmann had his true stroke of genius and stated that the likelihood of a physical macrostate is proportional to the number of microstates that can make up this macrostate.

This can be expressed tidily as follows. When there are many possibilities to put together a certain macrostate, based on specific microstates, entropy is high. In this case, there are many alternative possibilities for arriving at that macrostate. When there are only very few possibilities to put together a certain macrostate, based on certain microstates, entropy is low. The macroconfiguration that can be obtained with the most microconfigurations is 50% heads and 50% tails if we are flipping a coin, and with a gas mixture as many molecules of A and B on the left as on the right. When a closed process is sufficiently active, it will move on its own in the direction of the greatest entropy, we then say. (But it is more diligent to say that the chance of that is the greatest.)

[94] My discussion of Boltzmann (1844-1906) is based on the book *Great Physicists* by William H. Cropper, Oxford University Press, 2001.

If you toss a coin a small number of times, or if the number of gas molecules is very limited, the number of possible configurations is easy to grasp. But as n increased, it quickly gets totally unmanageable. The total number of possible configurations can, however, be calculated with the formula:

number of configurations = n! / (nA! nB!)

The exclamation point stands for factorial, and n for the number of particles. 2! is for example 1 × 2 = 2, and 4! = 1 × 2 × 3 × 4 = 24.

If we have 4 dark (gas A) and 4 light (gas B) molecules (thus altogether 8 gas molecules), the total number of possible configurations is 8! / (4! 4!) = 70. But if we have 8 dark and 8 light gas molecules (a total of 16), then the total number of possible configurations is 16! / (8! 8!) = 12870.

If you think that is an awful lot of configurations, then just imagine that we would have a total of 1 mole of gas, thus ½ mole of gas A and ½ mole of gas B. In this situation, $n = 6x10^{23}$ (the constant known as Avogadro's number, the number of particles in 1 mole), $nA = 3x10^{23}$ (i.e. half the amount) and $nB = 3x10^{23}$ (also half) Factorials of such huge numbers are more and more difficult to calculate; a 10 with 23 zeroes is already a staggeringly large number. The number of people on earth is less than 10 with 9 zeroes after it, and it is insignificantly tiny compared to Avogadro's number.

By using Stirling's formula (named after the 18th-century mathematician James Stirling), an excellent approximation of the factorial of a large number n can be calculated quickly and easily. Stirling's formula is the reason that the natural logarithm (ln) turns up in the formulas of the three balance models. But it is an approximation; the basic formulas are fundamentally not logarithmic but discrete, in line with recursive perspectivism. Making use of Stirling's formula leads just as well to the insight that the number of possible configurations for 1 mole of gas, distributed exactly equally between gas A and gas B, is equal to $e^{4 \times 10exp23}$.[95]

In all three cases, the configuration with all of the dark gas molecules on the left and all of the light gas molecules on the right can only be achieved in one way. The odds with 8 molecules are then 1/70, and with 16 molecules 1/12870. For 1 mole of gas, the odds are $1/e^{4 \times 10exp23}$. For any and all practical considerations this is negligibly minuscule.

4.2.3 The promise of the Societal Balance Model

There are thus strong analogies between configurational entropy in mixing gases, information entropy in tossing a coin, and societal entropy in thinking of yourself and/or of others. But just what does the Societal Balance Model express? In a conceptual sense, it

[95] $10exp23 = 10^{23}$

states succinctly and clearly that the greatest chance of a high societal quality does not lie with thinking and working entirely in line with your self-interest (left). It also does not lie with thinking and working entirely in line with the interest of others (right). It lies in between.

In qualitative terms, this finding may not knock you off your chair. Some consideration for other people never does any harm in societal terms, and an excess of it is damaging. No doubt you could have thought of this yourself.

But the balance model of societal quality suggests several other things to the thoughtful and sympathetic observer, and then the observation *does* become interesting and even exciting:

1. The Societal Balance Model suggests that the optimal balance – in strictly statistical terms – lies *exactly* between working for your own self-interest and working for the interests of others.
2. The Societal Balance Model suggests that our society will move in the direction of this balance, even though we may not be aware of it.
3. The Societal Balance Model suggests that we should actively examine how societal practices are made up of smaller replicable components. Thus we must better understand what the societal equivalent is of gas molecules (in mixing gases) or tosses (in flipping a coin). We must know how societal practices are composed and what they consist of – what the building blocks of sociability are. Then societal entropy and societal balance too can take on form and substance.
4. The Societal Balance Model suggests that, because we are able to intentionally deal with interests, we can also consciously and actively look for and promote this balance, at larger scales as well, and this results in *a higher societal quality*.

There is thus a huge societal promise hidden in the balance model. You may think that the analogies between gases, information, and societies are rather far-fetched. Personally, I do not think so.[96] When I take a good look around and think things over and I follow the four points listed above, I see the following:

1. You may well have an intuitive sense that the world would be a much better place if everyone would concern himself exactly as much with his own self-interest as with the interests of others. And that is exactly the point that people doubt: the idea that everyone will do this (see the earlier discussion of the dialogues with my audiences). If you do this alone, you are the one who suffers because of the societal variant of the Prisoner's Dilemma (discussed in 6.2.2). But optimal

[96] The Societal Balance Model is expressed by means of exactly the same formulas that apply to configurational entropy in chemistry and to information entropy in information science. These are formulas in which the natural logarithm (in an approximation) and the harmonic series (in the exact discrete approach) plan the central role.

reciprocity would be much better and more advantageous. If every time that there was a choice everyone would grant to another person a greater advantage than what he or she might achieve personally, everyone would after all – in a sufficiently arbitrary environment – on average come out better off. All things considered, everyone would benefit. Here we can see the entropic root of why cooperation and reciprocal concern for each other are much more rewarding than selfishness.

2. Furthermore, I think that if we look closely, we can see that this societal balance is already at work. *The path of humanity* is nothing other than how this balance has worked up until now, without our being aware of it. For millions of years, we have already been on the way to solidarity and cooperation, to reciprocity, on larger and larger scales, even though we regularly drop some really big stitches and as humanity are not yet where we want to be.
3. I think that recursive perspectivism provides exactly the societal equivalent of molecules and coin tosses: the experiential entity called improvement perspective. Actors are made up of perspective, and our society is made up of actors. Our society thus consists of improvement perspectives, just as molecules make up a gas cloud, and coin tosses make up a series of heads-or-tails outcomes. If those perspectives have to do only with the interests of yourself or only with the interests of others, they would be just as exceptional as getting only heads or tails in a long series of tosses, or finding all particles of gas A on the left side and all particles of gas B on the right side. The microstructure of macrophenomena such as societal practices is thus made up of improvement perspectives.
4. I think that we therefore can surmise that actively and consciously aiming for societal balance on average leads to an improvement in societal quality. Many studies suggest that the difference between prosperity and misery in societies has to do with the presence of inclusive political institutions such as a sound justice system, voting rights, and so on.[97] Inclusive institutions enlarge the balance by preventing elites from benefiting themselves at the expense of others. Such institutions see to it that the interests of a greater number of actors are considered (that is even the literal meaning of the word inclusive).

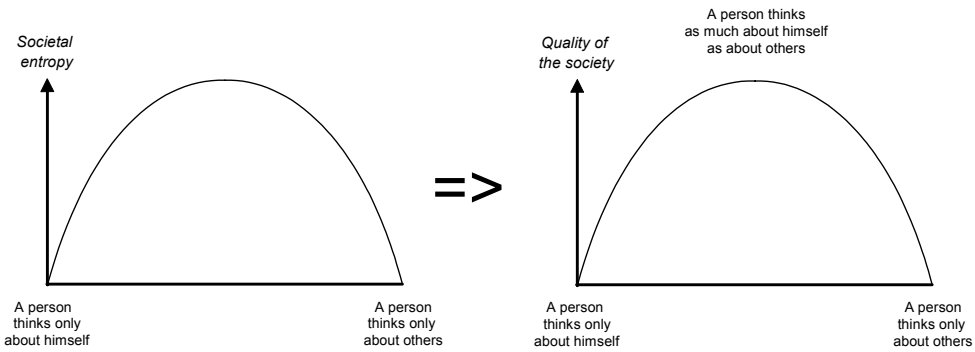
Based on the analogies with configurational entropy (mixing gases) and information entropy (repeatedly tossing a coin), we see that the Societal Balance Model expresses a

[97] See for example the book *Why Nations Fail* by Daron Acemoglu and James Robinson (2012), in which the authors convincingly explain that nations do not fail because of geographical or cultural characteristics. Failures are instead primarily due to shortcomings of inclusive institutions, first political and then economic as well, such as a fair form of property protection, participation, an equitable legal system, a level playing field (that furthermore in my opinion may be tilted in the direction of sustainability, which would be better for everyone), and stimulating the development of new and improved technologies and skills (innovation). Extractive institutions generally benefit an established elite, and therefore inhibit innovation (stakeholder behaviour). They claim that inclusive institutions combine centralization (the perspectivist dimension of unity!) and pluralism (the perspectivist dimension of pluriformity!).

perspectivist balance between a 'self' and an 'other' (in the environment), between a subject and an object.

Stated briefly, this means that given a 'self' and an 'other', only a limited number of perspectivist networks are possible if both are strictly selfish. This is the analogue of tossing all heads or of all particles of gas A on the left side. When the 'self' and the 'other' seek each other out to the greatest extent possible and use the improvement perspectives in combination, the number of possible mixed configurations increases enormously. This is societal entropy. We see it at work for example in the strongly internationally oriented community in Amsterdam in the Golden Age (17th century).

Therefore I state the societal correspondence hypothesis that societal entropy – in strictly statistical terms – is proportional to societal quality. This is, in my opinion, a legitimate step because the configurations of perspectives that perform the best in terms of their frequency of occurrence will correlate with the number of possible configurations that are available. Simply stated: when more microconfigurations are available, the odds of a better one are higher. And when the 'self' and the 'others' start to make combinations of perspectives, the number of possible configurations that can be tested in practice is hugely greater than when they remain in isolation. Because human beings seek improvement, these configurations – assuming there is sufficient variation – will be found. Societal quality will therefore, in the long run and in strictly statistical terms, distribute itself according to societal entropy. This is the driving force behind *the path of humanity* that we thus far have been following unconsciously.



The balance model of societal quality follows from the model of societal entropy

If this hypothesis is correct, then the Societal Balance Model is valid. Then we can aim for societal balance, and the building block that makes this possible is recursive perspective.

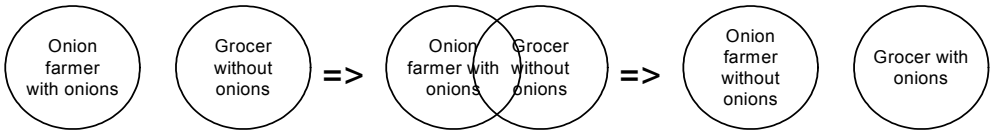
4.2.4 The N+1 identity

The balance model makes a sharp distinction between yourself and the other (I and you, we and they, subject and object, self and environment), and it brings them towards each other

in the middle. We can also name the partners in a balance model more precisely. Every collaboration involves different partners and therefore serves different interests.[98] This holds for two partners, but also for more than two – even many more. Every partner has his or her own perspectivist experiential world, his or her own identity.

However, in the interaction between partners, something exceptional takes place. After all, many practices of societal cooperation have an identity of their own and interests of their own; at a larger scale, they form a collective, composite actor. Take for example an onion farmer with a load of onions, and a grocer. Each of them, onion farmer and grocer, has an experiential world of his own, interests of his own, and (thus) an identity of his own. Imagine that the onion farmer wants a swift sale of onions at a price that is good for him, and the grocer wants an easy purchase of onions at a price that is good for him. They meet each other for the first time, and they investigate a possible transaction. The onion farmer would then do well to study the identity of the grocer, and vice versa. They then get to know each other's improvement perspectives. After all, a good deal has two winners (at least in this simple case). A smart onion farmer therefore assimilates the interest of the grocer into his own interest, and vice versa. What we then have is mutual reciprocity.

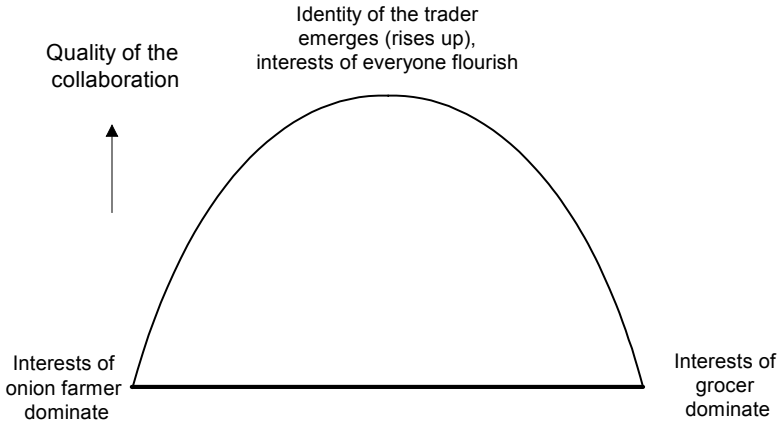
The consequence of this is subtle but far-reaching. After all, it means that in every cooperative relationship in which you participate, part of the interest of the other party has become part of your own interest, and vice versa. Because of this, in addition to the two identities that already exist, a *third identity* comes into being in the overlap: that of the traders who try to work out a transaction (see the figure below). A collaboration between two parties is therefore win-win-win (threefold), and not simply win-win (twofold).



The third identity comes about in the overlap: the trader

The optimal point of the balance model lies at the place where each party knows that both of them are participating in the transaction, and that it is the most interesting deal for both of them. It is exactly at this point of the mutual relationships (the optimum) that the third identity of the trader comes about (emerges) in its strongest form.

[98] After all, if the interests have nothing at all to do with each other, then these two are not partners. The two actors then exists as completely independent parties. Should the parties and interests be completely identical, then too we would not see these as partners; they then form a single actor together, one identity.



The third identity comes about in the overlap (2): the trader

How strong? That will vary. The third identity can be quite thin and temporary, it pops its head up, peaks at the moment of the purchase/sale, and then disappears again. That is true in general for transactional interactions, which are often rather superficial and fleeting (but because of this also flexible). When I buy a box of cookies in the supermarket, my emotional investment is pretty much negligible. But within a family relationship, the bonds are often deep and strong. That can even go so far that the common identity becomes stronger than the separate identities (we have then superseded the idea of balance, but it has significance only in statistical terms).

The third identity is always a bit present, even when the onion farmer is out in his field and the grocer is in his store (they are both far from a wholesale produce auction or market). Implicitly, the onion farmer has the grocer ever so slightly in mind, and vice versa. That also gives a tidy expression of the balance model.[99] Only when the onion farmer does not know the grocer and vice versa is their third identity non-existent. That is precisely the analogue of how an object needs a subject, and vice versa, to be able to improve.

A well-known statement of W.V.O. Quine is "No entity without identity." An entity is something that exists, a thing. You could say that an identity characterizes that thing. When a newly established identity takes on sufficient strength (its perspectivist network grows broader and deeper), we can turn this statement around to "No identity without

[99] This always reminds me of quantum chemistry. The position of an electron in an atom is described by its wave function. The possible positions of the atom form a three-dimensional probability distribution. The space within which the electron is present with 90% certainty can be pictured as an orbital; this orbital is generally close to the nucleus of the atom. The electron can also be very far from the nucleus – you never know exactly where it is – but the chance of that is very tiny. Similarly, the identity of the trader is a strong presence at the wholesale produce auction and nearly out of the picture for the farmer out in his onion field, but it is never entirely out of the picture for the farmer. We call that focus.

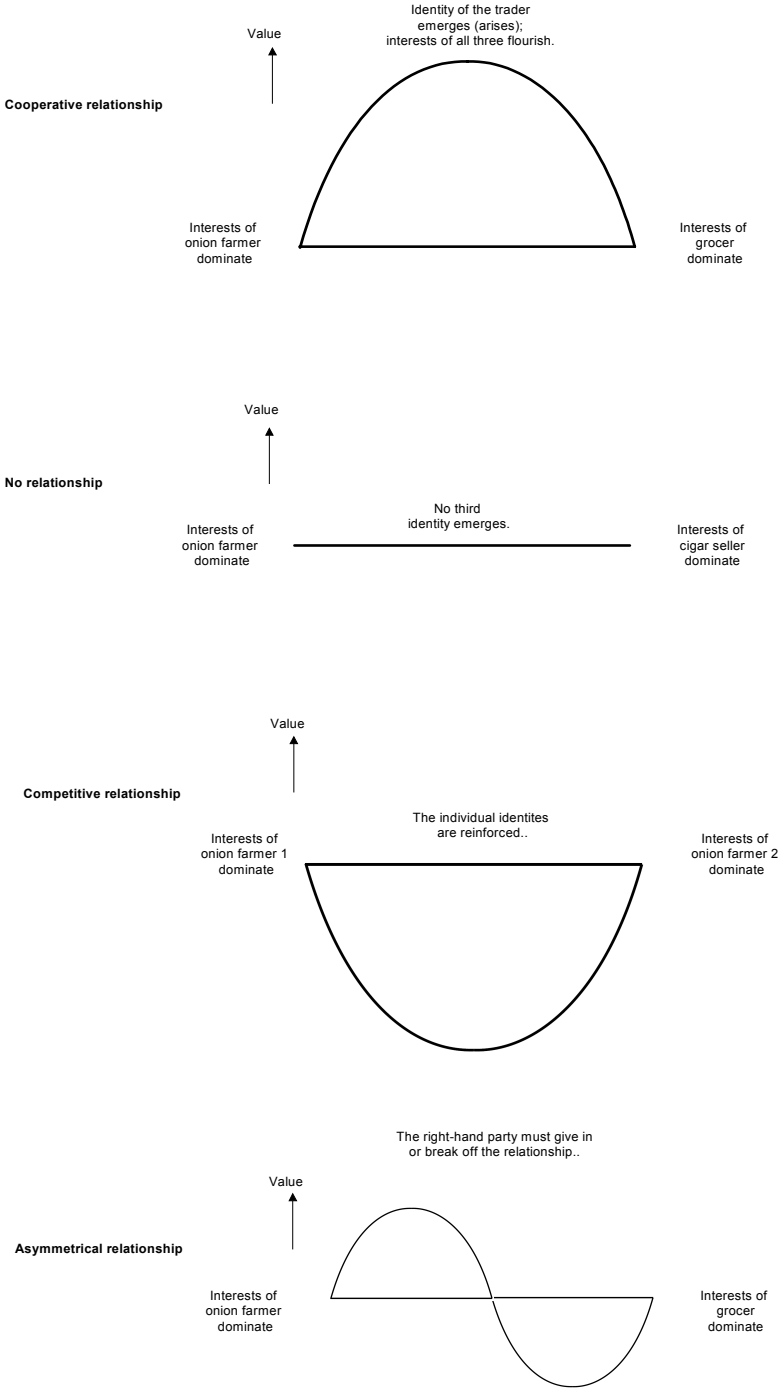
entity." A new entity then comes into being, a new actor with its own intentional logics, interests, positions, roles, and actions. The third identity can then be filled in by a new actor, possibly a role of existing people but possibly by someone else or by an entirely different group of people. Of course, in more complex interactions with more than two parties, that then holds as well – the third identity then becomes an N+1 identity. This is how auctions and market superintendents and other similar go-betweens come about that mediate between onion farmers and grocers. Here we can see a first recursive perspectivist explanation for social and functional differentiation and specialization.

Research suggests that transactional market norms are hard, clearly defined, and sharp, while social norms, on the other hand, are warm, deep, and fuzzy.[100] You must therefore not pay your mother-in-law for the Christmas dinner when she has cooked it with love and devotion. You must therefore not send a bill collector to chase after those customers whom you consider to be primarily friends. That is very easily understood from the point of view of the balance model and the emergent actor, as just explained. As one of the partners, you then turn your back on the interests that create the third identity, and that third identity then falls apart.

Our society consists of many kinds of interactions between actors. They can be volatile or structural, intense or superficial, complex or simple. They can include many actors or few, be market-directed or social, and so on. The result of this is that the immersion in each other's experiential worlds, the emergent experiential world, the collaborative (multi-)actor that arises is then of a different nature – larger or smaller, more superficial or more intense, etc. And that lays down specific preconditions and has specific consequences.

The emergent actor can become much larger and stronger than the original identities from which it originates. Think for example of the Catalonian identity, or that of a powerful family clan. The relationship between two (or more) real-world parties can also be completely worthless (literally non-existent) or on the other hand competitive. It can even be asymmetrical, when an advantage for one party means a disadvantage for the other. In the figure on the next page, we can see several examples of this.

[100] See Dan Ariely, *Predictably Irrational*, chapter 4, 'The Cost of Social Norms'.



Various relationships between parties (actors)

4.2.5 The balance model explains societal dynamics

Of course, different people, different actors, different cultures will think differently about exactly where the balance lies, how high the peak can be, and just how the curves on either side will slope. It does make a difference whether you are a mafia boss or the scoutmaster of the local troop. Or whether you are growing up in the Netherlands or in Rwanda. Whether you are an entrepreneur in a flourishing or a collapsing economy. Neoliberal or fascist or communist. But it also matters whether you are looking at a family, a company, a city, a segment of the population, a country, an economic block, or the entire world community. Whatever the circumstances, the deepest intuition of most people by far is that there should be a certain balance. If we lose that balance, one of the two ends of the Social Balance Model will dominate at the expense of the other. Consequentially, the quality of the society will decline, and that holds for both sides of the spectrum.

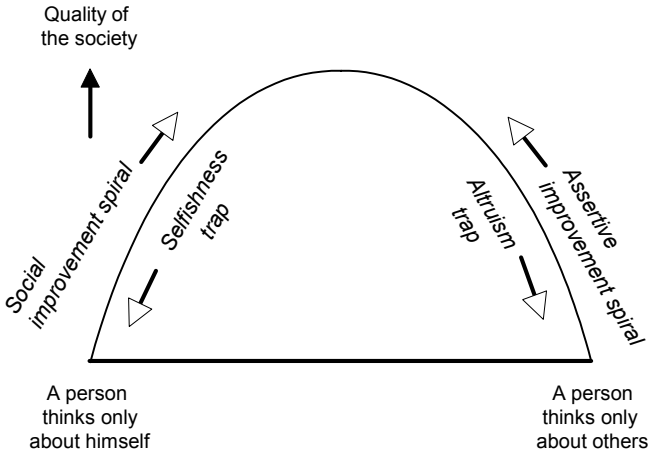
And future generations can naturally also play the role of 'others' in this model. The definition of sustainable development by the Brundtland Commission of the UN in 1987 makes this relationship explicit: this is a development that meets the needs of the present day without endangering the ability of future generations to provide for their own needs. This definition is thus intergenerational: it is necessary in our late-modern era because we are putting a serious strain on this relationship, especially in an ecological sense (e.g. climate problems, exhaustion of resources, and the steadily growing contamination of our environment).

Based on the diagram of the Social Balance Model, we can now assign a place to the observations made in the dialogue and to various societal spirals. The finding that members of my audiences experience people as being quite selfish (see Polling above) means nothing other than that the balance is strongly skewed to the left. The fact that the same people know intuitively that more concern for each other would lead to a better society comes down to following the diagram from a position rather far to the left and going more towards the right (after all, the quality of the society increases towards the middle). There are serious doubts, however, as to whether we are actually able to do that – after all, people are intrinsically selfish, and we are therefore doomed to end up at the left side of the balance model and thus to a relatively low quality of society.

The situations in which people are intrinsically selfish or on the other hand intrinsically altruistic correspond with positions at the extreme left or right sides, combined with an incapacity to make major changes in the balance. Take note that neither of these situations is optimal for society. We are missing opportunities exactly because the situation is so inflexible; we are then unable to move along the spectrum.

In the *Stir It Up* section above, the *selfishness trap* has already been mentioned – the perverse spiral effect that derives from the interaction between the assumption that human beings are selfish and the thought that it is therefore best to also behave selfishly yourself. This spiral is disastrous for societal quality. The selfishness trap can now take its place in the

diagram (see below). It drives societal structures at all scales (families, cities, countries, economic blocks, the world community) at the left side of the spectrum further and further to the left, thus bringing down societal quality. Analogously we can also name other mechanisms and place them in the area on the diagram at which they work.



The balance model and societal shifts

The *social improvement spiral* describes the causal relationship between starting to think somewhat more about the interests of others (cause) and societal quality (effect), with a selfish position (on the left side) as the starting point. This is a relationship that is often mentioned in the dialogues. The quotation from Dostoyevsky with which this book begins refers to this positive spiral: the outcome of better behaviour motivates better behaviour even more, on the part of others as well. It is the positive antagonist of the selfishness trap.

The *altruism trap* is at work in the right half of the diagram, when people think too much about the interests of others and are not thinking – or are not able to think – enough about themselves. Societal quality then suffers, because an extreme degree of attention for the interests of others will ultimately be at your own expense. You can neglect your own needs for example for your family, a club, a company, or a country, but another variant is that your interests are suppressed by others. That was, for example, the case to an extreme degree with black South Africans during the apartheid era, or with slaves. Here too the spiral effect is quite evident: when everyone is getting away with oppressing blacks, and everyone is doing it, then you will go along, won't you, and maybe even just lay it on a little heavier than the rest. Youngsters with a lower education, or no diploma at all, are in danger of falling by the wayside in great numbers in the Netherlands.

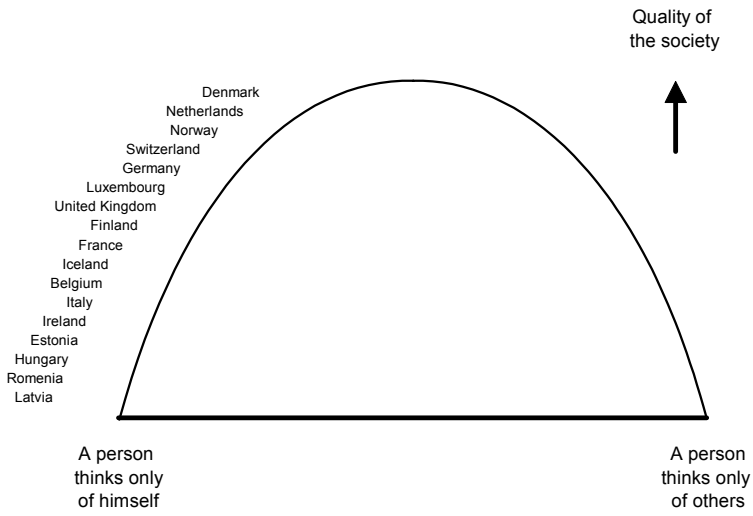
The *assertive improvement spiral* is at work in the right half of the diagram when people stop neglecting their own needs, or allowing others to neglect them, for the benefit of others. They then start to claim more space for their own interests. Take emancipation movements

–the suffragettes are an excellent example, as is Rosa Parks. The pioneers of such a movement may pay a high price, but an emancipation movement propels itself to a higher level under the right conditions (absence of strong opposition: altruism traps), because some attention for your unacknowledged interests only makes you want more (the rising spiral effect whets the appetite for more).

The route towards a higher or lower societal quality is determined in this model by the proportion in which one – strictly on average – thinks about himself *and* about others. The fact that a rising spiral can turn into a falling spiral is explained here by a shift in the balance between thinking of your own interests and those of others. As I mentioned already above, now and then the tide turns. A social safety net that keeps expanding can become a hammock, leading to a call for scaling down of social services (the turnaround: the social improvement spiral becomes an altruism trap, at which time an assertive improvement spiral takes over and the selfishness trap looms on the horizon). And a society that is becoming more and more selfish can also provoke opposing forces, causing people to start thinking of others once again. The selfishness trap then turns into a social improvement spiral; take as an example the French Revolution.

This phenomenon can be seen at work even at a very small and insignificant scale. Consider the example of a small lift that already is carrying three people; it is rather full. The lift stops, and there are two more people standing there wanting to get in. The three who are already in the lift realize that they are taking up too much space and shuffle around a bit to free up some space for the other two. Everyone now has more or less the same amount of space. If the two new passengers take up too much space, then the balance shifts from left to right: the three who were originally in the lift feel somewhat imposed on. Perhaps they push back a bit, and assertive improvement leads to a new balance. If someone with higher standing and status gets into the lift, the others will probably give her somewhat more space. Thus it does matter whether you experience it in that way: in the end, the balance is delicate. In this way, our society oscillates back and forth at different scales. Forces in society can be tremendous, but in essence, it is true that our experience of where we are and where we are going as a society is something that we all create together, based on the collective weight of our personal experiences. It is a matter of balance, and it is a matter of perspective.

The intuition and the statistics (see the table in 4.1.3) that indicate that countries score better for prosperity and well-being when their residents consider people to be less exclusively selfish are an excellent reflection of the left half of the balance model. The indicators in the table already presented express societal quality in terms of prosperity and well-being. You can now place the European countries in the left half of the diagram in rank order of their relative societal quality (see below; the ranking is indicative).

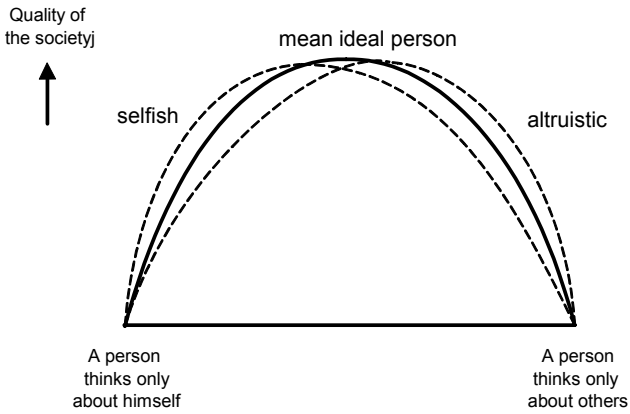


The balance model and the position of countries
(relative and indicative; the countries are actually closer together)

4.2.6 The balance model is both objective and subjective

The balance model is perceived very differently from various points of view, for example totally different personal or group-related interpretations of the same situation; the balance model is typically relativistic.[101] A selfish person sees the top of the curve skewed more to the left, while an altruist sees it skewed more to the right, even though it is the 'same' situation in both cases (see the diagram below). A selfish person therefore takes up a lot of room in the middle of the lift, an altruist presses himself against one of the walls, and an average person takes space proportionate to the number of people present (with perhaps waistline as another consideration). All three of them feel that they are in balance in this way.

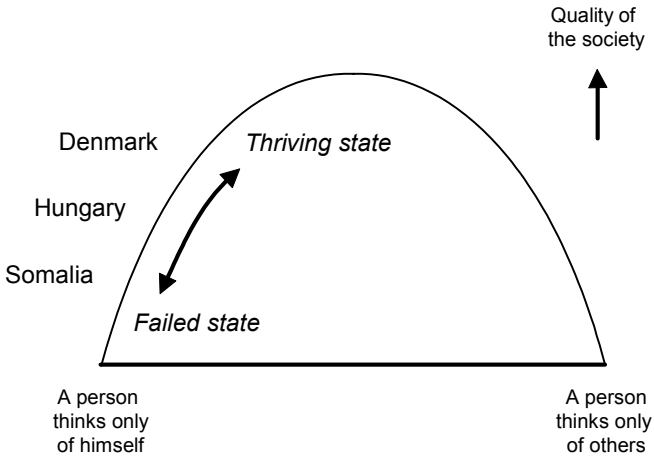
[101] Describing this as relativistic is inspired partly by Einstein's special theory of relativity.



Selfish people and altruistic people relative to the ideal balance.
According to my audiences, we are too selfish.

An example that connects closely with this is that of another small societal arena, a specific imaginary family consisting of three members: father, mother, and teenage daughter. The teenage daughter (as an entity) is shaping and establishing her identity and therefore scores a bit on the selfish side, the mother neglects her own needs somewhat and can be considered altruistic, and the father falls somewhere in between; he therefore runs the gauntlet between the two sides. Of course, there are also other entirely different family contexts and accents that we could sketch here.

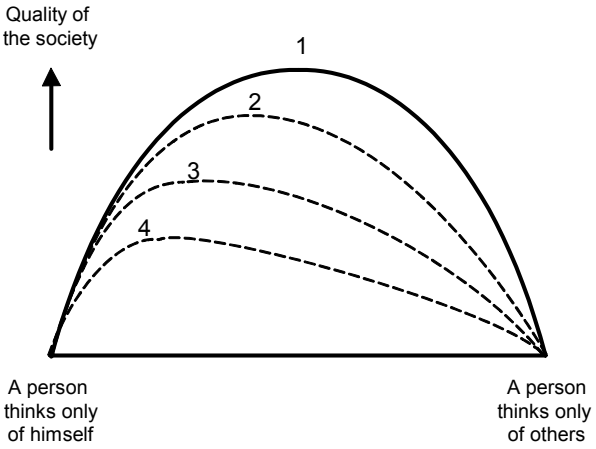
It can also be a matter of various situations that are evaluated differently in objective terms, that is, in the judgement of the overwhelming majority of actors. Consider countries such as Denmark, Hungary, and Somalia (the third of these is a so-called failed state). I am jumping here from an individual level to an international level, but the model simply remains valid. In a highly developed and prosperous state, there is room for yourself but also plenty of room and attention for others, and inhabitants come out close to the top. In a failed state it is every man for himself: we find ourselves on the left side. And if a somewhat developed state becomes a failed state, such as Somalia, the country shifts inevitable downhill towards the left, according to the same objective view.



The balance model and the dynamic development of countries

The inhabitants of a country that is on the way to becoming a failed state find themselves in a selfishness trap. Countries on the way up, on the other hand, experience the social improvement spiral. It is not odd that it is exactly inclusive institutions such as voting rights, social services, and an honest and transparent legal system that are crucial in this upward path, because these factors maintain the growing reciprocity.

If you do not take a detached and objective view but rather look through the relativistic eyes of the inhabitants, then citizens on the way from a thriving state to a failed state experience the balance model as a development proceeding from the average model towards the selfish model (see below from 1 to 4; the maximum quality of the society drops in line with the objective model above). Conversely, inhabitants on the way from a failed state to a thriving state experience the opposite development of their balance model (from 4 to 1; the quality of the society increases). In this way, it is easy to see how the inhabitants in the selfishness trap are becoming more optimal from their own relative point of view (they are aiming for the peak that shifts to the left), but from the vantage point of the optimal model they are acting less than optimally (the maximum level of societal quality declines in the direction of the failed state).



Inhabitants on the way to a failed state optimize as well: based on their own experiences each of them perceives his or her own balance curve. They act in accordance with it, so that they come to experience an even worse balance curve (the selfishness trap).

I recall clearly the conversation I had some years ago with the guide who drove me through a central African country in a four-wheel drive. He was complaining about the income tax, which was about 10%, which provoke a smile from me. When I told him about our 52% tax in the Netherlands, he looked at me with some disbelief. I told him that that is simply the price that you pay for a developed society. He mainly appeared to have a total distrust of the politicians, who put this money in their own pockets.

Furthermore, he was burdened with problems of an entirely different nature. As a licensed guide, he was responsible for the income of the families of two of his sisters. And now he did not know what he should do; should he pay for the education of his own children, or for food for his nephews and nieces? That put his aversion to paying taxes in an entirely different light. I did not tell him that I too had my doubts about the effectiveness of the government and how money was spent in the Netherlands; these suddenly seemed to be quite irrelevant details. We had an abrupt realization that we were terribly privileged and rich as Dutch citizens in the depths of Africa. And of course that is just what we were. I felt ashamed of my earlier snobbish judgement concerning his dislike for paying taxes. Everyone experiences his own balance model. It is only when you understand the experiences of another person that you can comprehend the balance of another person to some extent and can form a reasoned opinion about it.

4.2.7 The social motivators of actors

Above I have explained that people (and groups) as partly selfish and partly social animals experience the balance model in a variety of ways. In living our lives, we enter into all sorts

of situations in which we are 'out of balance'. We then find ourselves to a greater or lesser extent to the left or the right of the peak of the balance model that we experience.

When we find ourselves to the left of the peak, we experience that we overemphasize our own interests relative to the interests of others, and that because of this we also experience society – which we ourselves are a member of – as being worse. We experience ourselves as more selfish than we wish that we were, we experience that as suboptimal, and we therefore take steps towards the right (towards the peak) to come more into balance. There are countless examples of this to be found in the social domain. One of them is the lift already mentioned: you squeeze yourself in a bit further to make room for newcomers – the time will come when you will be the one wanting to get in the lift, or needing space for something else. Or as the driver of a car or a cyclist you wait to let an elderly pedestrian cross the street (common courtesy is what we call that – at least when you do not create a dangerous situation by doing so, in which case it is simply foolish). Following a tsunami, we contribute generously. As a grocer, we do not sell products that have passed their best sell by date. As a sustainable entrepreneur, you do not design products that are not intrinsically sustainable. You engage carefully in a long-term business relationship. As a government official, you serve the public good as well as you know how. As a politician, you are not out for more votes but rather for a better society.

On the other hand, when we find ourselves to the right of our peak, then we experience that our own interests suffer a disadvantage to benefit the interests of others. The peak lies to our left, and thus we thus must focus more on our own interests; then we will follow the rising line towards the left. When someone cuts in front of us into a parking space, then we do speak up. Would we react the same way in Mexico if a black SUV with darkened windows did the same? Politicians who strike us as untruthful can be voted away. (You can complain quite a lot about the practices in our Dutch democracy, but it has no match as a corrective instrument). Rosa Parks refuses to stand up and go sit in the back of the bus. As consumers, we demand food that has not been tampered with. As the common folk of France, we carry out a revolution.

People and groups always maintain an implicit balance model that determines the relationships between themselves and others. It guides our actions, for it is the basis from which we experience whether we are in balance with others or not. And if we see the chance, then we take steps in the right direction to maintain the balance or improve it. Seeking balance improves the quality of our societal context, and it determines from the vantage point of a broader common view whether our society improves.

People thus recognize societal quality and they strive for it actively where possible, even when their opinion differs – sometimes strongly – with respect to what exactly it is. Our society is determined to a great degree by the outcome of all these motives and steps in the direction of improvement. There is therefore much to be said for a view of society as a whole made up of actors who interact with each other, seek balance, and pursue societal quality: the world, the society, as a multi-actor process.

4.2.8 The visible hand

The functioning of the Societal Balance Model, as introduced above, is related to the original version of Adam Smith's famous idea of the 'invisible hand'. Milton Friedman, avid champion of free-market capitalism and of a small non-intrusive government, gave the most succinct and eloquent description of the invisible hand that I know. He needed only six words, and in the same sentence, he managed to place a crown on the work of Friedrich Hayek. This is something that only the truly great are able to do, and it appeared in a foreword to the essay "I, Pencil" by Leonard Read:

> Leonard Read's delightful story, 'I, Pencil,' has become a classic, and deservedly so. I know of no other piece of literature that so succinctly, persuasively, and effectively illustrates the meaning of both Adam Smith's invisible hand—the possibility of cooperation without coercion—and Friedrich Hayek's emphasis on the importance of dispersed knowledge and the role of the price system in communicating information that 'will make the individuals do the desirable things without anyone having to tell them what to do.'

Furthermore, I can agree with his words of praise about Read's essay "I, Pencil"; it is well worth the time and trouble it would take to read it. And I agree entirely with the wording used here to describe the invisible hand: 'the possibility of cooperation without coercion'. I could not have stated it better myself; I could not even come close. Only it is difficult to understand why that hand would in fact have to be invisible. To me, that would seem entirely undesirable, because that very invisibility could lead to many objectionable activities, both consciously and unconsciously.

The invisible hand metaphor is used and misused in many ways. It would mean that *a totally free market (thus an uninvolved government) would be the logical choice*. According to extreme liberals, it also legitimizes thinking only of your own advantage and pursuing only your own advantage. *As though led by an invisible hand*, the entire society would prosper from this. The example often heard in connection with this is that free market forces alone will cause the price of a product to fall, and the product itself to be improved (innovation). That is in the interest of the individual producer and the individual buyer, but good quality for a low price is also in the interest of the *entire* society.

In the early-modern times of Adam Smith, at the beginning of the industrial revolution, this way of thought may have perhaps made some sense,[102] but in our late-modern times, it is no longer tenable. Monopolies, obfuscated markets (think for example of shady investment schemes, or of subprime mortgages that are securitized, fitted out with glowing but false evaluations, and sold on to pension funds), and other market imperfections indeed cause large-scale disruptions of the ideal course of this process of free market

[102] According to various commentators, Smith never intended the invisible hand to be a defence of selfishness in combination with a free market, but neoliberalism made misuse of it.

forces. Furthermore, the argument involves only producers and buyers; in our late-modern society, there are generally many more individual actors involved in production and consumption processes.

Consider in the case of the sale of diesel fuel and diesel vehicles those people who live along a motorway (particulates lead to airway ailments and worse) and the inhabitants of the Maldives (CO_2 emissions lead to sea level rise). Which invisible hand then looks after their interests? The hand is at most invisible as a result of the blindness of society, but this is not a desirable invisibility, and it contributes in no way to a better world. We only have to line up the scandals involving Enron, Lehman Brothers, and Volkswagen, the construction industry frauds, and many shady investment schemes to see that it does not lead us in a good direction of its own accord. And that is only the tip of the iceberg; the truly major injustices have come about in the contexts of repression, exclusion, hunger, ill health, poverty, the climate problem, and pollution of our environment at various scales. The invisible hand is totally insensitive to the sustainability issues that arise in the near term as a consequence of local optimization in shared multi-actor systems.

Adam Smith himself did not for that matter think that the invisible hand ought to legitimate selfishness, or at least that is the central point on a long-running philosophical, economic debate concerning this proposition. Here I go back to the first mention by Smith of the 'invisible hand', in which he describes how a selfish landowner does in fact divide his harvest fairly among his workers:[103]

> The produce of the soil maintains at all times nearly that number of inhabitants which it is capable of maintaining. The rich only select from the heap what is most precious and agreeable. They consume little more than the poor, and in spite of their natural selfishness and rapacity, though they mean only their own conveniency, though the sole end which they propose from the labours of all the thousands whom they employ, be the gratification of their own vain and insatiable desires, they divide with the poor the produce of all their improvements. They are led by **an invisible hand** to make nearly the same distribution of the necessaries of life, which would have been made, had the earth been divided into equal portions among all its inhabitants, and thus without intending it, without knowing it, advance the interest of the society, and afford means to the multiplication of the species.

The heart of the discourse about the invisible hand presented above is in my opinion not at all legitimizing thinking primarily of your own interests and maximum space for the free market, but rather accenting reciprocity, of an essential concern for each other. The landowner needs his workers to be able to plant and harvest his crops; the workers need the landowner for access to land and materials to be able to plant and harvest. If one of the two

[103] See Adam Smith, *The Theory of Moral Sentiments*, part IV, chapter 1 (1759).

parties were to overextend his own interests relative to those of the other, then the level of quality of this societal connection will plummet in accordance with the balance model. Given their circumstances, they come together at an optimum point that lies not at one of the extremes of the spectrum but somewhere in the middle.

It is thus precisely the other way around with the invisible hand. Mutual concern for each other ensures that the quality of the society increases, from many different points of view, at many different scales, and in many different situations. The individual actors also benefit from this. If this mutual concern gets out of balance, then you pay the price as a society, and thus also as the (majority of) the parties that constitute that society. There is an invisible hand at work, and it does in fact work in the direction of a societal interest, but it does not do that from a position of selfishness but rather from a position of reciprocity.

This hand should actually not be invisible at all, but rather it should promote maximum transparency in a very visible way. This will not happen of its own accord: history is full of parties that sought to maximize their own advantage while hiding in the shadows, and at the cost of other parties. In this connection, we can think of Enron, Volkswagen, and many others. A fine example of how a visible hand works is the experiment by Dan Ariely et al., described in his book Predictably Irrational. An experiment involving students at Harvard, MIT, Princeton, UCLA, and Yale showed unambiguously that they would surreptitiously raise their own scores on a simple multiple-choice quiz by around 10% if they thought that this deception would not be detected.[104] In situations where it would be detected, they would not cheat. Of course there is a world of difference between knowingly manipulating the emission data of diesel cars (Volkswagen) or energy prices and financial figures (Enron) on the one hand, and on the other hand nudging up your score on a simple voluntary quiz. But the common thread is that fog and blurred vision does not bring out the best in people. It literally narrows the moral horizon. The balance is then at work on a playing field that is too limited.

With these insights, we hold the key to improving our world and the processes of our society. It is crucial to realize that every individual, every group, and every coalition in every societal process experiences its own Societal Balance Model and acts in accordance with it. The fact that they sometimes get quite close to the peak through actions that are largely intuitive and not well thought out does not in any way make a case for letting this societal hand remain invisible.

We can therefore work with each other at clarifying and understanding each other's Societal Balance Models. If we invest in this, we can plan the steps that we can take together to improve the balance in coherence for many of those involved. In short, we make the invisible hand visible from various positions, and the hand then turns out to be a societal hand! If the newly designed coherence and interconnection makes sense, it is also

[104] See Dan Ariely (2008), *Predictably Irrational: The Hidden Forces That Shape Our Decisions*, chapter 13, 'The context of our character', part 1, 'Why we are dishonest, and what we can do about it'.

attractive and then the improvement we seek will come about on its own (after all, an improvement perspective that is adequate and based on experience is self-implementing).

A more extensive and deeper exploration of each other's needs and interests to be able to design a broader societal balance with a higher societal quality is an intriguing route to follow. It actually says *nothing at all* about who will have to pursue what in practical terms. The only thing we have to do is to pay attention to each other's interests, as well as our own, for these make up the raw materials of a composite societal balance. The more sensitive we are, and the more actors we observe, now and in the future, the more powerful the societal development can become. Based on insight and solidarity, we can grow together to new heights of prosperity and well-being. We can then raise together in solidarity the flag of a society whose quality steadily improves.

4.2.9 Huge potential?

In essence, I am making a case for nothing other than making the invisible hand visible. (Later in this book I will describe how this will require a plurimodern transformation.) But I have to be honest: my audiences are sceptical about the ability that human beings show to take someone else's interest seriously (see the *Polling* section above). Clearly, this forms a roadblock across the route of the visible hand as it has been described above. This route assumes that we will have to explore the interests of others much more deeply and more often. Sensitivity to the considerations and interests of others, along with knowledge of your own considerations and interests, is the most important key to being able to achieve the promise of a higher quality of society. Smart people can already see that, but they estimate humanity as a whole of being incapable of this. In my opinion, this is due to the fact that societal consciousness of the average person is falling increasingly behind as the complexity and scope of the processes of our society increase. It is therefore high time that we increase our societal intelligence!

Why would we think that people will be able to develop the greater societal sensitivity that will be needed in the future? There are two arguments that I can present, one practical and one historical.

The practical argument is that further development of our societal sensitivity leads naturally to movement towards a better position. Use of the balance model implies that you seldom can expect of people that they will do something that is contrary to their inclination or experience. All you can ask is that they participate in the process of considering each other's interests in greater depth. This causes a shift in our experience of the balance in society, leading to different and better activities. In this way, we cooperate as human beings to explore the coherence and connections of a higher quality in society.

Presently, our professionalism in making sense of multi-actor processes at societal scale is downright miserable. When I look for example at the processes in the second chamber of the Dutch parliament, I sometimes get tears in my eyes. What I see are too many superficial perceptions. Seldom is there the creation of deep mutual understandings, and the focus is

too often on self-interest, one's own support groups, and debate. Discussions are seldom about complex connections in society and too often about 'issues'. In this way, we remain lost in the clouds. There are still huge steps to be taken in reconciling our political processes with the nature and complexity of the multi-actor practices in our society. How to deal with the losers in a process that brings about overall improvements – and of course there always will be some losers – is a separate issue to be worked out. If my well-being and that of my family were totally dependent on oil companies, then I would not be the first to campaign for an accelerated transition to climate-neutral energy sources. A truly professional visible hand would also give attention to the interests of these players.

Understanding and working with complex multi-actor connections and interactions in society ought to become a discipline that every politician and manager has mastered. Other writers and I have already written a lot about how that professional mastery can come about. But once a sharper view of such an improved coherence and solidarity in society has come about, you would be crazy not to cash in on the advantages that go along with it. As for what 'better for society' actually means, I will look more closely at this later in this essay. And of course, we will run into many problems, both expected and unexpected. But once a truly attractive societal coherence has been explored and brought into focus, the genie is out of the bottle, the balance shifts, and a different pattern of behaviour follows naturally. As soon as we can clearly see a higher peak, we will start to climb towards it. We have no choice in this, because as humans we are inveterate improvers. That is our *condition humaine*.

Perhaps for you, this sounds too good to be true. We only have to understand each other more deeply and to exercise a higher degree of reciprocity, and then improvement will begin automatically. What proof is there for this? Let me put forward a historical argument. I think that our entire history as human beings up to the present has been one great example of how we have shown higher and higher levels of the quality of society as connections in society have grown. In this book, I call that historical development of society 'the path of humanity'. I am clearly aware that this progress has been made through trial and error and that it is indeed not yet easy to share in this quality. Entire civilizations rise up and then collapse, and in some cases that is just as well. Still, the development of our human societies has on average shown an extraordinary evolutionary path, something that I will describe in greater detail shortly. That path sketches in huge steps our human development from the earliest times up until the present late-modern age, and in general, the quality of society has certainly increased. Here lies a truly enormous potential, and the conditions for improving the world are becoming better and better, if we adequately address the increasing complexity. Here once again I admit to being a societal optimist.

The path of humanity also offers a clear view of the next step that we must take together in society, a step towards a higher quality of society. This is the step leading from our late-modern society to a future *plurimodern* society. Shortly I will discuss exactly what plurimodernity is, but this plurimodern society offers in a straightforward way solutions for a number of very typical idiosyncrasies of our late-modern age that express themselves

in a series of crises. And we can take that step towards plurimodernity if we can manage to develop an even greater sensitivity for each other, as we have already done throughout human history.

4.2.10 The answer after some further exploration

Can we improve the world? I have already opened this essay with an initial positive response. Based on our further explorations in the pages since then, my answer is an even louder 'yes'. We can improve the world by steering towards a society in which people think of more than just their own individual interests. We feel very deeply that a world in which we think more broadly and deeply of the interest of others than is done today will be a better world. And not (only) on grounds of moral convictions. The world will become better because you have a greater potential of various capacities at your disposal and can put them to work in concert with each other. Roughly analogous to the way that a diverse gene pool leads to better biological quality, putting a broader supply of improvement perspectives to work coherently and cooperatively will lead to a better quality of society. With greater diversity, we can cooperate in solidarity with each other to elevate society to a better level.

Thus we have long known how we must improve the world – by being more sensitive to the considerations and motives and interests of others, and by using these new insights as the foundation from which to develop together connections in society in which every person experiences being more in balance. This has already been going on since the earliest origins of humanity, with dramatic ups and downs. We are just not that good at this, particularly at the larger scales; that we still need to learn. This essay will therefore aim to further develop this route in parts 2 and 3. If we can further stimulate and professionalize our powers of cooperation, entirely new levels of societal quality lie ahead of us. This essay aims to give our realization of this a hearty push forward.

4.3 The path: an outline in broad strokes

It is a popular idea that humanity is totally incapable of achieving purposeful societal progress. At the same time, the path of humanity shows that in general, we have already, for the most part unconsciously, traversed an uneven path of several million years towards a steadily increasing quality of society. The result is a fascinating paradox: self-declared incompetence and unconscious achievement are two sides of the same coin.

In the prelude to this section, I have already peeked behind the curtain at the solution to this paradox. In strictly probabilistic terms, we humans are propelling ourselves through a perspectivist landscape that was already present. In it, we follow a preferred route more or less along the diagonal as we compose our societal practices from improvement

perspectives that are more and more coherent. Our societies seek the peaks and find them, even though up until now we have hardly been aware of them.[105]

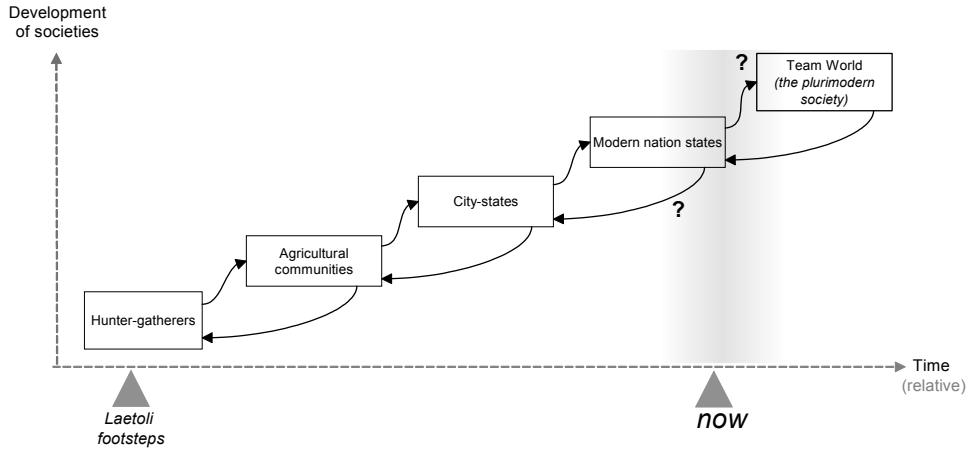
We are hardly aware of this phenomenon because the temporal and spatial scale of the path of humanity, which is based on the number of perspectives n, is so much larger than our ordinary human experiential worlds. The path falls literally outside of human scale; it exceeds for example by a wide margin the temporal and spatial extents of a human lifetime. For individual humans, it seems reasonable to think that human society does not exhibit a path of progress, but rather is chaotic and arbitrary. On the scale of a single human lifetime, that is not a crazy thought. Indeed, the pattern can only be clearly seen at the scale of *the path of humanity*. Then it is unmistakably present. It requires a broad and historical sense of society that is well documented and scientifically supported to be able to reconstruct and grasp *the path* at all. This is something that has only been available to us for a small number of decades, at most a couple of centuries.

4.3.1 The path in perspective: a first sketch

And still, the path speaks clearly to us if we know how to listen. The version of *the path of humanity* presented in the introduction is depicted below once again, but now with the addition of the next step that lies before us. The diagram shows clearly that I am working with a giant paint roller. With broad strokes I have covered the wall with primer, laying down a background of the overall societal development of humanity. We follow *the path of humanity* starting with the earliest moments of human history – the time of ultimate autarky – and continuing up to the present-day late-modern society, and we also look forward to the next step. This path covers millions of years and many variants of society, and the tempo of our journey increases steadily as it proceeds. I illustrate a succession of *four* societies from the path up to the present – societies that emphasize a steady increase in the scale of connection, cooperation and coherence. These are the *hunter-gatherers*, the first *sedentary communities*, the *city-states*, and *modern society*. I use the word 'modern' in its

[105] I have already compared this with the way that the average of a number of throws of a dice will tend towards 3.5. Every throw is totally unconstrained in its outcome of 1 to 6. But still the outcome of a large number of throws will inevitably creep closer and closer to an average of 3.5. It is also true of going through and experiencing perspectives that every perspective can have its own capacity. And still, as the number of perspectives increases, statistical rules will apply. Meanwhile we are able to understand this on the basis of statistical-entropic principles. Because there are many more possible microconfigurations to achieve an average close to 3.5, the chance of this happening is much greater. Strictly theoretically, we could come out with an average of 6 after rolling a dice 100 times, but the odds of this are $(1/6)^{100}$ and thus practically an impossibility. Analogously, the odds of a position along *the path of humanity* are much greater than for another position. Furthermore, the odds of an average of precisely 0 are exactly 0 for various values of n, just as some values of n can have no balance position in the object–subject plane (see the preface). Take for example n=3, i.e. three rolls of a dice. Because the total of three rolls would have to be 3 x 3.5 for an average of 3.5, and you cannot possibly roll a sum of 10.5 with three rolls, this value is impossible for three rolls. Later in this discussion we will examine this more closely.

specifically sociological meaning.[106] The huge time scale of the path makes it possible for us to better see our next and final leap in the scale of society. This is the leap to the *plurimodern society of Team World* – the society that we compose and construct as all of humanity together. We have already tested some facets of Team World; think for example of the establishment of the United Nations, of global trade agreements, and of programs of international emergency aid when there are great disasters. As humanity, we are globally at the shaded line marked with 'now' (see the diagram below).



The entire path of humanity up to the present, including the next step.

The central hypothesis: the perspectivist balance of society

I could have gone on painting with increasingly smaller paint rollers, then large brushes, smaller brushes, and finally with artists' brushes, for the pattern continues at every smaller scale (the patterns are recursive; essentially *the path of humanity* shows a series of large and for the most part autonomous perspectives).

It is, however, not at all my intention to be comprehensive, or complete, or historically accurate. That would stand in the way of the probabilistic course that such a path will take in the future: we can indicate the location in terms of network structure, but the exact substantive shape and route will have to unfold. Thus far I have left more detailed or more accurate versions of human development to be expounded by specialists in, e.g.,

[106] With the term 'modern' I do not mean popular notions such as 'up-to-date' or 'trendy', denoting the latest styles in clothing or furniture, but rather the sociological interpretation of the most recent period from the eighteenth century to the present late-modern age. Modernity begins roughly with the eruption of the industrial revolution, unleashing an enormous belief in progress, based on knowledge, science, and rationality. Society conformed to these concepts by becoming orderly and repetitious and centrally controlled. Because of this, modernity is the era of the greatest standardized logical thoughts, systems, and structures, such as education, healthcare, and the nation state.

sociocultural evolution – a branch of social science directed specifically to the structural development of societies in much more concrete terms than I can provide. The future I leave in the hands of futurologists, even though I now take their substantive projections rather less seriously. I read the books of Jules Verne at an early age, but even then you had to be quite young to value them as futurology, as they were when they first appeared. And I have on occasion taken a look at what people thought 30 years ago about the world of today. Some of those projections have indeed materialized, especially those forecasts that extrapolated basic human needs and how they would be met; you can hardly be wrong about that. But it is hard to hold back a smile when you see how the futurologists of that time of necessity expressed their future (and our today) in the substantive experiential frames of reference of their own time. I am thus not a big believer in concretely detailed images of the future.

That does not diminish the fact that the path of humanity gives a crystal-clear view of very specific trends in terms of the development of perspectivist structure that you can also extrapolate very well to the future. This I will develop further in Section 2. Here I observe that the scale of the number of perspectives (n) in connection, coherence and cooperation may fluctuate in the shorter term, and will tend to stay put at relative peaks and to avoid relative dips, but over the longer term and as a general trend it increases steadily and even shows an acceleration. Think for example of the patterns of the quotations of the more broadly constituted stock market indices (they too are subject to the same perspectivist laws). The dips become deeper, the peaks become higher, the process steadily speeds up, and actually, at every scale of n, the same pattern appears again, in a way that is similar but never *exactly* the same.[107]

In these fluctuations, we can also clearly recognize the three foundations of sociability that I already introduced in the Methodological Foundation. There I named them as follows:

[107] The casual observer might conclude that the perspectivist process is independent of scale, that is, that shapes or relationships do not change if you multiply specific variables by the same factor (this is also called thinning out or scaling up). Compare this with a number of circles of arbitrary size. The ratio between the circumference c and the radius r of a circle in independent of scale: $c=2\pi r$, where $\pi \approx 3.14$. The ancient Greek philosopher Parmenides would nod in agreement with this. He wrote many centuries before Christ in his instructional poem *On Nature* that nothing changes and everything exists: 'For it is the same thing that can be thought and that can be. […] It is all one to me where I begin; for I shall come back again there.' Singers and poets refer to this as well; see for example Jon and Vangelis, 'I'll Find My Way Home'. However, because of the discrete and quantum-theoretical nature of perspectives, the scale invariance is not perfect, but rather there is something that I will call practical scale invariance in Section 2. What it comes down to is that entirely different perspectivist scales can strongly resemble each other, but based on principles of number theory can never be perfectly scaled. I suspect that this corresponds quite well to the concept of self-similarity: a lot alike, but different. That is a better fit to the ancient Greek philosopher Heraclitus, who stated to the contrary that everything changes and nothing is eternal: panta rhei (everything flows, everything moves, everything changes). Entirely consistent with recursive perspectivism and its antidualistic fundamental attitude, Parmenides and Heraclitus are both somewhat correct, albeit in their limits, but the spectral truth lies in between. Everything changes, and nothing is lost forever.

> Actors are all **the same**; it is because of this that we can understand each other and empathize with each other.
>
> Actors are all **different**; it is because of this that we can choose a course of our own, mean something for each other, and add something to each other
>
> Actors are **one whole together**; it is because of this that we can achieve a quality and strength together that is never possible for individual actors in isolation.

These three principles form an exceptional triptych that is even a bit odd. They undoubtedly exclude each other if we consider actors strictly as people. As pure entities, you cannot be simultaneously the same as separate parts, different as separate parts, and one whole all together.

But in terms of perspectivist networks, these three principles together produce the coherence and cooperation that are characteristic of growing societies. Just look into what happens when a society develops more and more along the path of humanity. The perspectivist dimensions – together a single entity, all different, and all the same – all grow in absolute extent:

The **entirety** of perspectives n that a societal practice (as a unity) brings together becomes greater. This correlates directly with the number of people in a societal practice: dozens for hunter-gatherers, hundreds for villages, tens of thousands for city-states, millions or tens of millions for nation states, and billions for Team World.

The absolute number of shared perspectives of this whole (that are thus **the same**, similar) becomes greater. This correlates with the number of members of the various constituent groups of a society, because it is exactly within groups that many perspectives are shared. And the number of cooperating chemists or sociologists or mayors or politicians or criminals or whatever else in a late-modern society is simply much larger than the number of cooperating hunters or gatherers in a group of hunter-gatherers.

The absolute number of dissimilar perspectives in this whole (that thus are **different**, pluriform) becomes greater. This correlates with the number of dissimilar constituent groups in a society. After all, different disciplines, different specializations, different cultures, and different ethnic groups all distinguish themselves on the basis of their differing perspectives. They bring these to bear in solidarity and in cooperation. And while that were only a couple of specializations within groups of hunter-gatherers, the number of business sectors, professional specialties, and societal functions within a late-modern society is truly enormous.

Thus together one whole, all the same, and all different are all at work *simultaneously* in the processes of society.

The central hypothesis of the recursive perspective image of society is what I call the hypothesis of perspectivist societal balance. It holds only for complex processes in which stochastic effects can do their work at levelling out variations. Societal development is an excellent example of such a complex process.

In short, the hypothesis of perspectivist societal balance can be stated thusly:

> A high-quality society of any size can be recognized by a specific balance between the three perspectivist dimensions mentioned above. They constantly seek to establish and maintain a more or less equal proportion for each of the three.

When a societal practice develops, *all three* of the societal dimensions will therefore grow more or less equally. In concrete terms this means that in a larger society we will – once again strictly on average – encounter more groups that differ from each other socially and in terms of professional skills, and that each of these groups will on average consists of more members.

Shortly I will illustrate this by means of a more concrete description of the development of the human societal practices along *the path of humanity*. We will see that hunter-gatherers live in groups of several dozen people (the **whole** number of perspectives is small). They therefore have little specialization (the number of perspectives that is truly **different** within the group, for example between hunters/men and gatherers/women, is small). The group size within these specializations (the number of perspectives that is **the same**) is therefore low. In modern society, our societal practices include many millions – even hundreds of millions – of people. There is therefore a huge amount of specialization, and the number of people involved in these specializations is therefore much greater.

The societal balance hypothesis encompasses a broad feeling that many of us will recognize intuitively. If you go to a survival camp with a certain number of young people, it makes sense to split up into groups to carry out crucial tasks (food, shelter, sanitary facilities, etc.). If the group is even larger, then the division can be more specific, the task forces larger, and there will be groups within groups. With a certain number of perspectives, there is thus an attractive force towards a position of balance. *The path of humanity* adds to this camp process – in principle a perspectivist reconfiguration – an additional growth dimension: the number of available perspectives can also grow, from groups of hunter-gatherers up to and including all of humanity.

The societal balance hypothesis expresses this phenomenon mathematically, and it does this with perspective as a building block.[108] It is therefore a robust hypothesis that some will consider controversial, more so because it is thus far difficult to actually work numerically with perspectivist networks consisting of individual perspectives. In practice, it is not even

[108] In fact it is only possible to express this balance mathematically because of the differentiation of a building block of societal practices: perspective.

easy to actually count perspectives. We intuitively grasp whether many or few perspectives are brought to bear in a situation, or whether this is a unique perspective or one that is broadly shared and whether we consider that to be valuable (after all, a confused individual standing at the corner also shows a unique perspective). And as for counting, that will come with time. The first material atomist was Democritus, a Greek who lived several centuries before Christ. It has taken not just centuries, but millennia before chemistry had advanced far enough to be able to distinguish, count and weigh individual atoms. We might think of this book as an alchemist's description of perspectives. Hopefully, we will advance our understanding of societal structure in terms of perspectives much more quickly than our understanding of matter in terms of atoms and elements.

Another issue, and one that leads to much more controversy, is the fact that the societal balance hypothesis conflicts strongly with our late-modern self-image. We see ourselves – certainly since the Enlightenment – as individual and self-aware decision makers who rationally, free of any restrictions whatsoever, and with sound minds plot our own course in the world. As individuals, we experience only a very tiny bit of the overall development of *the path of humanity*, and we do not consider this bit to be a part of a much larger whole, but rather as our own personal life. In complete opposition to this, the societal balance hypothesis states that we individual late-modern humans participate collectively, as humanity, in a perspectivist balance. You could not choose a worse moment to bring forward such a hypothesis. And yet that is exactly what *the path of humanity* shows us. At the smaller scale (the microscale) and in concrete terms we are individual people who lead and guide our own lives, but at the greater scale (the perspectivist macroscale) the societal balance applies.

When the extent of a society grows, the number of actors and the number of members of these actors – in strictly statistical terms – grow as well according to perspectivist patterns. The exact form of this balance is the subject of Section 2. But you can compare this for example with the way that the radius and the circumference of a circle also always have the same ratio, independent of the size of the circle, which you can choose arbitrarily. The exact values of radius and circumference are determined by the size of the circle, but their ratio will always follow the formula $c=2\pi r$.

For a circle, the ratio between radius and circumference is hard and fast.[109] The circle metaphor, however, only goes so far. While the ratio between radius and circumference is fixed and obvious, the societal balance is a *probabilistic* balance. For the development of societies, the chance of larger relative deviations of the balance becomes smaller as the number of perspectives constituting the society grows.

[109] OK, it is as hard and fast as determining the value of pi exactly, and that too is of course an open question. That question will also remain open, because in practical terms the ratios between radius and circumference are scale independent at the macroscale, but not at the discrete microscale. I call the phenomenon that different scales closely resemble each other at the macroscale, but are different at the microscale, *pragmatic scale-invariance*.

Imagine that you were to roll a dice a large number of times. You tally the number of times that a one, two, three, four, five, or six turns up. Of course, there is a possibility that a 6 would come up 360,000 times in a row. The odds are exactly $1/6^{360,000}$, and thus in fact mind-bogglingly tiny (for the sake of comparison: the number of atoms in the visible universe is estimated to be on the order of 10^{78}). You will therefore determine that – in strictly statistical terms – as the number of rolls increases, the distribution between the number of ones, twos, threes, fours, fives, and sixes comes more and more into balance.[110] With more rolls of the dice, we can expect a better balance, greater symmetry, and figures of around the same size on the tally sheets.

The crucial point here is that every individual roll has a totally arbitrary outcome, while all of the rolls together are tightly confined to a particular pattern. Analogously, we can understand how individual decisions can be made entirely on the basis of free will, while the aggregate of all those decisions will show ratios and proportions that are rock solid.

To illustrate this phenomenon with rolling a dice, I have carried out experiments from n=1 to n=360,000 rolls (by intervals) with a single dice. The rolls are tallied by the value that comes up. You will forgive me that I have not actually rolled and tallied a real dice, but rather have used computer simulations. An outcome in perfect balance (only possible by a number of rolls that is a multiple of 6) would have six tallies of exactly the same value. The results of three simulations are depicted below. We can clearly see how the symmetry among the six tallies is far from obvious in the beginning, with fewer rolls. As the number of rolls increases, the symmetry becomes stronger and the relative balance better.

[110] This is a matter of the entropy that has already been mentioned.

Run	*n*	*number of ones, twos, threes, fours, fives, and sixes*
1		
	6	(0 2 0 0 3 1)
	12	(1 2 2 2 3 2)
	18	(2 3 3 5 4 1)
	24	(3 5 3 2 7 4)
	36	(8 6 4 5 7 6)
	360	(70 56 68 53 50 63)
	3600	(627 559 615 620 578 601)
	36000	(6030 5898 6010 6094 6067 5901)
	360000	(60241 60058 59707 59867 60461 59666)
2		
	6	(0 1 1 1 0 3)
	12	(0 0 3 4 3 2)
	18	(4 2 3 2 3 4)
	24	(6 1 4 4 4 5)
	36	(5 5 9 6 7 4)
	360	(64 55 55 61 60 65)
	3600	(564 604 600 585 582 665)
	36000	(5918 5962 6065 5985 6086 5984)
	360000	(60123 59505 60147 60179 59985 60061)
3		
	6	(0 1 0 0 3 2)
	12	(1 2 4 3 1 1)
	18	(4 4 3 4 1 2)
	24	(2 5 3 5 4 5)
	36	(8 7 6 5 5 5)
	360	(67 43 59 76 57 58)
	3600	(551 614 611 591 632 601)
	36000	(6092 5982 6015 6037 6017 5857)
	360000	(59878 60078 59716 60144 60374 59810)

An increasing number of rolls of a dice at microscale shows increasing balance among the various values at macroscale.

In a similar way, a societal practice that is constantly growing and has more and more perspectives at its disposal will seek its balance over the three perspectivist dimensions. In practical terms, that balance is never perfect. At any given moment, freedom of choice plays a role, just as every roll of a dice can result in any one of the six outcomes. But an attraction toward balance is pretty much unavoidable in pragmatic and probabilistic terms.

We humans therefore experience the reality that a balance-seeking process is involved here. Of course, it is essentially a matter of entropy. (Look back at the diagrams of configurational entropy when mixing two gases, and information entropy when flipping a coin. When the number of alternatives is 6, the balance is 1/6.) There are many more microstates (i.e. specific sequences of rolls of a dice) that can deliver a macrostate with a balance of around 60,000 ones, twos, threes, fours, fives, and sixes, than the one macrostate of 360,000 ones and not a single two, three, four, five, or six. Perspectivism sheds light on the scientific phenomenon of measurement error in a particularly intriguing way – something I have already mentioned in Volume I of this Society in Perspective series: *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation). There are in fact positions just outside of perfect balance that also show a great likelihood.

In this way, there are also many more microstates that deliver a macrostate of societal balance. The chances that a better societal practice is located close to the balance position is thus much greater.

The failure of winner-picking strategies

We must therefore never aim for a very specific concrete variant of societal balance. Assumptions of the manipulability of society and applying winner-picking strategies that are premature are deadly for the functioning of entropy. We have to provide for the combined deployment of many perspectives and of a broadly distributed quest for improvement, and to provide strong and inclusive societal institutions that guarantee that all of the perspectivist resources at our disposal are actually utilized optimally in interaction with each other. If there are winners, then you let them be known.

This indicates once again that policy-making processes that claim to have to focus on specific and concrete technologies or products or societal arrangements will generally be ineffective on average in the longer term. It is impossible to apply a winner-picking strategy as an instrument of policy, because this presumes that you can know ahead of time what the desired and winning technology will be. In a complex and developing society, that is difficult, if not practically impossible.

What you can do is to try your best to maximally account for the wishes and needs of as many groups and individuals who make up your society as possible. This requires that you give them a voice and a platform, as well as all possible means of expressing their power, position, wishes, and needs. What you can then aim for is societal balance.

That this perhaps is possible is evident for example from the fact that deviations from balance in society on average have negative effects on the quality of societies. *Together*, *the same*, and *different* are then out of balance. When one of the three is greater, this necessarily is at the cost of the other two, given a fixed amount of perspectives (see the table of throwing dice: very many sixes demands that the other tallies be smaller).

The relationship among the three dimensions is characteristic of a societal practice. When they increase more or less at the same rate, a society is in balance and in statistical terms also of good quality. The fact that societies perform poorly when out of balance is actually quite simple to understand. A society in which *unity* predominates at the expense of pluriformity and similarity is somewhat fascistic, a society in which *similarity* predominates at the expense of unity and pluriformity is somewhat communistic, and a society in which *pluriformity* predominates at the expense of unity and similarity is somewhat anarchistic, neoliberal and individualistic.

The path of humanity is nothing other than unconscious obedience to the entropic perspectivist balance. When a society deviates from this balance structurally and extensively, it pays a price for this in terms of lower societal quality. Eventually, something will turn the tide. The battle cry of the French Revolution was one expression of this. It is not so very difficult to see the political abuses of recent centuries, whether fascist or communist or neoliberal, as an expression of societies that are firmly out of balance in the light of these three perspectivist societal dimensions.

Why the Hadza do not have toasters

Originally the complete title of this subsection was 'Why the Hadza do not have electrical toasters (and you and I cannot make one)'. That turned out to be rather too long for the table of contents, so I had to shorten it. But the complete title reflects the essence of *the path of humanity*. I'll explain.

A few years ago I was in Tanzania, not far from Lake Eyasi. There I visited the Hadza, a nomadic people of a bit more than a thousand people who live as hunter-gatherers in groups of ten to twenty individuals. Being there is like being abruptly flung back thousands of years.

You will understand that the Hadza do not own any toasters. There are other things that they do not have, but also some things that they do have, such as an exceptional knowledge of and experience with hunting with bow and arrow. But I picked out the toaster because of a superb TED talk by Thomas Thwaites: 'How I built a toaster – from scratch'.[111] Mr. Thwaites is a young designer who had come up with the plan to make a toaster – the household gadget that you can buy at a department store for ten or twenty dollars or euros – entirely on his own. And by 'on his own' he meant *absolutely* 'on his own'. He bought a toaster and disassembled it, producing a collection of some 400 parts and then got to work making each of the parts himself. He tried making steel himself, and plastic, copper, etc. Gradually he found out that this is not all that easy. Every part of a toaster originates in its own world of people and technology and manufacture and trade. Tens of thousands, if not hundreds of thousands or millions of people are ultimately involved in manufacturing (and using) toasters. What he eventually was able to produce himself, after a period of extreme

[111] Search on the internet for Thomas Thwaites and toaster and Ted talk; the clip is well worth your time and trouble.

perseverance, is truly hilarious; just take a look at the TED clip and you will understand what I mean. I have on occasion seen a better-looking and better-working toaster, and that is an understatement!

His conclusion? It takes a society to build a toaster. This reminded me of the well-known saying 'It takes a village to raise a child.' And the thought followed immediately: 'It takes humanity to build society!'

After seeing this TED talk, I had to think of the Hadza people. They live as self-sufficient hunter-gatherers in small groups. They do not have a society that can make all those parts, working together cooperatively. They lack steel mills, oil wells, plastic factories, grain fields and bread factories, department stores, power plants, and electrical distribution networks. They have never seen Thwaites' TED talk; they do not even have the faintest notion what a TED talk is. Thus they do not have any toasters either. They also *cannot* have one. That is a matter of a perspectivist scale n that is much too low; they lack the extensive specialization and the large scale that would be needed.

What struck me about Thwaites' video is that, starting from something relatively simple like a toaster and the will to make one *on his own*, he highlighted with great clarity the essence of recursive perspectivism. He described the global nature of the relationship between the amount of perspective and quality. There is an overall positive correlation. More coherence and cooperation in terms of improvement perspective (within a higher n) correlates in general positively with more quality (in whatever form). This happens because we are improvers, for better or for worse. If more coherence and cooperation in improvement perspective does not result in quality, then we dissolve that connection and cooperation, for the effort has produced too little value. It is more trouble than it is worth. Because of this efficiency, over the longer term, a positive correlation develops between n and quality, between effort per perspective and value per perspective. Of course, there will be hefty ups and downs, as the Thracian servant girl points out quite clearly to us.

Thwaites showed that we create the higher quality of a modern toaster with millions of people acting in coherence and cooperation, which furthermore comes about for the most part spontaneously (it is emergent in time, not entirely planned). The toaster itself, in isolation, which you buy in a shop selling household appliances, is of course an excellent example of a designed product. But the toaster in its context: the entirety of materials and parts, the electrical supply, the sliced bread, the production of cereal grains – this huge ensemble in this specific connection is not. The number of perspectives in coherence and cooperation in a modern society is truly enormous, and that expresses itself even in (around) a simple toaster.

Because he wanted to make steel, plastic, etc. *on his own*, he hugely restricted the number of perspectives that were available to him. And as a result of the limitation in the number of perspectives, he quickly fell back many centuries in the technology that he could apply.

For steel, for example, he could not make use of modern mines and steel mills and hardware stores. He thus had to haul wheelbarrows of ore himself out of long-abandoned mines and make iron with a small smelter. Because of his self-imposed perspectivist restrictions, he used centuries-old books on metallurgy, ancient techniques, and mines that had long been closed down and abandoned.

On all fronts, Thwaites fell back in time (the experience that I had to an extreme with the Hadza). When you cut back sharply the number of perspectives in coherence and cooperation, quality declines. His experiment shows that you then fall back irrevocably to the level of quality that corresponds to a more limited perspectivist scale. Thus Thomas and you and I cannot make a modern toaster in isolation, any more than the Hadza can do that. That is a matter of perspectivist scale. Because the perspectivist scale is too low, the Hadza have no electric toaster, and you and I cannot make one either. However, the Hadza can do all sorts of things that we cannot do, in nearly perfect autarky; as already mentioned, they are true masters at hunting with bow and arrow.

This shows that there is more than a coincidental correlation between the amount of improvement perspective in coherence and cooperation on the one hand, and quality on the other hand. This suggests that there is a 'two-way causal' relationship: change one of these, and the other changes mostly in the same direction, and that the amount of perspective in connection on the one hand, and quality on the other hand, are tied together as though connected with a strong rubber band. When we increase the number of improvement perspectives, then the chances of a higher quality will increase on average. If we want higher quality, then we have to increase the amount of perspective. And when we see higher quality, then we can expect a greater coherent deployment of perspective.

Conversely, it holds that if we reduce the number of perspectives in coherence, quality will drop. And when we see quality declining, that generally comes about because the number of perspectives in cooperation and cooperation is decreasing. Then it is perhaps time to withdraw somewhat more into our shell and to raise the walls (Berlin, Israel, Europe, or around a family).

I wish to emphasize again that this holds only in a strictly statistical sense, on average. After all, when you blindly make something three times as large, it does not become three times as good. In individual cases, this can certainly work out differently. Specific individual perspectives can indeed be concretely better than others. Rembrandt did in fact paint better than I do. As a consequence, his paintings are still valued centuries later, and I do not paint. And the peaks and dips discussed in the prelude indicate that you can break your neck if you storm ahead too naively, and that in other cases it can be quite smart to reduce the perspectivist scale somewhat. But given huge amounts of perspective and enough experience and effort, we do in fact come up with an overall doubly-causal relationship between the amount of perspective and quality. That is unavoidable, just as a series of rolls of a dice ultimately ends up with a balance among the values rolled and thus an average of 3.5.

More and more improvement perspective in more and more coherence and cooperation generates more and more quality – definitely when we combine the gaze of Thales with that of the Thracian servant girl. That is what *the path of humanity* has shown us for millions of years.

On rise and fall

The path of humanity cannot be thought of as a stairway leading steadily upwards. The diagram also shows loops that turn back, and these are amply highlighted at a variety of scales. The city of Uruk in ancient Mesopotamia already had writing, coinage, and a legal system thousands of years ago, but it did not survive. The Roman Empire was an early-modern eruption, but the dawn of late-modernity caused it to collapse. And whether we ourselves as late-modern people will choose the downward route of the Romans in the near term, or rather the upward alternative, is yet an open book.

The loops in the diagram of the path of humanity always remind me of the dancing procession of Echternach, a procession that has been held annually on Whit Tuesday since the Middle Ages in a village in eastern Luxembourg. I once saw the procession as a small child, although not in the earlier form that I describe here, and at the time it made a deep impression on me. Up until 1947, the participants moved through the streets of the town by jumping three steps forward and then two steps back. But that created so much chaos and so many collisions that it was decided in 1947 to jump only forward. This did not entirely eliminate the chaos, but nevertheless, it was a decision that humanity can take as a shining example, for the dancing procession and the actual route of humanity are not all that different.

4.3.2 With seven-league boots through human history

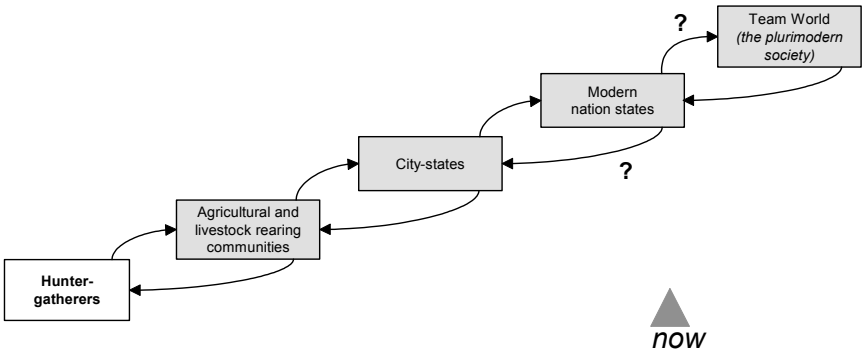
'Civilizations die from suicide, not by murder.'
Arnold Joseph Toynbee, 1889-1975

In this section, the path of humanity will be outlined in more detail. It shows how we are bringing increasing amounts of perspective to bear in constantly improving coherence and cooperation. I am aware that other divisions are possible and other accents could be placed, but my concern here is the overall picture. My intention here is to give some feeling for the erratic course in leaps and bounds of this overall path of humanity towards constantly improving quality.

The path turns up in many different places, in different forms, and with many different purposes.[112] The picture that I make use of is strongly generalized and schematic. It leaves

[112] Nowadays you can find it in nearly all history lessons and historical sketches of human development. Other interesting examples are the Big Science colleges (such as the University of Amsterdam) and the work of Ken Wilber et al. on spiral dynamics. The idea is also tightly integrated in the excellent book *The Righteous Mind* by Jonathan Haidt (2013). The path has an interesting relationship with evolutionary theory: the way

out some things, and many exceptions could be mentioned, but some processes are seen most sharply on a very long timescale and a very broad spatial scale, and with our eyes half closed. They are even totally invisible in the short term and with a magnifying glass; they then disappear in the nuances and the noise. The development of our society as a whole, as depicted in *The Path of Humanity*, is the prime example of this: you see it only at the temporal and spatial scale of humanity, a scale at which no single individual can have first-hand experience.



1 The autarkic phase: hunter-gatherers

Humanity began as hunter-gatherers. All early humanoids, e.g. Australopithecus or Neanderthal, lived entirely as hunter-gatherers. They gathered edible wild plants and were – especially later – skilled at hunting. This was the way that they came by their food. Modern humans, Homo Sapiens, have only been on the scene for around 200,000 years, but they too lived the first 90% or so of this time as hunter-gatherers. This phase is thus by far the lengthiest of the path of humanity. Development proceeded slowly. We know for example that some types of stone-age hand axes remained exactly the same in terms of technology for many tens of thousands of years.

Early humanoids other than modern man were also familiar with the use of fire. The dates vary, but the early traces date back more than a million years, and it is generally assumed that fire has been broadly used since half a million years ago.

Even today there are still several thousand people who live as hunter-gatherers. Examples are the San, who live near the Kalahari Desert in southern Africa, and the Hadza in Tanzania, whom we have already mentioned. There are also various indigenous tribes in Central and South America who live as hunter-gatherers. Modern people have the tendency to label these people 'primitive', but that requires a careful definition of what you mean by primitive. These are for example enormously skilled and experienced hunters, making use of an impressive technology and a wealth of experience. I spoke with the Hadza (via an

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that coincidental evolution and intentional development relate to each other is in fact the leitmotif of recursive perspectivism and *The Path of Humanity*.

English-speaking Datooga interpreter) about their bows, their arrows, and their arrow points. They choose which bow, which arrow, and which point to use depending on which animal they are hunting and the circumstances. They also possess an impressive ability to track their prey. They see and sense a world of which we are totally unaware. Modern humans would not last even a couple of days under the circumstances in which the Hadza lead their lives.[113] I once watched with amazement a documentary that showed how the San cooked an ostrich egg that they had found. They do this at the spot where they find the egg, with nothing more than fire, the ground, and the egg. This gives a whole new dimension to the principle 'less is more'.

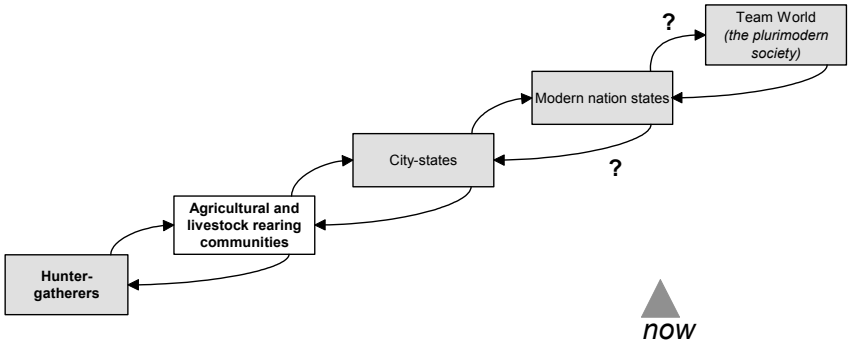
Characteristic of the way of life of hunter-gatherers is that they have little if any impact on their environment. They are much more likely to go along with it and merge with it, and they make use of the fruits that their surroundings produce on its own. And for anyone who senses a romantic image here: their life is in fact as hard as nails. If hunting is going poorly, there is a real threat of starvation. I saw that many Hadza children had respiratory ailments because of their remarkably simple lodging (a few cloths laid over some brushes and sticks stuck in the ground, and some brush stuffed in the gaps, and that was their home). Such accommodation may seem primitive in our eyes, but it suits the requirements of their hypernomadic way of life very well.[114]

Hunter-gatherers lived their nomadic and autarkic (self-sufficient) lives in small groups of at most a few dozen people. In principle, each group did everything themselves: one took care of one's own interests. There was therefore practically no trade or sharing of specializations between groups; there was hardly any need for this. Still, we saw here as well how humans acted as connectors and cooperators within the groups. Differences in talents and needs led even in these first communities to a division of tasks and specializations. This had to do with the difference between the men (as hunters of larger game) and the women (as food gatherers and caretakers of the children; you would not want to have children walking around during the hunt). But even the Cro-Magnon of 10,000 to 40,000 years ago in France had workplaces for the manufacture of stone tools. Making tools and weapons, and using them, for example in the hunt, was already a specialization. It is reasonable to presume that there was also an early form of local trade of meat for tools, within whatever coherence and cooperation existed within groups. The Hadza in present-day Tanzania trade bushmeat for metal arrowheads from the Datooga, a tribe of farmers and smiths. (The forges of the Datooga are a story in themselves: a small fire, a primitive bellows, very primitive hammers and stones, and a thorny hedge to keep out the wild animals, and that is it.)

[113] My experiences with the Hadza made it clear to me that it is primarily the perspectivist scale of connection and cooperation in which societies differ from each other, and not so much the number of perspectives per individual. If Westerners were to be thrown back to the scale and circumstances of the Hadza, it could take thousands of years before we would reach their level of development. I therefore do not use the word 'primitive' carelessly in describing these early societies.

[114] In these times a trekking tent is also simple, but it is full of modern technology.

There are also many traces of fierce conflicts *between* groups of hunter-gatherers in the past. One suspects a strong us–them feeling and intense competition for scarce resources. This helps to explain the development into the following phase.



2 The early sedentary phase: Agricultural and livestock rearing communities

The phase of the hunter-gatherers transitioned via the Neolithic revolution (some prefer to call it an evolution, as it did not proceed all that quickly) into that of the simple agricultural and livestock-rearing communities. As the name indicates, communities came to rely more on agriculture and livestock-rearing for food production, and there was also some managed storage of food supplies. It probably all began very carefully: people began to protect wild food plants and to manage wild animals more than they had before. Because of this, the character of a community slowly changed from one that mostly involved going after food via variants of pastoralism (shepherd and their flocks constantly looking for fresh grass and water) to more one that mostly sought to manage food supplies.

It is difficult to get a clear picture of the motivations behind the transition from hunter-gatherers to sedentary societies. This move is called the *Neolithic Revolution* – it led to the Neolithic era. I see both opportunity-driven and problem-driven theories and motives. The more opportunity-driven theories state that life in early sedentary societies was better than life as hunter-gatherers. One had better control over food supply, and lodging was sturdier and more comfortable (sedentary refers to the fact that people began to live in settlements). At a later time, villages got defensive walls that provided better protection. The more problem-driven theories state that hunting and gathering provided a good and varied diet, but that because of this success the numbers of hunter-gatherers became so great that the carrying capacity of nature was no longer sufficient, resulting in exhaustion of natural resources and scarcity.

Scarcity is a theme that introduces a surprising parallel to our present-day late-modern era, in which we are quickly exhausting the available natural resources. There have never been many hunter-gatherers on our earth, but this way of life demands a large land area per individual (it is surface-extensive). Because of this, you can run up against the limits of the carrying capacity of our earth with only a relatively small world population, on the order of

a few tens of millions of hunter-gatherers. In our late-modern society with billions of modern humans, we are once again reaching the limits of the carrying capacity, and now too it is time for a next phase of society.

Probably both types of motivations – opportunity-driven and problem-driven – played a role. The Neolithic Revolution was thus both an escape from scarcity and a leap towards more abundance. (In terms of perspective, a lower and sinking peak was abandoned and a higher peak was climbed.)

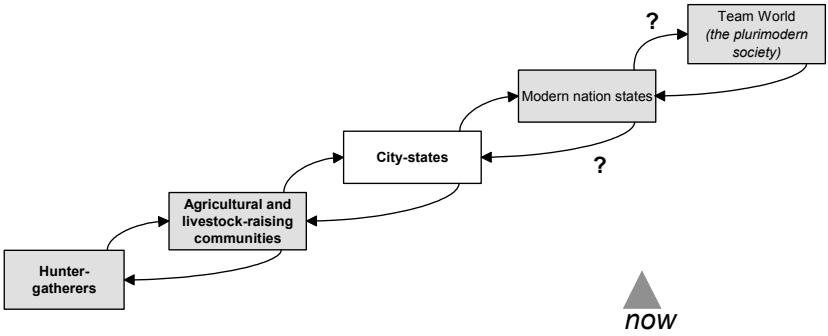
This does not alter the fact that the step towards sedentary societies, once it had been made, set an enormous societal development in motion. Living together in settlement led to further specialization within more complex social connections. People engaged in agriculture and animal husbandry, there was a need for ceramics for storage vessels and other household uses, and one discovered the advantages of metals and developed it even further. The strongly egalitarian society of the hunter-gatherers slowly changed into an early stratified class society through the appointment of leaders and the development of the first legal systems. Perhaps the role of village herdsman (or woman) came into being, and religious movements developed further.

The notion of private property became important because of the ownership of land and cattle and the storage and management of food supplies. For hunter-gatherers, private property had little significance, since nearly everything was available in nature and could be obtained when it was needed. Once there were stores of food and other resources, there could also be both shortages and surpluses, and barter trade could also increase in scope and variety. The first true serial production came gradually into being, of pots, polished hand axes, and other weapons. As barter transactions became more complex, a greater need developed for generally accepted media of exchange such as salt (*salaris* in Latin, the root of modern 'salary'), silver, and gold. And this in turn made possible the implementation of a later function of money, that of *savings*.

The step from hunter-gatherers to the first sedentary societies involved a change of the scale of group size from a few dozen individuals to several hundred (and perhaps thousands) of individuals. From a perspective viewpoint, we can see how this increase of scale automatically leads to an enormous social and functional specialization: the perspectivist societal balance does its work. Coherence and cooperation inevitably increase, and quality grows as well – at least on average. When sedentary societies stop providing this added value of quality, whether from human or natural circumstances, then we see them spontaneously disappear from the stage.

The coherence and cooperation *within* sedentary societies increased enormously. But we also see defensive structures arise around the settlements, and many early forms of professional armies. This indicates once again the fiercely competitive and downright hostile relationships *between* the various sedentary societies. Still, the trade between

settlements (a peaceful relationship) increased because of the scale phenomenon already mentioned – the valorization of surpluses and the supplementation of shortages.



3 The late sedentary phase: city-states

Simple sedentary societies eventually grew into cities. This happened mainly at places that were geographically interesting such as river crossings, road intersections, and fertile deltas. Here too we see a mixture of problem-driven and opportunity-driven motives. In the area between the Euphrates and the Tigris in ancient Mesopotamia for example, there was too little water and complex irrigation works helped to make agriculture function well. People also sought out the security of well-defended cities. The organization of these defences was steadily improved by means of fortifications and professional armies. Building construction flourished because of this, but also because of the need for palaces and temples. Armies and craftspersons had to be paid, leading to taxation and to an even greater need for money as a flexible economic medium of exchange. The need to manage storehouses and to balance stores by means of trade increased constantly, leading to the development of writing, which quickly evolved. The notion of money flourished, and local rulers struck the first coins as an independent medium of exchange. The growth of villages into cities led to more laws, rules, and agreements and to further religious development and to more elaborate specialization.

Hunter-gatherers were largely egalitarian, and in villages, there was at most a modest degree of class differentiation between the peasants and the leader. In the city-states a rich classification of residents could be recognized: slaves, peasants, a broad spectrum of craftspersons and soldiers, writers (the first civil servants), priests, and a ruler (for legal decisions and as commander of the army).

Around 3000 BC there were already several dozen city-states in Mesopotamia, averaging around 10,000 inhabitants. Uruk was the largest of these, with around 50,000 inhabitants. But, of course, we also know of city-states in the Far East, Central America, classical Greece (e.g. the Trojan War), and the Italian Renaissance of the fourteenth century. In Italy, powerful cities such as Venice and Florence conducted a lively trade and generated welfare,

but simultaneously made life miserable for each other with bitter feuds and wars over issues of competition.

Between around 1600 and 1800, the Republic of the Seven United Netherlands, also known as the Dutch Republic, was in essence a confederation of provinces with strong central cities. Together they set up a defence pact and a unified customs system. They were somewhere between the city-state and the modern nation state. In the seventeenth century, a century in which the arts and sciences flourished and there was an enormous freedom of thought relative to the neighbouring countries, they launched a fleet that at one time numbered some 2000 trading ships and warships – more than France and England combined – and this with only 2,500,000 inhabitants. Holland was unmistakeably *primus inter pares* among the seven provinces, and Amsterdam naturally appeals to the imagination as the most dominant city.

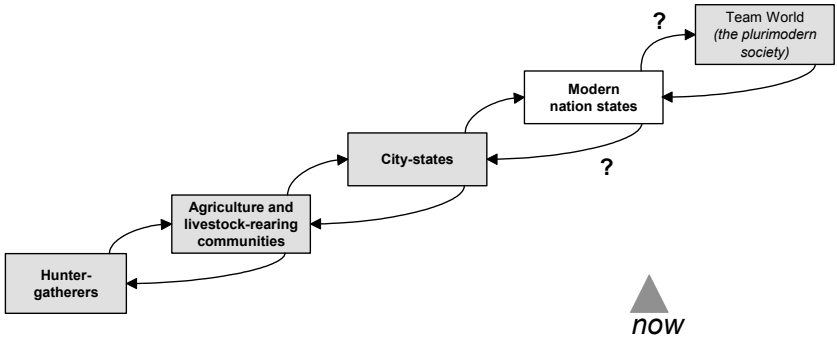
By the middle of the century, Amsterdam had around 200,000 inhabitants. The famous half-moon of the canal belt was constructed in four phases during the seventeenth century. But following in the wake of Amsterdam were many other cities, such as Hoorn and Monnickendam, which were also powerful and prosperous. It was certainly not always sweetness and light between the cities and provinces, but they generally understood quite well that cooperation would lead to more value than bitter competition and conflicts among themselves. That competition and conflict they saved for the English, French, Spanish, and Portuguese.

The many wars, the increase in the scale of production, and the investments required for trade (ships, purchases of goods) demanded huge amounts of capital, leading to many financial innovations, in city-states as well. According to Aristotle, the philosopher Thales of Miletus (a Greek city-state on the western coast of Asia Minor) was one of the first persons to become rich with derivatives. He took options on olive presses because he had access to information predicting a good olive harvest, thus becoming a wealthy man. In Venice, the *commendas* were established: commercial partnerships of a rich person who provided capital and an adventurer who set out and sometimes literally risked his neck to conduct trade. It is not surprising that in the Italian renaissance goldsmiths evolved into the first bankers and began to lend out money against interest: the need for capital was great. It was impractical and dangerous to drag around large amounts of gold and silver, and the solution to this problem was the invention of the bill of exchange – credit notes that served essentially as the first fiduciary money (*fiducia* is Latin for confidence or trust).

A bill of exchange is only worth anything if you have confidence that the countervalue can also be exchanged. Banks quickly understood quite well that they only had to keep just enough countervalue of gold and silver in the bank as they would expect might actually be withdrawn on the basis of bills of exchange. The banks tried to see how far they could push this, the gold and silver standard was quickly abandoned for all practical purposes, and the first bank failures were soon in evidence. This happened in 1343 and 1346 and involved the Florentine banker families Bardi and Peruzzi, with as their primary cause the fact that the

English king Edward III could not meet his financial obligations. The recent financial crisis of 2008 has shown a fine reprise of just how large the gap can be between the book value of a bank's assets and the value actually available. The development of the concept of shares in an enterprise also followed from the need for financial risk management. The Dutch East India Company was the first to issue shares in their ships, so that shareholders no longer had to bet on a single ship, but rather could take out shares in several ships.

With the phase of the city-states, I bring together here a huge and multifaceted development of society under a single label. As seen from the viewpoint of the path of humanity, that is illuminating: while hunter-gatherers lived and worked together in groups of a dozen to some dozens of people, and populations in agricultural villages generally ranged from a few hundred to around a thousand inhabitants, the city-states included tens of thousands or hundreds of thousands of inhabitants. We increased the scale slowly but surely (though with major setbacks along the way) in terms of coherence and cooperation among inhabitants, in terms of specialization and social stratification, and thus in terms of connection, coherence and cooperation within the concept of perspective.



4 The modern phase: Colliding systems and the missing individual

At present we are living in the (late) modern age. Modernity is the strongly rational phase that follows the more religiously-tinted premodern phases (everything that preceded, from hunter-gatherers up to and including the city-states). According to various historians, modernity begins at around the time of the American and French revolutions (1776 and 1789 respectively). But just like the phase of the city-states, the modern phase cannot be assigned an exact place on the timeline. *The path of humanity* sketches a picture of development that follows a stochastic upward drive for improvement, with all its peaks and dips, and it offers no historically accurate placement on the timeline. For example, it is easy to defend the notion that the Roman Empire already had late-modern traits around the first century CE with respect to religion (considerable freedom) and was modern with respect to the deployment of large-scale infrastructure (roads and waterways). At the same time, in our present-day world there are still a number of Hadza and San and Emberra families who

wander around Tanzania, Namibia, and South and Central America following the lifestyle of the hunter-gatherers.

Personally, I prefer to let the centre of gravity of modernity coincide with the time of the modern nation states, knowing however that this may be seen otherwise by historians. The notion that a state generally coincides with a single nation, and thus a single ethnic group with a certain cultural, disciplinary, linguistic, religious, and/or intuitive kinship, is broadly prevalent in the last few centuries. France is populated with the French, Germany with Germans, the Netherlands with the Dutch, and we have a certain image of each of these, however incorrect that may be for individual cases (the Belgians, for example, hardly follow the one country, one nation rule). The development towards nation states proceeded from two directions. States such as Italy and Germany, for example, were *united* in the nineteenth century, pulled together from patchworks of smaller (city-)states. On the Balkan Peninsula, however, the Ottoman Empire *collapsed* several centuries earlier into a diversity of ethnicities, and Yugoslavia did that again at a smaller scale in the twentieth century, with consequences that are still fresh in our memories, such as the Srebrenica drama. Nation states thus came into being through both unification and fragmentation, though one can question the original coherence *among* the parts in the case of the fragmentations. In Europe, and certainly in the Balkan region, the Ottoman Empire was more a collection of a number of smaller states organized around cities (city-states), held together loosely in a weak network, rather than a self-conscious and unequivocally united entity.

Placing our focus on the internal coherence and unity and the self-awareness of nation states helps to articulate the ongoing development at larger scales from groups of hunter-gatherers through sedentary villages and city-states to nations. We see mutual friendships and hostilities at every phase: between groups of hunter-gatherers, between villages, between city-states, and between nation-states. Nationalism in its fiercest political forms also shows internal hostilities due to the exclusion of 'the others', alleged outsiders of the nation – e.g. the persecution of the Jews, Romani, and Sinti before and during the second world war.

The step from city-states to nation states brought about once again a large number of societal developments. The administrative revolution that accompanied the transition from agricultural villages to city-states was revolutionized once again. Increasing complexity demanded an even more complex political assessment, more complex governance, and a more differentiated corps of public officials. More complex buildings, defensive works, and armies came into being, as warfare and defence also scaled up. Taxation systems grew because more complex services and facilities were evolving. Transportation and communication networks had to be brought in line with the new scale and intensity of societies, not just within nation states but also between them. The further specialization of trades and professions, which had already begun with city-states, accelerated even more. The financial world grew both in scope and in specialization, in line with the demands for greater investments in warfare, infrastructure, and trade, and the growing need for

managing and spreading risks. Subclasses of entrepreneurs, specialists, public officials, and citizens differentiated even further.

Especially in Western countries, the existing feudal systems changed into more inclusive forms of government. Inclusion, the phenomenon through which important social groups in the emerging nation states obtained more rights and possibilities (as well as duties and limitations), was unavoidable, because this indeed guaranteed their participation and support, which were sorely needed at the new larger scales of coherence and cooperation of modern nation states. For an early but illustrative development towards more inclusive institutions, see the struggles concerning the Magna Carta, signed in 1215 by King John of England under pressure from a group of rebel barons. The Magna Carta set limits to the power of the king while expanding the power of other parties such as politicians. The church also received more autonomy, for example in being allowed independence in filling ecclesiastic vacancies. The judicial and legislative system was reformed to the detriment of the authority of the king, and his officials could be held accountable – which was an important improvement, considering the widespread corruption and arbitrariness of the time. The levying of taxes thereafter required consultation of the king with his council of barons, and fines were established. Imprisonment of free men henceforth required a verdict in accordance with the law. Merchants gained the right to travel freely throughout the country. Altogether, these changes meant a considerable curtailment of the power of the king and a combination of less arbitrariness, more freedom, and a greater reliance on legal claims by the church, nobility, free men, and merchants.

The Magna Carta is sometimes called a special and exceptional occurrence. Personally, I think that something like it was unavoidable sometime between the year 1000 and the year 2000, with only the exact form and the exact point in time being undetermined. If not this specific charter, there would have been another, this I can say with the wide paint roller in hand and the probabilistic character of *the path of humanity* in mind. Up to the present day, history agrees with me, at least in the West.

The emergence of modernity as a specifically *rational* societal phase is best characterized by a pair of developments. The first of these comprises the scientific and industrial revolutions and the link that binds them together, technology. The second is the dominance of rational thinking, scale, similarity, and efficiency that resulted from the first. I'll discuss both of these.

1: The scientific and industrial revolution, and the pivot point between these two: technology. The scientific revolution from around 1500 up to 1900 (but you could argue that it had already started with the rise of the handicrafters in the Middle Ages), caused a shift from a more religious conception of relevant knowledge and relevant ways of acquiring knowledge to one more grounded in the natural sciences. In that natural scientific view, the central position is no longer held by speculations and magic, but rather by experiments and observations (empiricism). The famous sociologist Max Weber wrote in this connection about the *Entzauberung der Welt* – the disenchantment of the world: the magic

disappeared.[115] Copernicus, as already mentioned, came according to hardcore empiricists to his view in 1521 that not the Earth but the Sun is at the centre of our solar system strictly on the basis of observations of the night sky.[116] His accomplishment is often said to be a starting point of the scientific revolution. But of course such a shift in thinking does not come about at a single moment in time; it takes centuries.

The *industrial revolution* refers to the shift from the manual production of a few products (before the industrial revolution, farmers made their own tools) via small-scale serial production in home workshops (the first industrial revolution, e.g. home weaving) to mechanized factory production of large quantities of products (the second industrial revolution). Because large-scale centralized means of production (factories) could only be financed by those with the greatest capital resources, the industrial revolution went hand in hand with the full development of capitalism. We also see a similar process in agriculture: a huge increase in scale and a huge application of science and technology to food production has led to modern agriculture that in no way resembles the early agriculture of the first sedentary societies.

Both revolutions, scientific and industrial, are closely connected to each other via their pivot point of technology: the application of scientific knowledge to tangible industrial products and production processes. Technology made industrial production of goods possible. It also quickly led to information exchange and communication at a scale never before experienced. Or at least, that is what technology experts claim in a rather monocausal sense. Personally, I think that again and again a societal constellation comes together of knowledge, social structure, industries, technologies, etc. that demonstrates a certain societal (perspectivist) balance, thus leading to a position on *the path of humanity*.[117] A series of developments of constellations of this kind is what makes up *the path of humanity*. Technological innovations certainly lead to a few steps forward, but on the other hand, they can only flourish and achieve a larger scale because a specific position along the path of humanity makes the relevant possibilities available. You can thus just as well state that information technology and communication technology – and any other kind of technology – take their place in a niche that belongs to a position on the path. 'Technology push' and 'society pull' are two aspects of one and the same path of humanity.

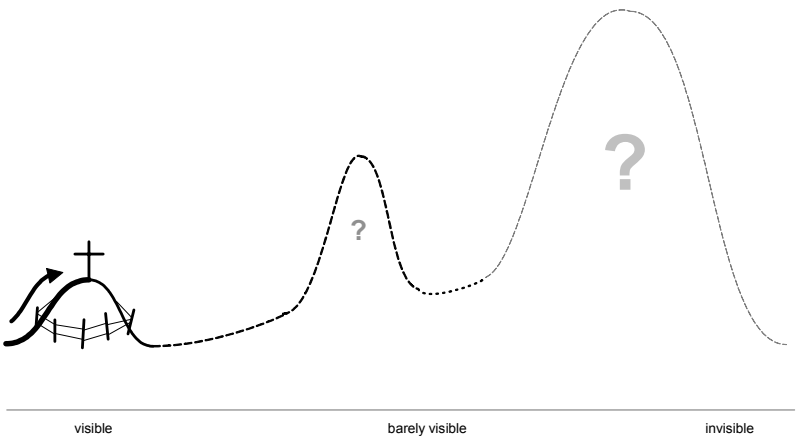
2: *Dominance of rationalism, scale, uniformity, and efficiency in processes and systems.* In discussing object–subject tensions and the various relationships between rational and

[115] Magic, religion, and speculation were discarded; empiricism and rationality took their place. See Max Weber, *'Wissenschaft als Beruf'* (1919).

[116] In his fresh and disruptive book *Against Method* (1975), philosopher Paul Feyerabend made critical comments about this alleged objectivity of the natural sciences: people are still people.

[117] Since the eighteenth-century philosopher Hume, causality has been a notoriously difficult phenomenon for dualistic empiricists. Recursive perspectivists simply claim that a coherence in perspective that has thus far shown itself exclusively and regularly will probably appear often in the future as well. In statistical terms that is more often the case than not, but there is nothing dualistic about it.

irrational perspectives (in the Methodological foundation section earlier in this book), it was already mentioned that at present we overemphasize the share of the objective relative to the share of the subjective. Just above, this was further indicated in terms of a scientific and industrial revolution. This leads to a strongly rational attitude that makes our short-term decision making more accurate, but it seriously clouds our view of opportunities, possible improvements, and risks that lie farther in the future. Modernity is the social–cultural label that we have applied to this overemphasis of objectivity relative to subjectivity, with as its net result a strongly rational view of things. The emergence of the scientific and industrial revolution is the defining expression of this rational overemphasis.



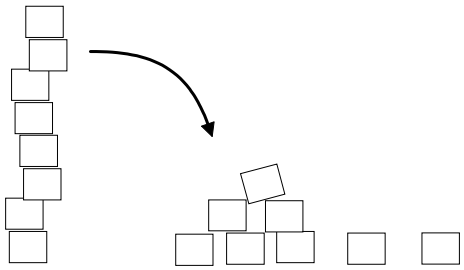
Rationality leads to short-sightedness.

By applying the achievements of the scientific and industrial revolution and the technologies derived from them, processes and systems have been set up and developed for greater uniformity and greater efficiency. Just look at our modern (sic!) systems of production and consumption, our modern educational systems, our modern healthcare systems, our modern building and construction systems, our modern transportation systems, our modern energy systems, our modern financial systems, our modern information and communication systems (especially internet and social media), our modern large-scale companies, and many other systems.

It is impossible not to be impressed by the scale, the uniformity, and the efficiency of all these systems and structures when considered in isolation. When we see for example how cars and food and smartphones are produced and distributed, it is quite striking. Even in the eyes of the inhabitants of the earlier city-states, we modern humans are like sorcerers.

In what ways can we see that modernity is approaching its sell-by date? Well, we see that mainly by the increase in **collisions of modern systems**. Think of food supply, shelter, employment, healthcare, education, transportation, and politics – each of these claims its territory and develops according to its own needs and conditions, and the coherence that

should tie them together is getting lost in the process. Everything in modern society is creaking and groaning. All of these structures and systems that continue to grow in scale, uniformity, and efficiency according to their own autistic conditions are finding it increasingly difficult to accommodate each other. The individual human being is getting lost in the shuffle, while we are seeing more and more collisions, tensions, and hard boundary lines between these systems. This is happening because we are *stacking up* the requirements and conditions of all these various modern systems instead of *integrating* them. The end result of this is what I call **multimodernity**: a multitude of relatively disconnected modern systems. The late-modern phase is thus characterized by multimodernity. And a stack that only grows higher will inevitably eventually fall over.



Multimodernity: continuing to stack up the conflicting requirements and conditions of isolated modern systems leads to collapse.

A simple and telling example of multimodernity, that is, of stacking up and the extra work that it entails is a noise barrier between a residential neighbourhood (the modern system of shelter) and a motorway (the modern system of transportation). Because the requirements and conditions of shelter and transportation are totally different and are poorly harmonized, extra facilities such as noise barriers are necessary at places where the systems are in contact and tensions arise. This is far from an ideal solution. Not only does it cost extra effort (or money, as we say in modernity), but problems such as exhaust gases, particulates from tyre wear, and noise nuisance are difficult to tame with an extra barrier. If we were to develop transportation to be quiet and clean, bringing in conditions from the shelter system, then a noise barrier would be entirely unnecessary. How would you prefer to live and to travel? But unfortunately, thus far our shelter systems and our transportation systems have, for the most part, developed independently of each other as autonomous systems. Furthermore, in the emergence of all sorts of postmodern trends and subcultures, we can see once again the reactive movement towards individuality and smaller-scale coherence.

Through the increasing frictions and collisions of large modern systems, we are already far past the peak of the modern phase; the shiny newness of our late-modern, multimodern society has mostly worn off. The next step up in development, the **plurimodern** phase (to be

explained in detail shortly) is already appearing on the horizon. But of course we could also lose ground.

I could name many other examples of the increasing degree of tension between various relatively autistic modern systems. Take for example private life and work. Private life was once something that we lived at home; that was something that hunter-gatherers already did around their nomadic campfire. Modern work takes place in a factory or at the office, with targets that have been set by others and fixed ways of working that have been set by others, all taking place at schedules enforced by time recorders.

The growing late-modern tension between work and private life can be seen in the appearance of patches such as *flexible working times*, child care, and the growing army of freelancers. If you still doubt the dominance of modern work systems, just take a good look at the names that these repair phenomena have been given. It is only in the last few decades that there has been any attention given to matters such as flexible working times, while essentially the central issue involves the reason why we work and why that flexibility is necessary: a *good private life*. *Childcare* suggests that those children have been shoved aside, are superfluous, and therefore have to be cared for; of course, we are not totally barbarian. But what parent considers her work to be more important than her children? When examined against the background of *the path of humanity*, is work (at least for parents) not a matter of a *context for a quality upbringing of our children*?

And then the freelancers: this concept expresses the fact that the most noteworthy characteristics of this group of people are apparently that they have no boss and no employees, at variance with what is usual in modern systems of work. Also typical of modernity is the political emphasis on employment opportunity, entirely according to the time clock, tallied ad nauseam, and compared regionally and nationally. If you do not have work, you are an outsider. (Outside of what? Outside of the modern economic system.) The modern system of work is placed on a pedestal and becomes a dominant goal in its own right. The notions that you work to provide for your basic needs and that the quality of solutions for those basic needs ought to take precedence have been totally left behind in the modern age (in late modernity, our own era, they are once again getting some attention). Hunter-gatherers would not have the least understanding of all this. Naturally, they were independent and egalitarian. What would the alternative have been? They did what they did to have as good a life as possible, as human beings integrated with their ecological and societal environment. Modern systemic strains were unknown to them.

Or take being healthy and being ill. In the Netherlands, we have excellent medical care in comparison with other countries. According to all conventional modern quality standards, there is absolutely nothing that would need to be changed; at most, some things are too expensive. Such comparisons are entirely a reflection of modern values and will thus hardly register the growing disadvantages of the modern age. Those disadvantages are like walking stick insects – invisible societal stealth technology. Overall, the Dutch healthcare system is a hypermodern and hyperprofessional system. I also certainly do not wish to gloss

over the many services provided by our Dutch healthcare professionals. In my own personal experience, specialists have truly gone to extremes to save those whom I love. They have often succeeded, and I am sincerely thankful for their huge efforts. But there is also another side to this. As soon as you become ill to some extent, you get sucked up into the healthcare system and you had better conform. It sometimes seems as though the patients are there to keep the systems going, instead of systems doing their best to let patients live as normally as possible with their health situation. Having an ailment that falls somewhere in between the medical disciplines is not pleasant; you would do better to break a leg.

Recently, I read in the newspaper that a young psychiatric patient costs on average around €100,000 annually, and that money had to be found to keep this system going and further perfect it. Children are in danger of falling by the wayside; they even see no point in going on living. I then have to ask: in the eyes of the parents of these children and – to the extent possible – of these children themselves is there truly no other and better way imaginable to care for them properly, considering the availability of this level of means?

Old age homes too serve a modern idea of growing older: the elderly are a population category that is not productive and does not fit into the normal pattern of modern life (they do not work) and that has to be dealt with efficiently. I do not mean this ironically, but we put them into the icon of the modern age: a factory. In caring for the elderly, we have in some cases so totally lost sight of the interests of the patient that distressing situations have been the result. That is bizarre given the fact that the care of the elderly was initially set up to serve the interests of these elderly people. Such terms as patient (from a Latin root, meaning someone who suffers, but in present-day English also meaning resigned and stoical) and disciplinary specialist indicate how far we have removed ourselves from the full normal lives of ordinary people.

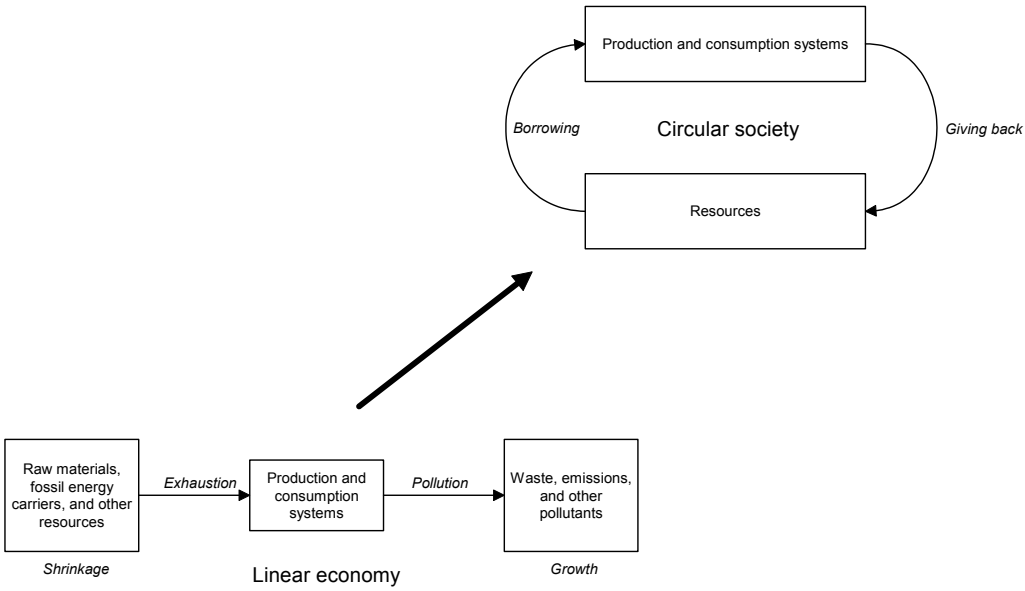
Or take the relationship between our production and consumption systems and our lives as inhabitants of this earth. That relationship will become more and more painful if we do not quickly address the excessive domination of modernity. Our modern systems of production and consumption are of course very impressive. The scale of production, distribution, and use of cars, smartphones, and food is huge, the chains consist of many links that are also strongly networked, delivering a broad range of uniform products, and all of this is extremely efficient.

But these processes of production and consumption are also linear and, because of this, difficult to comprehend. They are linear in a highly undesirable way in the sense that they consume large amounts of scarce raw materials and fossil energy, while spreading large amounts of greenhouse gases, packaging materials, and other pollutants throughout our environment. They are difficult to comprehend in the sense that various links in these chains can optimize their own positions at the expense of others relatively invisibly, and thus shamelessly and without restraint (see the selfishness trap of the Societal Balance Model discussed above). Examples I have in mind are the Volkswagen scandal, in which emissions tests were knowingly and deliberately manipulated; the soft drink industry that

colludes with the supermarkets to conduct biased studies of the litter problem, and more specifically of plastic bottles (the outcome will be that the problem is not that bad, for it is cheaper to forget about these bottles than to collect them, never mind the pollution in our oceans); the frequent malpractices in food safety; the pharmaceutical industry that develops only profitable medicines and minimizes findings of their side-effects. I could go on and on, and you too can surely name many other cases of abuse. All of these undesirable outcomes are up against the huge power and scale of these systems, which undeniably provide an incredibly high quality of consumer goods for an incredibly low price. But sooner or later we will have to pay the price – human beings are more than just consumers – in the form of the greenhouse effect, migrations as a result of climatic shifts and changes in zones of vegetation, the spread of diseases and infertility; and those are only the consequences that we are somewhat aware of.

How we handle our production and consumption systems reminds me of the aquarium with goldfish that I got for my birthday as a young lad after pestering my parents for months, on the condition that I would take good care of them. I talked a lot about cleaning the aquarium, but actually doing something about it happened less often (you may recognize this pattern from how we are handling the climate problem). The water slowly turned greener and greener until my mother grabbed me by the skin of my neck and stopped matters from getting even worse. Dutch astronaut André Kuipers once made the striking statement that it is only from space that you see how delicate and vulnerable and small our planet actually is, and I had to think back about my goldfish in their increasingly filthy water. The earth is our own aquarium. It is therefore necessary to restore the relationship between all aspects of our lives and our machinery of production and consumption, and to convert our linear economies back to societies that are integrated at multiple scales and are more circular, as the hunter-gatherers have already demonstrated for us on their very small scale (see the figure on the next page).[118] When we include the time dimension, this circularity becomes a path along a growth spiral, mostly upwards but back again as well with some regularity, in line with the increased scale and the growth of coherence and cooperation (in terms of perspectives) along *the path of humanity*.

[118] According to Douwe Jan Joustra (champion of the circular economy, in a personal communication), in a circular economy a shift takes place 'from ownership to usage', in which the producer remains responsible for the functioning of products, their quality, the materials used, and their reprocessing at the end of their life cycle or use cycle. He claims that the producer will then give more attention to the proceeds of reuse (of the entire product or its components, or of the raw materials that are incorporated in it). Of course this results not only in single cycles of reuse but – just as in nature – complex forms of completion of these cycles. This means there is less waste; what would otherwise have been discarded becomes raw materials again. This is indicated in the diagram below as 'giving back': biological materials come back into nature, and technological products form the basis of succeeding phases of production. Materials are assigned a persistent value, thus there is an economic incentive to close the cycles.



From a linear economy to a circular society (a snapshot)

My mother is no longer with us, and even if she were, she would not want to or be able to grab all of humanity by the skin of its neck. This is something that we really have to do ourselves. On the positive side of the balance are two things that are important. The first is that there are many of us and we are all adults. We only have to act like we are. The second is that we can make use of one huge asset not available to the hunter-gatherers who were already practicing the circular economy in a nearly optimal form. We only have to place scientific, industrial, and technological progress in a societal methodological frame of reference to devote our modern production and consumption machinery to societal improvement. If we do not do that ourselves, then ultimately the path of humanity will take care of the job. But then we will first have to endure painful falls into a number of wells, if we are not lucky, as was the fate of Thales of Miletus. It would be better to combine his talents and those of the Thracian servant girl, and start to follow the path consciously and more professionally, in a considered mix of objectivity and subjectivity.

I will summarize. The *modern pattern* remains the same. There are hard boundaries between autonomous systems that continue to grow only on their own merits and reach high levels of scale, efficiency, and uniformity in conformance with their own conditions and constraints. That offers advantages that are truly enormous.

But there are two especially negative effects that go along with modernity. The first is that in our late-modern age those hard boundaries are experiencing more and more friction. Systems are less able to tolerate each other and tensions between them are building up. Examples are the tensions between private life and work, between being healthy and being

ill, between school and individual personal development. Between construction and housing, between transportation and housing. Between our production and consumption chains and our health. Our late-modern age is multimodern. The incompatible constraints of more and more modern systems are stacking up higher and higher, leading again and again to collisions between systems.

The second negative effect of modernity is that we as individual human beings are being totally overlooked. Does the system serve the individual, or is it the other way around? The patient is lost in the maze of the healthcare system, as are voters in the political system (politicians take note: voters are not just 'undecided'; they simply have little involvement in current forms of politics). The inhabitants of our housing have no say anymore in what is being built, those feeding themselves no longer know what it is that they are eating, the individual human being vanishes into the bowels of the production and consumption machinery, the student with a need for personal development is ground up in the education mill, and the traveller loses his way in the public transportation system (e.g. the Fyra debacle in the Netherlands). The individual citizen, a member of a small group of others who are dear to him, is fated to be ground up between the whirling millstones of modern society. And wasn't there once a time when this was all about the individual? Didn't we once sit in small groups around the campfire, in the centre of our worlds? And isn't that campfire in our present age simply the kitchen table?

We get 'one size fits all', but we have *individual* needs. And we are finding it more and more difficult to put together a coherent wardrobe from what we are offered as 'one size fits all' possibilities. Thus we find ourselves of necessity back in the late-modern phase, the final days of modernity in which that modernity is more and more a subject of discussion. It is of course not unique that a phase such as modernity is reaching its end like the others; this is something that we can expect. Between the phases of the hunter-gatherers and the first villages, between the first villages and the city-states, and between the city-states and the nation states there were always complex mixtures of opportunities and problems that led to making the next leap – often a leap forward, but also quite regularly, of necessity, a step back again.

The modern phase with its dominant nation states and its rigid, impassive, and mutually incompatible systems is a waystation on the path of humanity, just as were each of the previous phases. The advancing globalization and the formation of economic blocks (e.g. the EU), the once again rising power of regions and cities, and growing patterns of international migration that nibble away at the power of nation states, all underwrite this characterization as a waystation: we are undeniably leaving behind the phase of modernity. Postmodernity, a phase that once again places value on smaller scales, our unique personal features, and subcultures, is nothing more than a reaction to the strain that modernism has placed on the smaller scales. In my opinion, the next stage after modernity is not that of postmodernity but that of plurimodernity, and it is already perceptible in the distance, but the question still remains whether we will take a step forward or fall back again. More about this shortly.

It is ironic and paradoxical that it is exactly our rationality that stands more and more in the way of our further and larger steps of improvement. It leads to a constantly expanding efficiency that we are seeking compulsively with incremental steps of improvement. But an excess of rationality is just as foolish as an excess of irrationality. As frenzied rationalists, we are less and less able to see the real leaps ahead, the large improvements that call for vision and inspiration and empathy. Such steps are definitely not free of risks. They demand a huge degree of creative destruction – see economist Joseph Schumpeter about this. Entire branches of the economy, professional groups, and regions will endure the negative consequences of this, reason enough for the many parties for whom it is going rather well at present to stay out of the way, whether nervously or calmly. But those negative consequences are mainly the result of how we deal so indifferently with the losers in a development that is seen to be primarily *economic*. Why don't we see this development much more as a *societal* development in which we can all pluck the fruits? Dealing poorly with individual losers can then be turned around into dealing well with progress as a society.

A present-day and obvious example is the scanty willingness to make the step from a socio-industrial complex based on non-renewable resources (oil, gas, ores, etc.) to a renewable socio-economy based on reuse of raw materials. It is crystal clear that at some point we will have to make that step. The greenhouse effect, the steadily advancing contamination of our environment, scarcity and exhaustion of resources, a collapsing solidarity – you cannot hold back the end of a societal phase. Something stronger than the tide will eventually end it. But the question is whether we are going to make that transition intelligently and proactively, or rather slowly and reactively, and thus accompanied by widespread misery in society. The question is whether we will take this step forwards and upwards, or rather fall back out of necessity. The current champions of the linear model of waste and pollution consider the risk that they will end up on the losing side simply too great. In rational terms, they are entirely right from the point of view of their own limited logic. The pioneers of the future that beckons us, whom I will discuss shortly, have to fight fiercely for a place of their own right now. They often feel more resistance than support, and from the point of view of their own limited logic, they too are entirely right. There is a pitched battle going on between the old regime and the new.

If *the path of humanity* teaches us one thing, it is this: our journey upwards along the path is, first of all, a route of coherence and cooperation, and only secondarily a route of conflict and competition to investigate the issues and create space. If coherence and cooperation are the winners, then we most likely will come out at a higher level. If conflict and competition win, then we will most likely fall back. It is up to us as humanity to lay out clear paths in this landscape.

4.3.3 A moment to catch our breath

We are all late-modern humans. Of course that colours our experiential world enormously. We understand *the path of humanity* up to the present as late-modern people, and we are

also trying as late-modern people to get a grip on our future. It is exactly at this tipping point of looking back and looking forward that we have arrived in this book.

The description of the path of humanity has thus far been to a great degree explanatory. There are historical sources that support the descriptions of the earlier phases; generations of scholars have concerned themselves with these. We all have first-hand experience as living humans of our late-modern phase. That in itself leads to an exceptional strain between a more scholarly description and a more experience-directed involvement. And here and now we are taking the next step beyond. I am going to describe the future phase as well.

I admit that I do not feel very comfortable about this. I have never been all that impressed by futurologists who try to paint a *concrete* picture of the world of the day after tomorrow. From time to time I have looked at books written decades ago that said something about the world in which we now live. That is generally quite amusing, but hard to take seriously. It is hard to understand the world of tomorrow with today's ways of thinking. Of course, that very trap lies before me as well.

Still, I think that something can be said about the future, with the path of humanity up until the present day as a guide and with allowance for the knowledge that extrapolation is always dangerous. In doing this I stay far away from concrete predictions, and I prefer to focus on the perspectivist structure. One thing that the description of the path of humanity up to the present makes clear is that all three of the perspectivist dimensions of societability – the scale, the number of distinct perspectives, and the number of shared perspectives – follow a rising line on average, as though they were tied together with a rubber band. Scale, specialization, and equivalence all increase together. Then I do not think that it is such a huge presupposition to assume that this will continue in the future as well, with all the changing proportions and ups and downs that go along with it.

Supertransitions form an improvement path

The path up to the present shows a series of three societal supertransitions, one between each of the successive four phases.[119] The path suggests a new (fourth) supertransition towards the plurimodern society of Team World. Transitions are structural changes at

[119] In essence, it is a sketch of a sequence of three huge societal transitions, and we are at the eve of a fourth one. It has been my pleasure to work for several years as a part-time collaborator with the Dutch Research Institute for Transitions (DRIFT) at Erasmus University in Rotterdam, where transitions are being studied intensively. See e.g. "Societal Innovation: Between Dream and Reality Lies Complexity" (the inaugural address by Jan Rotmans in 2005) and "To Transition! Governance Panarchy in the New Transformation" (the inaugural address by Derk Loorbach in 2014). Recursive perspectivism has a different origin (see my doctoral dissertation of 1997), and *the path of humanity* follows scales and ways of thinking of its own, but my involvement with DRIFT and with the Dutch Knowledge Network for Systemic Innovations and Transitions (Kennisnetwerk Systeeminnovaties en Transities, KSI; here I mention also Marjan Minnesma, René Kemp, John Grin, and Johan Schot) has stimulated and influenced my thinking about *the path of humanity*, for which I am thankful.

different scales within society. They change a (relatively stable) societal structure via a fierce mix of smaller revolutionary and evolutionary steps into another (relatively stable) societal structure. They proceed from one firmly-supported societal practice to another firmly-supported societal practice, and that support is to be found in the experiential worlds of the constituent actors that are at or close to the peaks. In this way, a transition is nothing more than a large-scale societal perspective, for a perspective changes an initial situation into a resulting situation. I use the prefix 'super-' because with five phases and four transitions the *entire* societal path of development from end to end is described in a number of large societal steps that are strongly schematic and generalized but recognizable.

The path of humanity is, in general, a path of improvement. We are no longer hunter-gatherers, and we have also passed the phase of the city-states that were often strongly competitive among themselves. But the realistic possibilities also include that of a regression, as history shows us with some regularity. The Mayan civilization on and around the Yucatan peninsula in what is now Mexico, consisting of some ten million people, fell apart around the boundary between the ninth and tenth centuries as a result of revolts and wars, but recent research into soil profiles has demonstrated that the primary reason was a climatological drought that disabled their food supply, primarily maize. Historically, natural climate-related causes are often the reason for a regression.[120] But high up along the path, societal causes more and more often appear together with natural causes as the reasons for an advance or a regression – and of course, a mix of the two can also be found at times. For example, the superstate of the Romans, that was far ahead of its time, and the mid-Mexican nation state of the Toltecs in the eleventh and twelfth centuries (that disintegrated into city-states) did not survive mainly because of human disagreements and societal conflicts, and fell apart through competition and war, just as did the Greek city-states. The final periods of these societies and those just following were a bitter time for many of their members.

During our journey through history from the hunter-gatherers to our present position in later modernity, the level of our development has increased enormously on many societal fronts, thanks to the combined advancements in inclusive institutions, science, technology, and trade. We harvest the fruits of these developments every day. This improvement manifests itself in many ways. Even if you see parallels between the recent threat of an Ebola virus epidemic and the plagues of the Middle Ages, and if you consider the human response at present to be primitive and slow, you would have to admit that our modern scientific instrumentarium, our modern communication, and our epidemiological insights and logistics are putting up a much better fight than the barber-surgeons of the Middle

[120] See for example Anthony J. McMichael, *Insights from past millennia into climatic impacts on human health and survival*, Proceedings of the National Academy of Sciences of the United States of America, December 2011. This gives serious food for thought concerning our present climate problem!

Ages. We are certainly not invulnerable, and Ebola can get seriously out of control, just as the plague did back then, but we are decidedly doing a better job of defending ourselves.

Of course, we as humans are not good at sharing, there is bitter poverty here and there, and we still choose too often to benefit ourselves or our inner circle more than others. But every successive step along *the path of humanity* adds new and larger scales of coherence and cooperation relative to the preceding step, and this allows in general for a rise in societal quality. The sedentary community clearly has a larger scale than the groups of hunter-gatherers, the city-states are even larger in scale than sedentary communities, and modern nation states are once again larger in scale than city-states. In the course of history, we have tested larger and larger associations, and with Team World we are probably taking the next (and last human) step towards a larger scale. As larger scales are added, the original smaller scales continue to exist, but their character changes unmistakably. For example, we no longer sit in small groups around the campfire as hunter-gatherers, but we do still maintain our bonds of family relationships and friendships around the kitchen table or the living room fireplace, and we still help each other in a friendly way at around the same scale. We are no longer a threat to each other as city-states, and cities thus no longer maintain armies, but larger cities still show many specific characteristics some of which are similar to those of the city-states – take for example the mutual economic competition between urban regions.

Cooperation leads to societal quality

The path of humanity shows a clear correspondence, a positive correlation between coherence and cooperation on the one hand and societal quality on the other hand. My central hypothesis is that this relationship may not be ironclad, but in general, it is certainly a causal relationship at the many scales of the plurimodern society. The adage is therefore simple: improve coherence and cooperation, and the chance is the greatest that societal quality will increase. This is something that I feel very deeply. This hypothesis also expresses clearly the intuitions of my audiences (see 'Observations from the dialogues' above). *The path of humanity* gives further support for this, even though we regularly stray from the path. The plurimodern society of Team World is the ultimate consequence of this idea, but it also provides living substantiation of it.

However, we cannot suggest that the situation is better than it is. Our development along *the path of humanity* has thus far hardly been purposeful. Humanity does not always search consciously and structurally for every increasing coherence and cooperation to further raise the quality of society. It probably does so very seldom. Of course, there are policies that promote coherence and cooperation, think for example of companies that commit themselves to these goals, sister city initiatives, scientific networks, the European Union and the United Nations (the last two being a consequence of the Second World War). And there are in fact individuals, organizations, and leaders that promote coherence and cooperation and serve as examples of it. The original foundations in solidarity and cooperation of many Dutch organizations (banks, insurance companies, dairy companies) did not appear out of thin air, although they have sometimes lost sight of their roots. But

especially at the larger scales, coherence and cooperation are simply exceptionally difficult to understand and to put into practice with our present societal consciousness.

It is perhaps more accurate to state that we optimize mainly at smaller scales, and from there we are now and then suddenly forced in exceptional circumstances to solve a problem, or we suddenly spot an opportunity, or we 'fall upwards' a considerable distance as a result of a fortunate combination, and thus we stumble forwards towards a higher societal coherence and quality. We get busy then and we hold onto the attainments of that leap forward; we safeguard, exploit and support the societal outcome in all sorts of ways, for example with our institutions. We see more often in societal practice that people put their own interests and those of their constituencies first and look for improvement in their own family, job, company, or their own inner circle. We see this also at somewhat larger scales, think for example of nationalistic tendencies and the appalling situations of the Lampedusa boat refugees.

But as for actively and openly searching together at a large scale for opportunities for improvement, with the preconceived intention of dealing generously and respectfully with the losers of such a step (they too will of course always be there), this is something that we see much too seldom. We look mostly for our own improvement and confirmation that we are right, we defend above all our own positions. Even in our democratic national parliaments, politicians mainly carry on a 'debate', a see-who-is-right form of dialogue that whips up the differences, helped by the media, and through this achieves little potential for a thoroughly constructive outcome. Large-scale coherence and cooperation come about much too often mainly by accident, crises and in problem-driven circumstances. Examples are the well-known Dutch Polder Model that originated in the battle against the sea, and the establishment of the United Nations as a result of the Second World War. In this way, we leave a huge, positive force for improvement for the most part unexploited.

The swan song of modernity

The modern way of thinking does make it possible to develop at the larger scales. Modernity thus partly meets the requirements for a higher position on *the path of humanity*. But modernity has resulted in large technical and standardizing systems with little mutual coherence that create frictions among themselves and even are on a collision course ecologically (multimodernity). They are often impassive, and the human individual often gets lost in the shuffle. In our age, modernity is therefore singing its swan song as the dominant scale. This is happening because in blind success, we are continuing to develop and interconnect these various large-scale and strongly standardizing systems, each with its own group of actors that pluck the largest fruits without any understanding of their coherence at a yet larger scale. They also give insufficient attention to individuals and smaller social groupings such as families, households, and subcultures. Modernity is simply not plurimodernity; it sees only large and rather commercial scales clearly, it aims mainly to perfect the existing systems, and in doing so it misses the largest global scale that would bring everything together, as well as the many smaller and more social groupings. Because of this, our society is meanwhile so complex and chaotic that we face the threat of

becoming the pawns of our own societal development increasingly often. Systems grate past each other, undermine each other, and proceed on a collision course. This leads meanwhile, in addition to all the positive modern achievements, to negative effects as well, at both large and smaller scales. This book has given many examples of this in various sectors such as the financial world, the construction industry, healthcare, our food supply, and transportation. There are new major threats such as pollution of the environment, financial crises, the climate problem, and proliferation of weapons of mass destruction. And there are individual threats, such as the patient whose ailment falls through the cracks between two specialties. Or consider the low-skilled young person with no prospect of finding a place in society – how could he, when society has no place for him and there is no one who will really help him?

Considering the time scale of *the path of humanity*, the swan song of modernity could still last for some centuries. Humanity is, after all, no stranger to protracted periods of muddling along.[121] The end can also come quickly. But one way or the other, we are approaching once again a major fork in the road: do we fall back along *the path of humanity* towards the smaller scales, as some postmodern tendencies would suggest?[122] After all, subcultures enjoy a warm reception, and cities are becoming more and more powerful – never before have the mayors in large cities around the world been as well-known as in our age. Or do we instead step vigorously forward and clear the last hurdle towards the plurimodern society of Team World? We also see signs of that possibility; in spite of all our crises (or perhaps because of them), international discussions are unmistakably on the rise.

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[121] See also *The Science of Muddling Through* (1959) by Charles Lindblom, an advocate of incrementalism. In his opinion, policies mostly took small steps forward – an idea that pitted him against the excessively rationalistic and even somewhat megalomaniac planning culture that was evident principally in governments but also in businesses in the 1950s and 1960s (his own time) – and for that matter is still evident today; it is simply a dominant characteristic of modernism. Personally I think that Lindblom was certainly correct in his claim that people only show 'bounded rationality' (a term coined by Herbert Simon) and that you have to allow for this in your policies. Lindblom introduced the terms 'root system' and 'branch system': the 'root' approach tackles issues integrally, completely, and rationally, while the 'branch' approach works with the pieces that various decision-makers manage and consider to be important ('multiple bounded rationalities'). In my opinion this does not detract from the fact that those 'boundaries' are determined to a certain extent by our own tenacity, professionality, and persistence, and otherwise by our acceptance of the experiential worlds of others. Our understanding of how a complex society works is at a stone-age level. The boundaries of our bounded rationalities (the recursive staircase) can still be enormously extended, and we can therefore still take huge qualitative steps in our plurimodern future. For me, Lindblom and his incrementalism are wrong just as much as are the modernists with their megalomaniac rational systems. In my opinion, the future is plurimodern.

[122] Postmodernity: the societal phase following modernity (post = after); in reaction to modernity, it calls large structures into question and assigns great value to the small, to the individual, and to unique subcultures. The term 'postmodern' was coined by Jean François Lyotard in his book *La condition postmoderne* (1979). In his book he claims that modernity is behind us and that its great stories have died. I too think that modernity has reached its end, but in addition to the small stories we will also have to formulate even larger ones. We have to consider a range of scales, and from the point of view of modern scales we have not made enough use of either the smaller scales or the even larger scales.

The path of humanity *tells us what to do*

We are now at the end of the phase of modernity, and in societal terms, we are standing at a fork in the road (see the figures of *the path of humanity*). Our modern multi-actor society has meanwhile become so complex that we have become pawns of our own creations because hardly anyone understands and manages them – not that they are even controllable, as recent financial crises showed us clearly.

The path of humanity is crystal clear as to what the next large step of improvement could be: coherence and cooperation go up one more step, and we proceed to yet another scale, the global scale. Because of this, I have called the following phase *Team World*. The heart of the next societal phase of Team World is that we will also begin to make intensive use of the largest scale of coherence and cooperation: that of all of humanity. The development towards Team World is a fine last step, because an even larger scale is not necessary and in fact not even possible. For human beings, it does not get more inclusive than Team World.

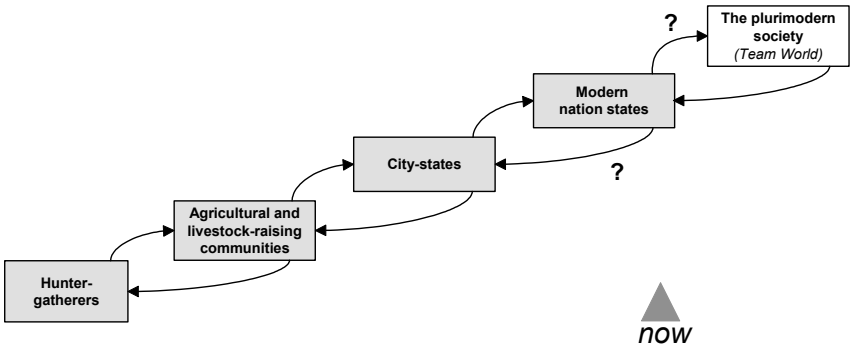
Some people claim that a global scope is required because the great problems of our late-modern times demand it – problems such as poverty, large-scale cultural conflicts, wars, hunger, tsunamis, climate change and extreme weather, the widespread pollution of our world, Ebola, financial and economic shifts, and increasing scarcity of a range of resources. I too consider that to be a legitimate motivation. Team World tackles exactly these very challenges. But of course this only provides a partial motivation.

For why should we take this next step out of a problem-driven necessity, based on the failure of the final phase of modernity? Why do we not see the enormous ***opportunity*** that is being offered to us?

The path of humanity tells us after all that increasing coherence and cooperation at scales that are increasingly interconnected will lead to a further increase in the quality of society.

All of the previous steps along the path have also to a great extent been opportunity-driven. The preoccupation with problems is typical of an end phase, and it emphasizes primarily the conservatism, the anxiety, and the retrospective view that dominates at that time. You could even claim that nearly all of the societal problems that we are experiencing at this time in our late-modern era – and they are in fact not trivial – result from a *lack* of coherence and cooperation between actors and a *lack* of vision farther ahead that our own local peak. By now you know what I think of *substantive* scenarios of the future and of policy-makers who indulge in substantive winner-picking: I prefer to avoid these approaches, which only lead to technocracy. But we have a huge reservoir of societal potential at our disposal that we can unlock and put to use together. That route can be made accessible by consciously looking at our society as a perspectivist multi-actor practice, as has also been argued in the earlier volumes of this Society in Perspective

series.[123] We find that to be difficult, as short-sighted and small-scaled as we are with our (possibly also genetically anchored) legacies of the long phase of the hunter-gatherers. But we are quite capable of following this route by enlisting the strength of our human power of imagination and our ability to consciously involve ourselves with the desires and interests of others. Indeed, we have been able to tackle early modernity. Human consciousness harbours unsuspected forces that are only gradually being released with the help of the recent developments of the internet and social media. These are developments that we could have expected in accordance with the path of humanity. How they would turn out technologically was a puzzle for a while, but the fact that they would come about can be directly deduced from the path.



4.3.4 Phase 5: The plurimodernity of Team World

A widening gap

Until now we have been for the greater part stumbling upwards along *the path of humanity* rather than following it consciously. And just as the large-scale leaps upwards have thus far for the greater part simply happened to us, the same is true as well for falling back and downwards. Nevertheless, the path draws humanity towards increasing cooperation, increasing interconnection, and increasing societal quality in a way that is almost (r)evolutionary. The upward forces have had a broad margin of victory over the downward ones, even though both have been at work. The net result is *the path of humanity* up to the present day. We are now in the late-modern era at the end of the phase of the modern nation states and the mutually abrasive modern societal systems such as healthcare, education, transportation, food supply, energy, etc. (multimodernity). We are already testing elements of Team World. The positive side of modernity is that many of us

[123] Especially Volume I, *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation), and Volume IV, *Multi-actor Procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation), published by Parthenon.

experience the support of modern technologies, institutions, and comfort levels to a degree that was entirely unthinkable only a couple of centuries ago.

Is our modern society actually a result of technological development? Or do our institutions and technologies in fact grow together, meet up with the increasing scale and hence demands of our societies? In this last interpretation, for example, technology is drawn along and even caused by the growing scale of society, just as much as it makes the growing scale of society possible. Think for example of the emergence of the telegraph, telephone, radio, and television, of the internet, and of social media and their influence on humanity. The growing society cried out its wish for these things, and therefore they have been developed. In this way of thinking, our access to knowledge, insights, and opinions has never before been so great, because the scale of our society requires this. It is more and more difficult to keep a population in ignorance, and if you actually do succeed at this, then you fall back along *the path of humanity* as though a natural law was at work.

Just why does a regression appear among the possibilities again and again? Why would we let that happen? Historically, that has sometimes come about through natural circumstances. Thus the Yucatan peninsula was once abandoned by an advanced Mayan culture of around 10 million people because of a huge reduction in rainfall that made production of food – mainly maize – impossible. The hypothesis was at one time broader than this, and one suspected wars and revolts as well, thus human factors, but analyses of soil profiles showed a period of sharply decreasing rainfall. We simply have to put up with such natural phenomena. They too push us first firmly out of balance and then suddenly quite far downwards along the path.

It appears to be mainly the limited nature of our societal consciousness, an obvious degree of societal short-sightedness, which gets in the way of this ongoing and dynamic cooperation and further improvement along the path of humanity and increases the chances of a regression. We live our lives in smaller circles and in small societal practices. We can most easily oversee this small scale, and this is therefore also the scale at which we can improve most simply. At larger scales, improvements are hugely difficult; our society is then often elusive and sometimes affects us as though it were a natural disaster, or even a lottery ticket: incomprehensible, arbitrary, and sparing nothing and no one.

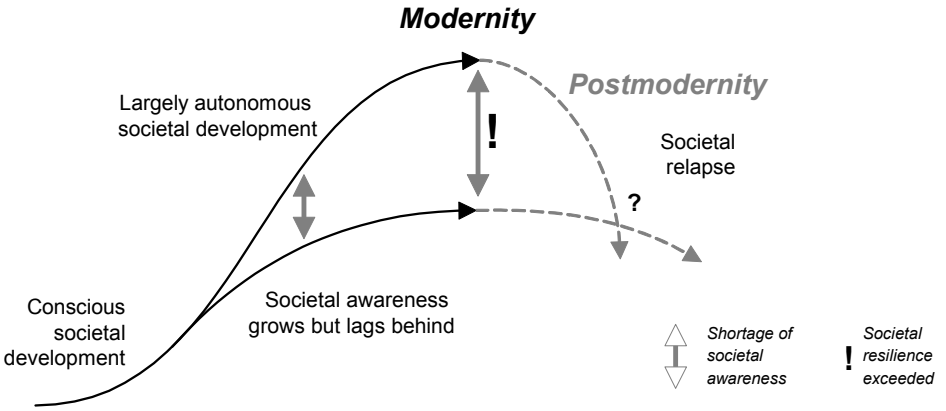
We gladly and often improve at a small scale. We take pleasure in furnishing and decorating our homes, and we change jobs. The scale of improvement is then in line with the scale of the societal practice of a private household and individual employment. But small-scale improvements in a large-scale late-modern society can also be far from optimal. If you had bought new furniture at the end of 1952 in the Dutch province of Zeeland, that would turn out to be a futile investment because of the huge floods of 1953 as a result of negligence in maintaining the dykes. The Dutch polder model, an icon of cooperation out of necessity, failed miserably, and the consequences were gruesome. Or as an American you can save for years for your retirement, only to see bankers buy expensive sports cars with that money and then go bankrupt.

There is in fact some positive news to be mentioned. The scale of societal consciousness is expanded as we proceed along the path of humanity; it admittedly does not match the pace of the growth of our societal multi-actor practices, but it does grow slowly along with them. A late-modern human keeps track of more actors than an average hunter-gatherer did, if only because there are more of them in his environment, and he learns to do this simply by doing it. But more and more often malpractices and injustices crop up in our society because our societal consciousness is no longer equal to this oversight task and is no longer in line with the degree to which we interact with each other in multi-actor practices.

Something crucial thus changes along *the path of humanity* as we proceed further along it. The discrepancy between the dimensions of our society and our societal sensitivity grows. The gap between the scope of our societal multi-actor practices and the extent of our experiential worlds grows ever larger. Of course, our societal sensitivity does not stay at an absolute standstill, but increases slowly as we take further steps in our development. Late-modern humans can oversee what is definitely a more complex society than the hunter-gatherers did, if only because we live our lives and have our experiences in that greater complexity. And the same was true for the inhabitants of the early agricultural communities and the city-states. This is also suggested by the development of IQ scores, though it is not always clear just what they measure.[124] We grow up in societies of increasing complexity, and because of this, we become increasingly competent in understanding them and navigating in them.

But our societal sensitivity lags farther and farther behind as our journey continues along the path of humanity. Our societal consciousness constantly loses ground relative to societal practice (see the figure on the next page). And then ultimately cracks and tears will develop and we run the chance of falling back to a lower level.

[124] The phenomenon of increasing IQs goes back many decades (measurements have been made since the 1930s) and is known as the Flynn effect, named after James Flynn, who did much research concerning it. There are indications that the trend of autonomous growth of IQs is weakening in modern developed countries. Further growth of our societal consciousness would then demand a deliberate effort.



A widening gap (exclamation mark) between a societal practice that thunders ahead and a societal consciousness that hangs back leads inevitably to a regression.

The advantages of modernism are not to be scorned. And our societal consciousness is undeniably taking its steps along the path. But it keeps falling farther behind, and the widening gap between societal practice and societal consciousness casts its grim shadows forward at unexpected moments. We keep trying once again to take the steps of tomorrow with the societal understanding of yesterday. Our journey along the path of humanity is therefore akin to an unnecessarily chaotic procession of Echternach.[125]

The widening gap has already taken the axe to modernity's roots, and some are already experiencing a *fin de siècle* feeling. Our vast modern systems, take for example our production and consumption systems, have downright threatening side effects that meanwhile affect humanity as a whole (e.g. climate change, extreme weather, and plastic soup), and individuals are regularly ground up between the gears of the educational, healthcare, and economic systems.[126]

[125] The dancing procession of Echternach has been held since the Middle Ages in the city of Echternach in Luxembourg. The procession honours Saint Willibrord, who founded the monastery there in the year 700. Until 1947 the rhythm of the procession was, just as in the popular saying, three steps forwards and two steps back. That led to too many irregularities, and since 1947 the procession has been carried out by jumping (only) forward.

[126] Furthermore, this is denied with a straight face by modernity's advocates. When international comparisons show that Dutch healthcare and Dutch education score quite high, you do not have to change very much. But how then do you explain the fact that hardly any money or research facilities are dedicated to rare diseases, that those needing care have to conform to the healthcare system rather than vice versa, and that education, especially in the primary and secondary schools, is one big paragon of boring uniformity, with a preference for only a very limited number of styles of teaching and learning?

The plurimodern transformation

Our present societal consciousness is too limited, and if we let the gap grow too large, this will even toss us backwards along the path of humanity (see the figure). But even at the present time and at its present extent, the gap already presents a formidable barrier to taking the next step towards the plurimodern society of Team World. How can we even think about a next step when we have already fallen behind?

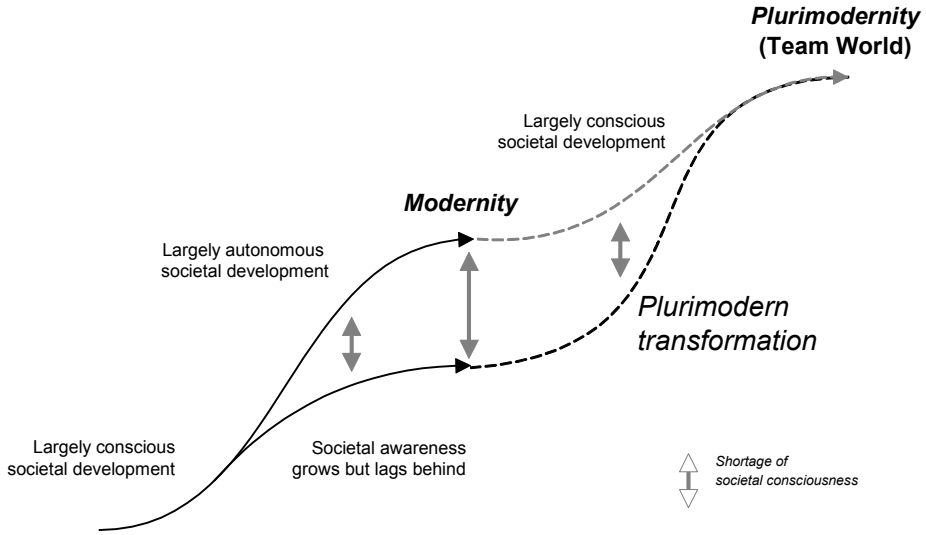
In top form, Team World requires our societal consciousness, our societal sensitivity, to make a huge effort to catch up. At present, our society is too strongly organized around attending to ourselves in our own inner circles (we take care of ourselves at the small scale) and around impassive modern systems (the scale that is already reasonably large). We will have to shift the balance and give our attention to other scales as well; after all, our human consciousness should be applicable at *all* scales of society.

We have to switch our consciousness from the telephoto lens to the wide-angle lens. We have to trade in attention to ourselves in our own inner circles for attention for others and how we get along with them at larger scales of society. In doing this we certainly do not have to ignore ourselves as individuals in our smaller circles, but we do in fact have to shift the balance and give much more attention to the larger scales as well. Our human consciousness has to once again fit our societal scale.

This requires a *plurimodern transformation* – a leap in consciousness, a change in our present short-sighted and late-modern societal consciousness to a broader plurimodern understanding of society at different scales. *Plurimodernity* combines pluriformity and modernity. One half of the word, *pluriformity*, emphasizes the value of the smaller scale, of the many different and unique smaller systems and experiences – for example, (sub)cultures, regional customs and products, cultural niches, and personal identities. Or think in terms of the path of the specific characteristics and constituent components of families, sedentary villages, and city-states. The other half, *modernity*, indicates thinking and working at the larger scale, often in large and inflexible central systems and structures that operate in a strongly repetitious and standardizing manner – for example, the surgical wards of hospitals or the hamburgers at McDonald's. Other examples are education, healthcare, and financial systems. Plurimodernity sees the importance and the added value of both approaches, pluriformity and modernity, and seeks to connect them in *one coherent whole*: the plurimodern society.

Our largest societal practice is Team World. The name expresses the idea that we form one team as humanity, and that we keep our specific characteristics as actors within that team at all intermediate scales. Team World thus extends from the entirety of humanity, responsible for the fishbowl that we inhabit, down to the most private and individual scale. Team World is a pre-eminently plurimodern society, and it tries at every scale to do that which fits the best at that scale.

Our societal consciousness should work in this context as a flexible zoom lens with a broad range.[127] You cannot get by in a city-state with the societal consciousness of a hunter-gatherer. And similarly, you cannot create a plurimodern society with a late-modern consciousness that is already lagging behind. But if we allow our late-modern societal consciousness to go through a plurimodern transformation, the next step in societal development lies within our reach (see the figure below).



A plurimodern transformation closes the gap, thus making the next step possible.

This plurimodern transformation that our consciousness requires is intriguing. You can determine that it is desirable; various thinkers with a variety of titles have also done so. But is it actually even possible? And is humanity capable of it? That is a good question, and an even better question is whether we actually have a choice. If we cannot go through this transition, then we will have reached our maximum level on *the path of humanity*. We will then have already overshot out maximum development, and the negative effects of modernity will overshadow the positive effects more and more. We will then stumble from one crisis to another, and in the worst case, we will experience a hefty setback. Looking back at *the path of humanity*, that has been more the rule than the exception, and the fact that we happen to have no personal experience of this or do not wish to think about it offers no certainty that it will not happen again.

[127] It zooms from a fish-eye setting to a super telephoto setting, from the entire experiential world to only a couple of perspectives. An actor is characterized by a perspectivist experiential world in which a consciousness plays its swirling perspectivist game as a zoom lens that constantly changes its position, the direction that it looks, and the angle that it takes in.

In times of increasing chaos, we are looking to our leaders. Those leaders, for example politicians and captains of industry, are blamed more and more often for being societally incompetent and for being out too much for their own gain. Their motives are distrusted; confidence in the intentions of politicians and big business is low. But how can we condemn them for this? We might make higher demands of them as our leaders, but in the end they too live their restricted lives as members of the human population, mere specks at the scale of the path of humanity. It is easy enough to point the finger at our leaders, but the plurimodern transformation applies to all of us to the extent of our individual capabilities – to consumers who still choose the cheapest factory-farm chicken and sweatshop clothing, to holiday travellers flying to the Maldives, to entrepreneurs who develop and market goods and services with concern only for their profits, to government officials who advance mainly the interests of their own department or municipality or ministry, to religious fundamentalists with ambitions of growing their following, to politicians and leaders of all genders who want to maintain their positions.

We all come up short, because all of us have a societal understanding that lags behind relative to our position on the path of humanity. If you take the plurimodern step on your own, then there is a very real chance that you will sustain the disadvantages of your altruism; you will plummet into the altruistic trap of the Societal Balance Model (explained near the beginning of Part 1 of this book), and the effect of your difficult and courageous choice is next to nothing anyway. The growing powerlessness of leaders and managers is only one selected example of a much broader incapacity in society. We all suffer from a growing failure of societal understanding, only we expect more of our leaders and managers, and their shortcomings are more noticeable because we are looking up to them and expecting solutions of them. That is a vain hope, for we will all have to transform, to the extent that each of us is able, if we want to take the step towards plurimodernity.

Just as you cannot get by in a city-state with the societal consciousness of a hunter-gatherer, neither will the consciousness of a late-modern human suffice in a plurimodern society. Consideration for each other and practicing a cultural attitude of coherence and cooperation cannot simply be delegated to leaders. Things will be that much worse if these leaders have achieved their positions through a highly competitive power struggle. If they have taken their place at the top after such a struggle, then their proven competencies almost disqualify them from plurimodern leadership. This is serious food for thought about the form and the nature of plurimodern leadership. Leadership too will have to be distributed, and responsibility will have to be spread out. The 'strong leader' offers no solutions to the challenges of the late-modern age.

A major regression from the present late-modern level of scale is unprecedented, and it defies imagination; even the end of the Roman Empire does not even come close. A regression as such is not at all that unusual; this is a lesson of *the path of humanity*. Our lack of personal experience of such an event or our unwillingness to consider it does not

guarantee that it will not happen,[128] or for that matter that it *will* happen, but there are many signals that are at least disturbing. And the very realization that a regression is possible offers us additional motivation to work hard at the plurimodern transformation and to take the step forward. A movement such as this is a very good fit with the nature of us humans as improvers. And just like the scale of the possible regression, the scale of the possible step of improvement towards plurimodernity is also unparalleled, representing an enormous societal value.

We now know where on the path a lot of societal potential is to be found: in the plurimodern society of Team World. And the key to unlocking this potential is the plurimodern transformation – the further improvement of our understanding of our society, the augmentation of our societal sensitivity, and learning to live in and experience our society from the vantage points of various experiential worlds and at various scales simultaneously. For a societal practice can only truly be plurimodern if our societal understanding – the way in which we organize society, experience it, and live in it – transforms towards plurimodernity. This allows us to close the gap and to become capable of the next jump forwards and upwards along *the path of humanity* towards Team World.

There are huge societal improvements in store if we manage to raise our society up to the next scale of *the path of humanity*. If we succeed in making the step towards plurimodernity, we will stop the modernist overexploitation and exhaustion of our planet, as well as the multitude of late-modern Procrustean beds, social excesses, and buck-passing, without having to give up the enormous benefits of modernity.

This answers the 'why' question about a next societal step. I think that exercising plurimodern thinking and working involves learning to better understand how our societal practices function as multi-actor practices. It thus requires that we take a closer look at each other and that we learn to enhance out societal sensitivity. I have already discussed this in detail in Volume IV of this series, published in Dutch as *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation).

Plurimodernity is a spectral notion

Thus I call the next phase in our societal development, that of Team World, the *plurimodern* phase.[129]

[128] See also the books of Nassim Nicholas Taleb, especially *The Black Swan* and *Antifragile*, in which he sharply defines our blindness for 'black swans' – major unforeseen and unexpected events that can disrupt our lives, and our incapacity to deal with them effectively.

[129] Those who read Dutch can also see Volume IV, *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor process Management in Theory and Practice* in preparation), Intermezzo 4: 'Leven na postmoderniteit, de plurimoderne fase' (Life after postmodernity – the plurimodern phase).

According to some observers, we are currently in a postmodern phase.[130] Multimodern strains and modern bleakness are causing us to put up more and more resistance against modernity. Postmodernism is a reaction movement, even an opposition movement. Modernity emphasizes the belief in large narratives and structures, science, consensus, unity, and absolute truths – a belief that is weighed down by the extensive stacking up of modern systems (multimodernity). On the object–subject spectrum, modernity tends more to the side of materialism, objectivism and rationalism (the objective side). Postmodernism, on the other hand, opposes this with an emphasis on uniqueness, smaller scales, and cultural niches. Postmodernity is a direct opponent of modernism, emphasizing the more relativistic and thus also the pluriform side of things (the subjective side) and giving a place back again to the uniqueness of individual people. Premodernity is the era that preceded modernity, from the hunter-gatherers up to and including the first city-states, in which religious concepts supported the formation of societies. Here we see the cultural pendulum playing its dualist game on the object–subject spectrum.

But there is an essential difference between plurimodernity and postmodernity in the sense of a swing back to a smaller scale and more individuality, as sketched above. The concept *plurimodern* expresses the synthesis of two concepts that are essentially in conflict, each of them located at its own end of the subject–object spectrum: pluriform and modern. With this synthesis of thesis and antithesis (Hegel would surely have appreciated this), one seeks to cover the entire object–subject spectrum, thus both ends (or at least their limits) as well as all hybrids between them.

Plurimodernity is thus a *spectral* notion rather than a *dualist* notion. How is this evident in the last phase of *the path of humanity?* Every successive step along *the path of humanity* adds new and larger scales of coherence and cooperation relative to the stage preceding it. The sedentary community is clearly larger in scale than the groups of hunter-gatherers, the city-states are even larger in scale than sedentary communities, and modern nation states are yet larger than city-states. We are undeniably evolving to larger and larger scales of society. Team World requires the next (and final) step upwards in scale. As a consequence of the addition of scales, the original scales change unmistakably in character, but of course they do not disappear. For example, we no longer sit in groups of 10-30 people around the campfire as hunter-gatherers once did, but we presently have family and friendship connections at around the same scale.

At the same time, every new layer that has been added thus far has a certain tendency to want to dominate the layer added just before. The new layer is fresh, vital, full of opportunities, powerful, and in charge. For example, the field workers in a sedentary community with some degree of structure (i.e. villages) are subjects (slaves and serfs) of more powerful elements of their society, or in any case, they are poor. Prosperity and power were concentrated in a village elite, a notion unknown to the hunter-gatherers. The villages

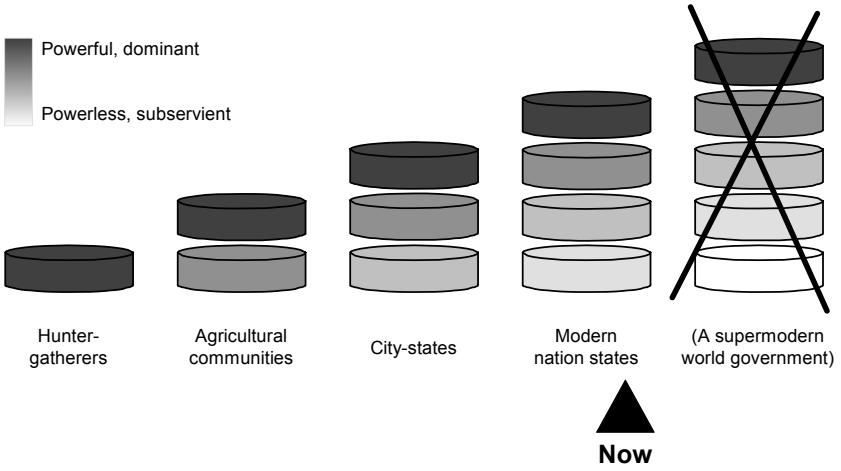
[130] See the writings of Jean François Lyotard, who coined the term 'postmodern'.

surrounding a city-state belonged to the central city and served it. The cities and provinces of a nation state belong to the nation state and serve it, with a powerful central capital city generally playing an important role. You only have to take a look at the highway and railway networks of France to see the physical manifestation of this principle: Paris has a clearly dominant position. Zipf's law shows this as well: Paris is twice as large as the second largest French city, Marseille.

Modernist strain

The stacking process of the path of humanity is depicted below in a very schematic form, and as though it would continue to develop as it has up until the present day. It is often the case that the power of the uppermost and most recent layer plays a dominant role. For hunter-gatherers, the crucial layer is that of hunting and gathering food. For the San people at the southern edge of the Kalahari Desert, one of the last remaining populations on earth who still live as hunter-gatherers, the pressure on hunters to find food can become enormous; the survival of the group indeed depends literally on their success. In the city-states, the administrative elite, that also controls the armies, is in charge – think for example of the many wars between the Italian and the Greek city-states, in which power played a central role.

In our present-day world, there is an intense **modernist strain**: as a patient, as a student, as a resident, or as a user of energy, we only have to encounter the systems that our patriarchal state has thought up for these regimes of modern life to experience that strain. The figure on the next page is greatly simplified; of course, there are many other scaling processes in these societies. Note that the modern nation state is not followed by Team World but rather by a world government – a dominant authority at the global scale. You could call this new and last dominant phase the **supermodern**. I do not think that it will come to this; this stacking of layers is proceeding with more and more difficulty as scales continue to grow, because unrest at the underlying scales keeps strengthening, which can be seen clearly in the case of Europe (both national politicians and citizens drop out when too much sovereignty is shifted to the larger scales) and in the feeble mandate of the United Nations.



An unlikely next step of further stacking up towards a supermodern world government

For this reason as well, our journey along *the path of humanity* does not proceed without problems and setbacks; every *growth spurt* has its winners in the last layer added and losers in the layer just before, and all the needs of the lower layers generally will suffer as a result of the far-reaching overemphasis on the last layer added. In the opposite sense, every *regression* has winners in the next-to-last layer and losers in the layer that is abandoned. Lower layers generally become stronger because of this. When underlying layers are subjected to too much suffering, they will even resort to revolution through various layers above them to restore the balance – the French revolution offers one example of this. But in general and in terms of 'net' outcomes, every step upwards means a step towards a higher quality of society, and every step back a step towards a lower quality of society. This is why societies develop as they do in the course of history: it is a matter of perspectivist entropy.

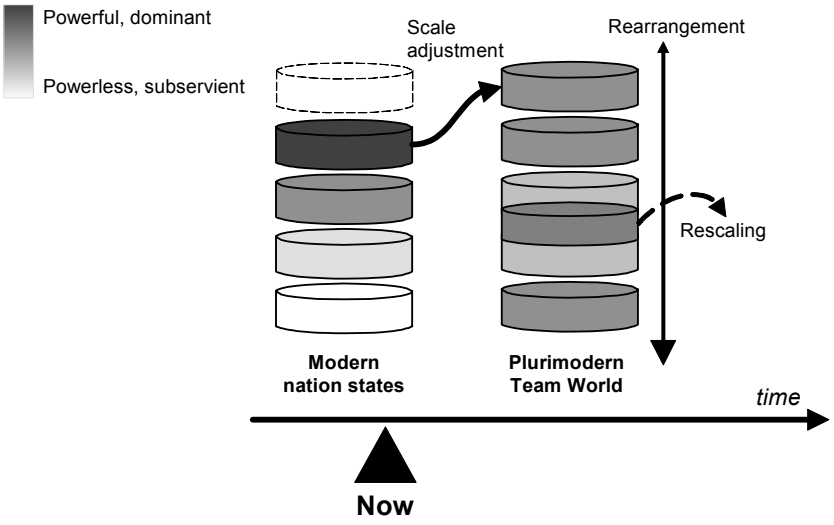
In the modern age we are living under an intense modernist strain (see the arrow at 'Now' in the diagram): the systems at the national scale are dominant and powerful. This causes all sorts of tensions at the lower levels; we might consider these to be 'luxury' tensions when compared with the quality of life in the earlier phases, but they are experienced nevertheless. In our national healthcare systems, the patient loses out; in our modern educational systems, students lose their way; in the construction of new housing, the inhabitants have little or no say; and the national players among the energy producers dominate the market. Or at least, that is how it *used to be*; the tide is slowly but surely turning, and it is exactly for this reason that I call the age in which we now live the late-modern era. Healthcare is once again being delegated back to municipalities; with considerable hesitation, students are being seen once again here and there as individuals rather than as aggregate scores on their exams; the wishes of residents are being taken more and more seriously by the construction industry; and the energy world is even shaking on its foundations under the influence of the renewable energy revolution (for example, the solar panels being installed on the roofs of private homes). As our societal

system becomes larger and more top-heavy, all kinds of rescaling operations inevitably gain more power. The other layers demand to take back the space that is rightfully theirs, which modernity had taken away from them.

The plurimodern phase of Team World caps this stacking process at the top. At the same time, the tensions and with them the urge for rescaling are becoming unmanageable for those in power. We therefore see, as the path of humanity suggests, a double process. On the one hand, a final layer is being added at the top. That could be a powerful world government if we go on stacking in a manner consistent with the past, but no nation state in the world is inclined to turn its integral sovereignty over to such a juggernaut, and all the lower layers are in hearty agreement with this, for they consider modernist power already much too indiscriminate. Therefore the world government may only do that which is of global concern. At the same time, the dominant modern layer is brought back to acceptable proportions, and sovereignty is given back to city-states, villages, and families. The ideal behind this is that those things take place at each level that are the best fit to that level. Families raise the children, municipalities provide care for the elderly and infirm, cities and their urban regions regulate their local economies, nations take care of national infrastructures and institutions, and a global governing body deals with extreme poverty, climate agreements, and similar matters.

Scale adjustment, rearrangement, and rescaling of layers

Altogether, this involves a combination of *scale adjustment*, *rearrangement*, and *rescaling* of the layers of society. This combined process goes along with changes in a number of layers at varying intensity.



A probable next step towards the plurimodern society of Team World.

There will be one more *scale adjustment*, as has happened several times before in our past along *the path of humanity*: the global scale that caps the spectrum appears at the top. This *scale adjustment* at the top is ongoing; larger configurations have in fact already been tested for some time, take for example the Roman Empire, the Carolingian Empire, the United States, and the European Union. We have global trade agreements, we had the League of Nations and we now have the United Nations, and we have the Olympic Games. But many of these institutions are shaky, and national and sectoral interests still dominate. In principle, with this last scale adjustment, the entire spectrum of *the path of humanity* is covered. The smallest scale is that of the individual experiential world; there are more than 7 billion of these. The largest scale is that of humanity; there is still only one of these, no matter how much we may as yet grow.

The plurimodern phase is further characterized by *rearrangement* and *rescaling* that is sometimes hefty.

Rearrangement is a shifting of activities, habits, sovereignties, tasks, and responsibilities towards those scales that are best suited to them according to the actors in society. In the Netherlands, we are seeing a lot of rearrangement, especially towards the lower scales, for example in healthcare, energy generation, and construction. We are shaking off the paternalism of the modern nation state. The municipality is becoming more important in healthcare, families are generating their own electricity with solar panels, and people are once again designing and building houses for themselves on their own parcels of land. The lower scales are winning back their influence that they had started giving up to modernity a couple of centuries ago. We will also be seeing a lot of upwards rearrangement; it is inevitable that municipalities, regions, provinces, countries, and a global governing body will get responsibility for the emissions of CO_2 or packaging materials that are the consequence of the activities of households (home activities and needs, transportation, etc.). Possibly you do not see this before you yet, but it is a logical consequence of *the path of humanity*, and the alternative is quite awful: our oceans turning into plastic soup and our planet becoming a greenhouse.

Rescaling is the transformation of the existing scale spectrum into a new one. For example, a scale can split into two, or two scales can combine, or the top of a lower scale can merge with the bottom of the scale above it to form a new intermediate scale. Like the rearrangement of scales, this rescaling too is clearly visible. Between the global scale of the United Nations and the nation states, political-economic trade blocks have arisen in the most recent centuries. Between provinces and municipalities, regional entities have come into existence. Between provinces and nations, superregions have been formed; that too has not gone smoothly, but in the end, entropy will win out here as well over the interests of specific provincial and national stakeholders.

In the future, rescaling will not be dominated by the desire to have *only a few* scales. That is, after all, a typical modern preoccupation of this age, based purely on considerations of scope, efficiency, and uniformity. Rescaling is instead dominated by the consideration of

whether there is a reason for the existence of the scale in question. If we rescale intelligently, we will see to it that we avoid the huge vulnerabilities of modernity while at the same time retaining the modern advances in quality. And the meaning of a feasible and intelligent rescaling has up until the present day been hidden in the perspectivist landscape (see the quantum theory of society in Theme VI).

Hunter-gatherers and the inhabitants of the first sedentary villages generally had a much lower quality of life than that which we enjoy today. But they also had something that we presently have to do without: autarky and autonomy, i.e. self-sufficiency and self-determination. When modern societies do their work normally, that lack of autarky and autonomy at the smaller scales is of course not a problem. Our machinery for production and consumption provides us with everything that we desire. But heaven help us if there is a major malfunction. Our modern megacities would suddenly be without food, water, electricity, and transportation because significant subsystems of our modern societies are not at all self-sufficient. In times of disaster, crisis, and disintegration the Achilles heel of modernity becomes apparent.

The last time that there was such a major failure in the Netherlands was during the last winter of the Second World War, known as the hunger winter. There are harrowing stories and images of people who had to go searching for food under the harshest conditions, and many of them died of hunger and freezing temperatures. This happened because the large-scale modern chains of food supply had been disrupted. But we presently see early modern food supply systems collapsing in the Middle East and in parts of Africa, attributed to climate problems by more and more people, with huge streams of refugees as a consequence.

At the smaller scales as well, a great deal is going wrong presently because we are trying to provide for the primary needs of individual people too much at the modern scale. I have already mentioned some examples. The last vestiges of individuality have slipped away in the larger companies, people are treated like interchangeable components, and they have become unhappy in their work. People who are sick or otherwise disadvantaged are pulled out of their accustomed lives and placed in hospitals, nursing homes, and other institutions that are supposedly *specialized*. Ironically, it is precisely in such institutions that the laws of 'one size fits all' dominate. Similar standardizing specializations are also more and more evident in our educational systems.

I am not opposed to modern systems. Nothing is finer than a modern system that satisfies modern needs. The scale, monitoring, product quality, and efficiency are unequalled. But at the same time, there is nothing as ugly as needs and desires that are present at some other scale than at the scale where they can be satisfied. It all goes wrong if we all have to go make our own smartphone, because to do this the requirements of material quality, versatility, product quality, and uniformity are extreme – think for example of the toaster project of Thomas Thwaites. It does not work out to put the elderly into modern care factories where requirements such as efficiency and uniformity apply, when these are individuals with

individual needs and requiring individual attention. These are examples of **scale errors** – mismatches between the scale of the need or desire and the scale at which they can be satisfied. Our food supply system suffers from such scale errors, as does our modern educational system. A plurimodern society is aware that such scale errors can come into play, and it works consciously to avoid them by applying a continuous dynamic of rescaling.

It is logical to provide large parts of the primary needs of people (food, health, education and development, shelter, social contacts) close to where these people live and work, at the smaller scales, and other parts farther away from these people, ultimately even at the supermodern scales such as the global scale that goes beyond the present modern scale. When people have serious illnesses, it is quite intelligent to go rather far in the interventions in their normal lives and to place them in hypermodern national – and ultimately even global – specialized care centres. They themselves will also not object to this, at least if they want to get better. But these systems should have the goal of serving the ordinary lives of individual people and not of putting their own systemic needs ahead of anything else. Yet that is the insanity shown by a modernity that has gone berserk, when the patients and the students have to go to great lengths to adapt themselves to the healthcare and educational systems, instead of the other way around, and end up asking themselves in amazement whether healthcare and education were not originally intended to serve them.

This kind of modernist strain is typical of ages other than our own. Hammurabi, king of the Babylonian city-state, lived from around 1800 BC to around 1750 BC. He was the ruler of the ancient Babylonian Empire, a collection of early city-states in which the usual state of affairs was that they were fiercely at war with each other. That empire quickly fell apart following his death; it was not a true nation state, and a step backwards was taken on *the path of humanity*. Just as we are now testing the transition from nation states to Team World, at that time the transition from city-states to nation states was being tested.[131]

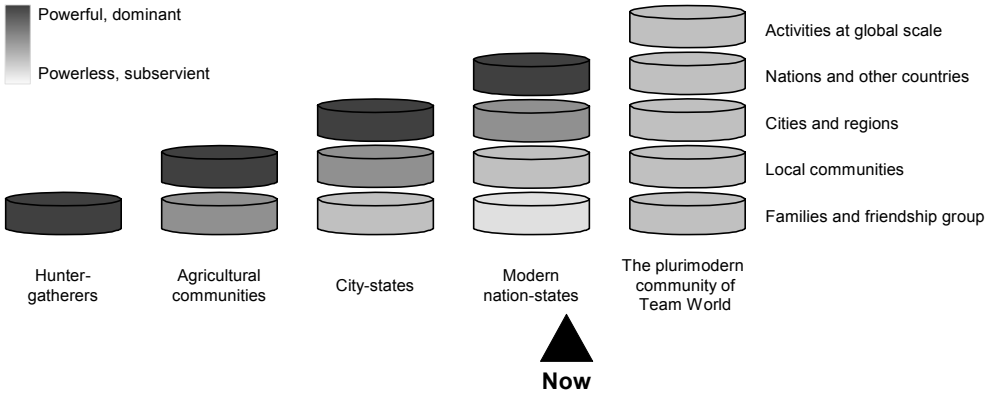
[131] Parallels between the earlier and the later steps along the path of humanity turn up again and again. Just as groups of hunter-gatherers were in conflict before the establishment of the first sedentary communities, and these first sedentary communities fought with each other before uniting around a city-state, and city-states waged wars with each other before being absorbed by nation states, nation states waged war before joining larger constellations such as the European Union. Samuel Huntington predicted in the 1990s that in the period following the tensions between communism and capitalism (the Cold War) a 'clash of civilizations' would come about between collections of populations with differing cultural and religious identities. This is simply a next step of upscaling in an ongoing process.
Huntington's view came to be at odds with the position of Francis Fukuyama that Western liberal thinking had emerged the winner (see his *The End of History and the Last Man*). Personally I think that both Huntington and Fukuyama may be partly right. It is quite possible that the phase of plurimodernity will be preceded by bitter wars between various power blocks with differing religious and – especially – cultural identities. Thus far, every transition along *the path of humanity* has involved war and conflict. At the same time, a plurimodern society would seem to have its foundations in cultural values that place considerable emphasis on a balance between unity, diversity, and equivalence, the three basic societal dimensions. That indicates the possibility

Hammurabi was well known because of his *Code of Hammurabi* – a system of laws and judicial procedures that was far ahead of its time because of the many rules that it contained that sought to maintain balance in society. Hammurabi already understood what modernist strain was, and how specialists can bring about many benefits but also can severely disturb the ordinary lives of those whom they serve. A telling example: builders who constructed rickety houses that collapsed were sentenced to death according to the Code. While I do not advocate the death penalty, this does provide food for thought about the fact that it still happens now and then here in the Netherlands that a balcony falls off an apartment building, with fatal consequences for those standing on it. Thankfully these are extreme exceptions.

The parties who are prospering in modernity (large international companies, national governments, economic elites, and monopolies in healthcare, transportation and education) are not going to give up easily. They are fighting back fiercely. They are clinging to their power and feel that they are confirmed by their modern logical constructs. They especially refer to their scale and their supposedly superior average quality and efficiency relative to smaller-scale solutions. I don't think that they are going to win this fight in the long run. After all, the long term logic of societal balance is rock solid: every scale has its own strengths and weaknesses, including the modern scale, and in strictly statistical terms it is pointless to emphasize the modern scale more than the others. It is much more reasonable to do those things at each scale that are the best fit to that scale; that leads ultimately to the highest quality of society. Of course, that requires a lot of multi-actor dialogue, understanding of each other's positions, and designing and testing better societal practices together. But ultimately, the multiscale balance logic of the plurimodern community of Team World will be victorious over the present modern strains, postmodern disturbances, or a supermodern overemphasis (a world government) – that is my firm conviction. If we don't do it, then the path of humanity will achieve a plurimodern society itself. That is what it has always done up until the present day. It will only take a lot longer and will be accompanied by far more setbacks and thus far more animosity and far more hardship.

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of a development towards a situation in which this balance gains broad recognition in society as something desirable. The perspectivist societal development is drawn unmistakably towards balance.



The path of humanity is expected to lead to the multiscale balance of a plurimodern community.

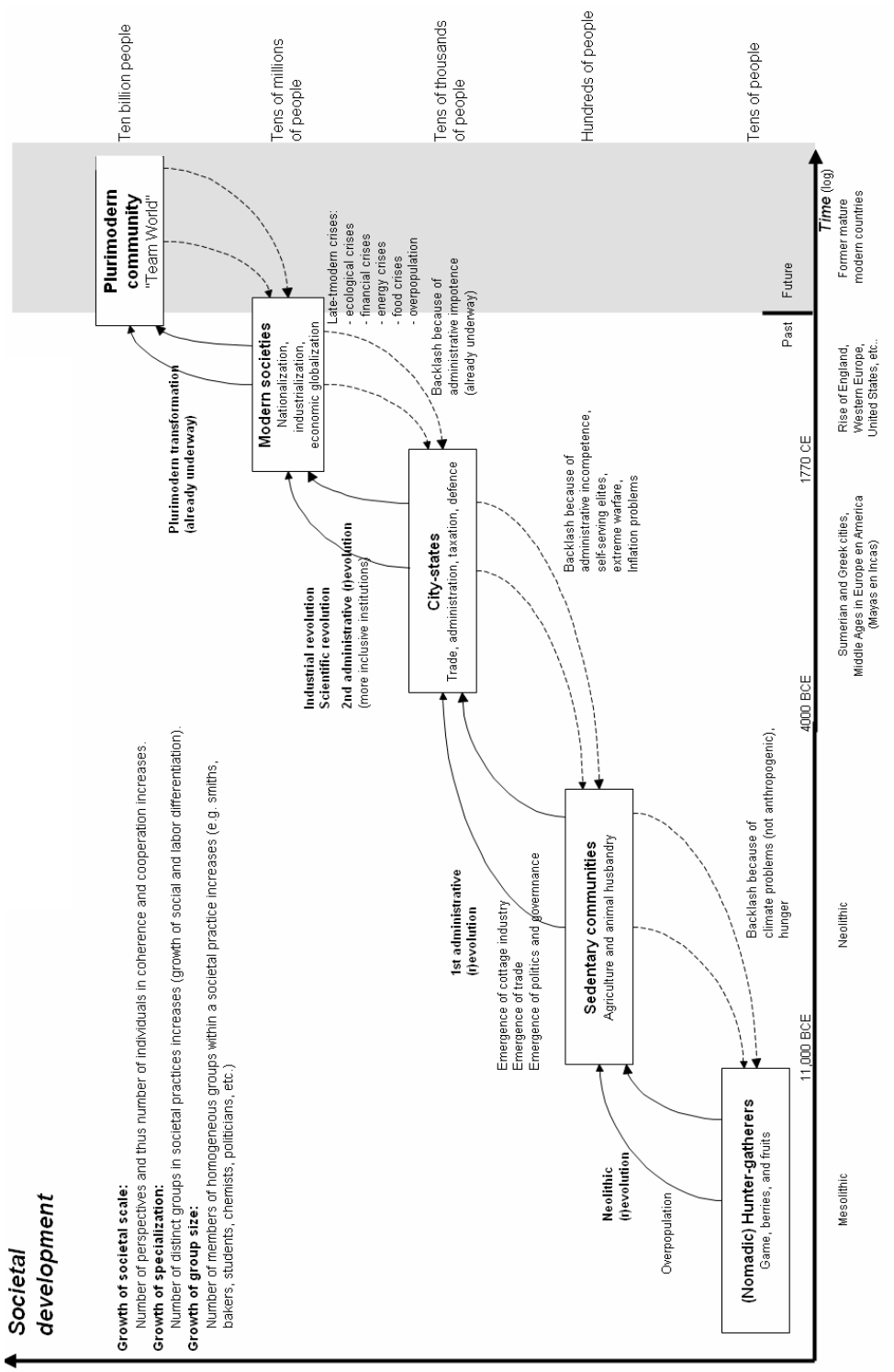
With one more step, we will be done as humanity with scale adjustments of layers. The ongoing process of rescaling and rearranging will then become the daily plurimodern reality of Team World (see the figure above).

In the long term, a society does not change scale as a result of poorly conceived ideological principles. A society determines its scale according to principles of perspectivist balance, because that is what makes a society better. A variety of needs, wishes, and functions require the use of a variety of scales. And it is better if we involve ourselves explicitly in this process by consciously seeking that perspectivist balance. Plurimodernity is thus a pre-eminently *dynamic spectral* concept, and it is able to be this because the boundaries between the layers of societal experiential worlds of perspective are able to shift. At the scale of *the path of humanity*, this is definitely a recent development, involving mainly the last few thousand years, and modernity has been with us only a very short time.

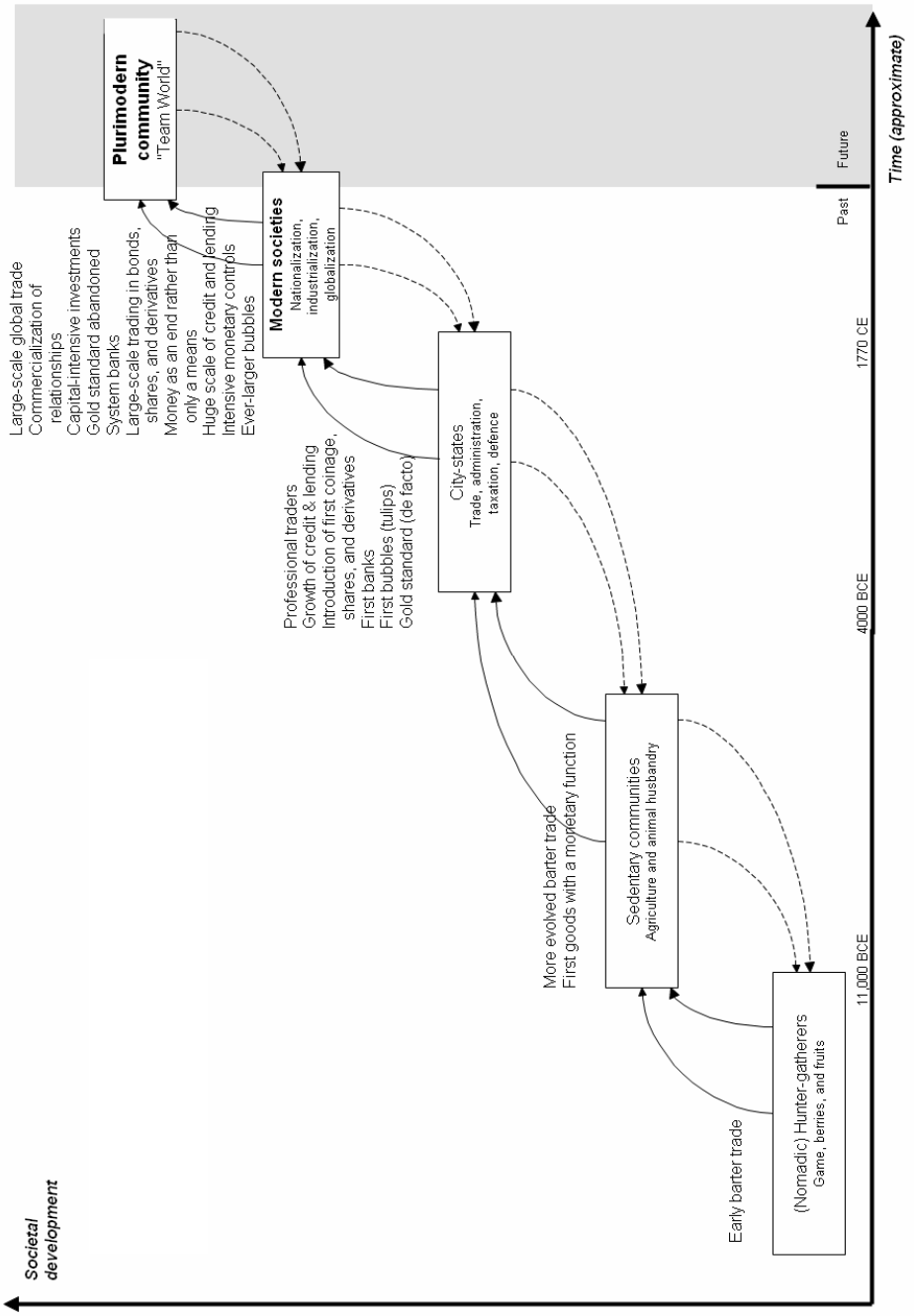
4.3.5 Modernity as a pivoting point

The illustrations on the following pages show overview sketches of 'The path of humanity' and of 'Trade and the financial world'. They show how specific socioeconomic sectors conform to the path of humanity.

The path of humanity: ***an impression***

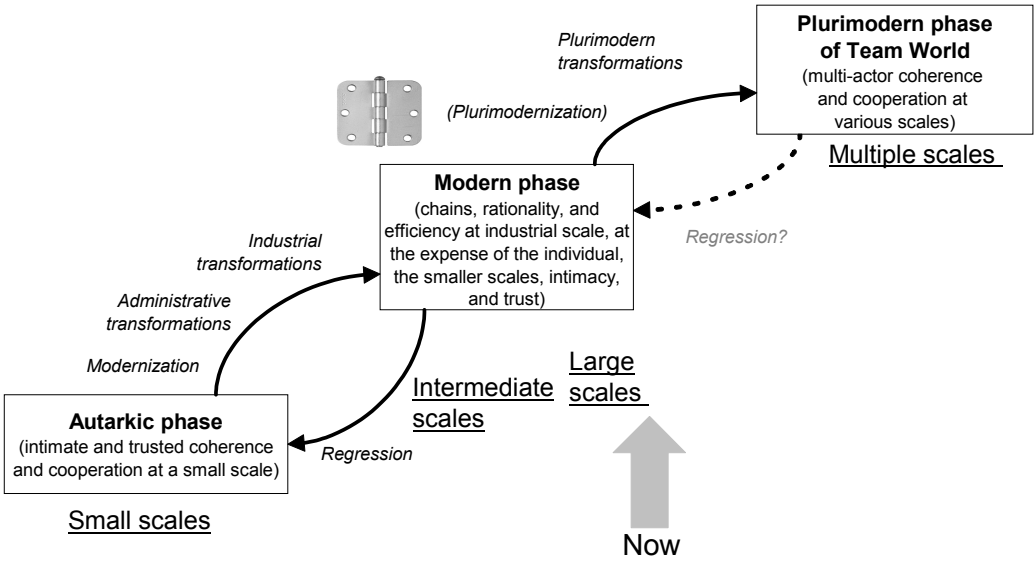


Trade and the financial world: an impression



Modernity as a turning point

In the light of the discussion about scale adjustment, rearrangement, and rescaling of layers, it is hard not to notice that modernity appears to be a typical transitional phase from societal forms that are more autarkic towards societal forms that are seeking coherence and cooperation at larger scales. Proceeding according to modern paradigms offers no good prospects; this is a typical turning-point phase. We may be impressed from time to time by the large scale of the modern phase, but the coherence and cooperation that Team World requires are not yet evident (from this point of view, the modern phase is only an intermediate stage; see the figure on the next page).



The modern phases as a hinge between small-scaled autarky and multiscaled plurimodern coherence and cooperation

4.3.6 Plurimodern explorations of economic sectors

In collaboration with various other people in recent years, I have described the development of autarky via modernity (and postmodernity) to plurimodernity depicted above. That was partly prior to writing this book, but the pattern autarky-modernity-plurimodernity turns out to be clearly observable,[132] despite the differences between the sectors and the limited clarity that societal developments always show.

[132] An earlier presentation may be found (in Dutch) in Henk Diepenmaat (2011), *Multi-actor procesmanagement in theorie en praktijk* (published by Parthenon, English translation *Multi-actor Process Management in Theory and*

The descriptions that follow below show that we are near the end of modernity, even somewhat between the modern phase and the plurimodern phase, but still very strongly within the modernistic sphere of influence. Postmodernity (literally 'after modernity'), here radically conceptualized as a rejection of the uniform and universal truths of modernity and a re-evaluation of uniqueness at smaller human scales, is, in fact, a movement in reaction to modernism that seeks a solution in returning to progress along *the path of humanity*. The plurimodern society of Team World offers a much more complete answer to modernity than does a postmodern regression to the smaller scale. It is also an answer that does justice to the combined power of modernity and premodernity. In premodernity, coherence and cooperation were much more the norm, at least within the smaller social groups (but *between* groups there was in fact often hostility).

The plurimodern society of Team World is for most of those involved a vision of the future that beckons. Ultimately we will also end up there anyway, if we do not die off on our way there through a cometary impact or some other collective disaster. This is the claim of this book, because we as humans also unconsciously follow the path on the basis of stochastic-perspectivist principles.

But if there is one thing that *the path of humanity* makes crystal clear, it is that regression is always one of the possibilities, and that this unconscious path is long and even, and can cause a lot of pain and misery. It makes little sense to make the step from modernity to plurimodernity any more slowly than we have to. For this reason, a more conscious and energetic course in the direction of plurimodernity is highly preferably in societal terms, even with the full realization that this conscious course will be exceptionally difficult to put into practice in society.[133]

We will now take a look at several (socio-)economic sectors. The first five are described in greater detail:

- Construction[134]
- Juvenile healthcare
- Personal transportation
- Goods transport
- Agriculture and food supply

Practice in preparation), Intermezzo 4: 'Leven na postmoderniteit – de plurimoderne fase' (Life after postmodernity – the plurimodern phase).

[133] One the other hand, you only have to do better than you would if following the unconscious path, so the bar is not all that high.

[134] An earlier description of the construction sector has already been presented in Henk Diepenmaat, Anke van Hal, and Joost van Ettekoven (2012), *Mastering Three: A Threefold Method Towards a Vital Building Practice*, Centre for Sustainability, Nyenrode Business University, Breukelen, The Netherlands (also available in Dutch). With thanks to the Royal BAM Group (Koninklijke BAM).

I was able to compile these diagrams in collaboration with several talented and ambitious colleagues and am grateful for their contributions (they are credited in the diagrams). These colleagues endorse the descriptions of developments in these sectors, but of course, I myself bear the responsibility for the placement of these developments within the broad context of *the path of humanity*.

Only a few essential points have been sketched for another four (socio-)economic sectors:

- Energy
- Learning, education, and ICT[135]
- Defence
- Governance, leadership, politics, and management

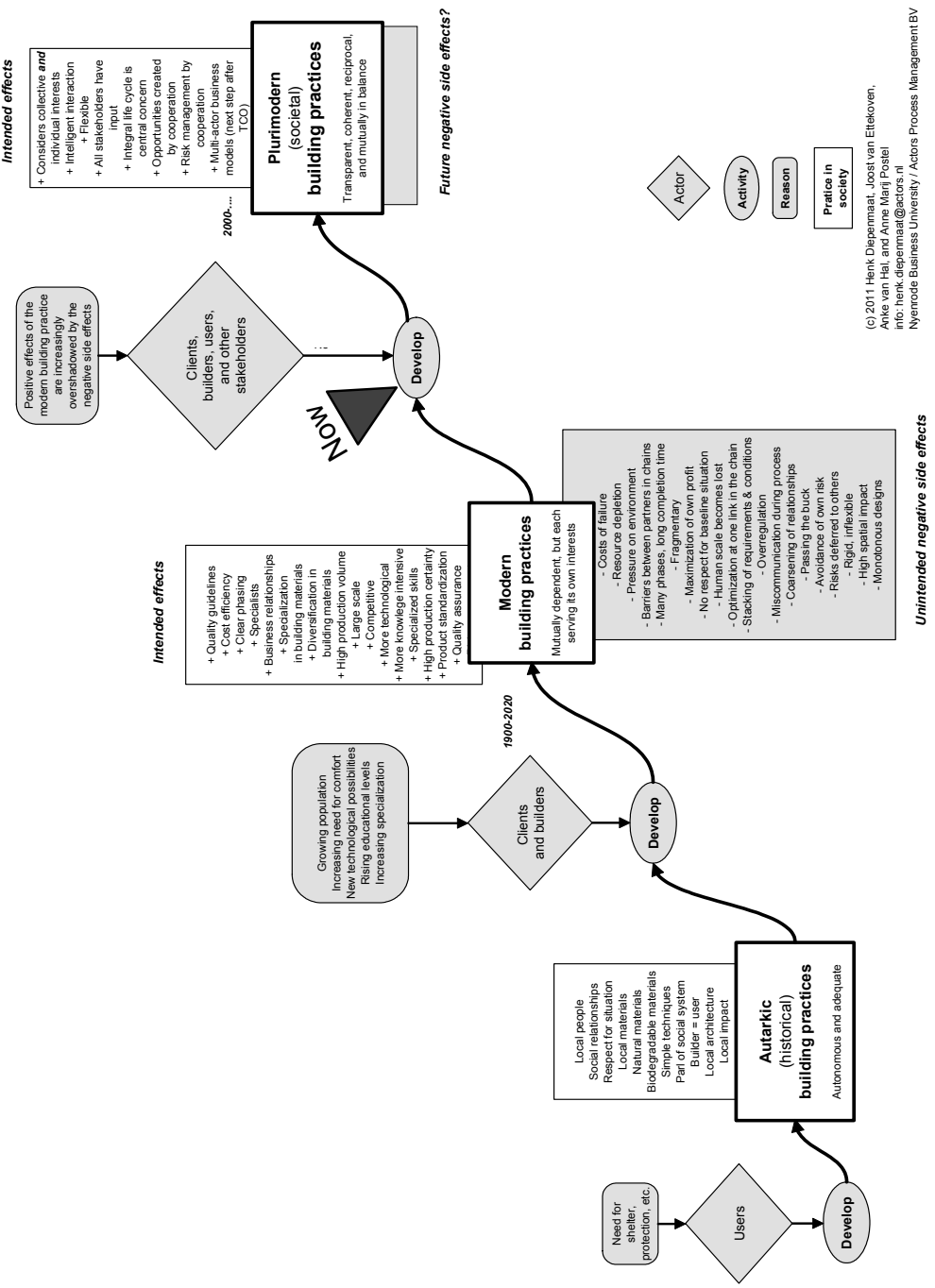
The descriptions have often been compiled from a Dutch or a western point of view, since this is the setting in which I generally carry out my multi-actor practice. Taken as a coherent whole, the descriptions give an engaging insight into the present-day developments in various parts of our society. The contours of the step from modernity to plurimodernity along *the path of humanity* are clearly visible; that will quickly be evident in these descriptions. At the same time, it will also become clear that in areas such as defence and governance there are still a few more steps to be made: my sketches here are probably somewhat optimistic or – more to the point – plurimodernity is still further out of the picture and modernity more the status quo. Defence and governance are after all directly concerned with our rational powers.

Let's get right into these explorations of economic sectors. In the first five diagrams, the white box above modern phase lists the intended effects (the advantages), and in the grey box below it, we see the unintended negative effects (the disadvantages), which become more prominent the further that modernity proceeds.

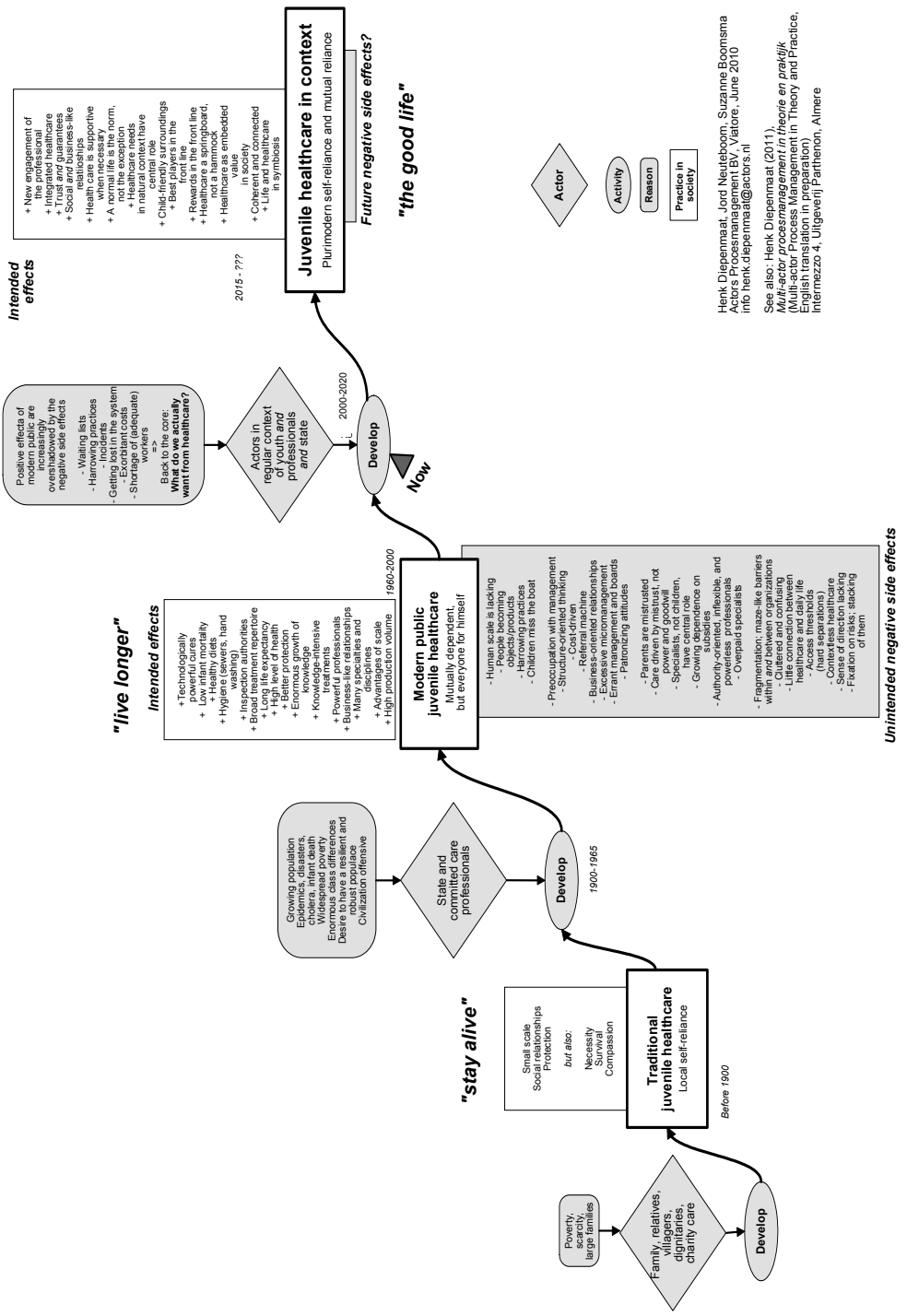
[135] ICT = information and communication technology

1: Construction

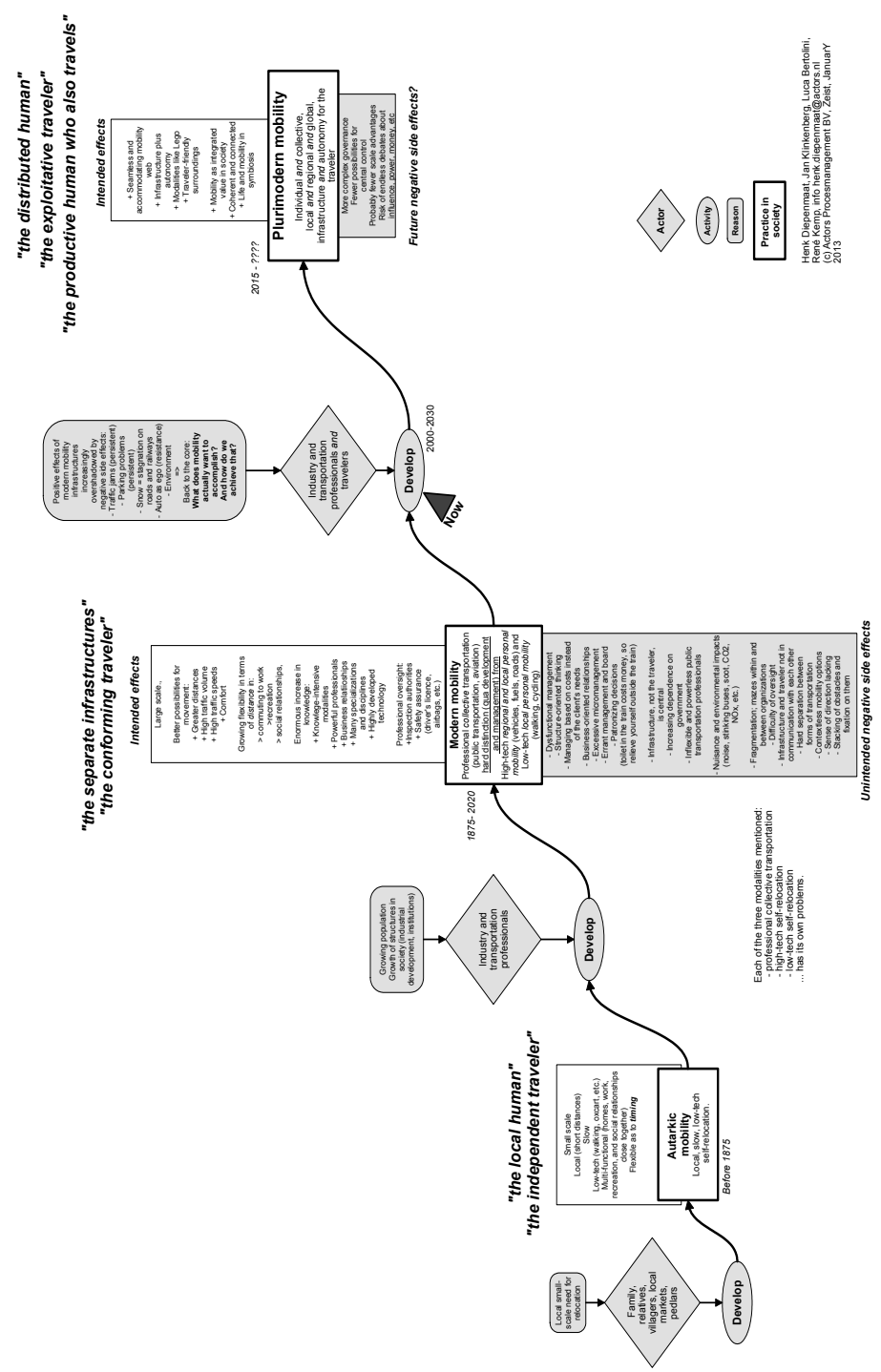
"Cities are people; people are cities."
Frank Diepenmaat (14 years old)



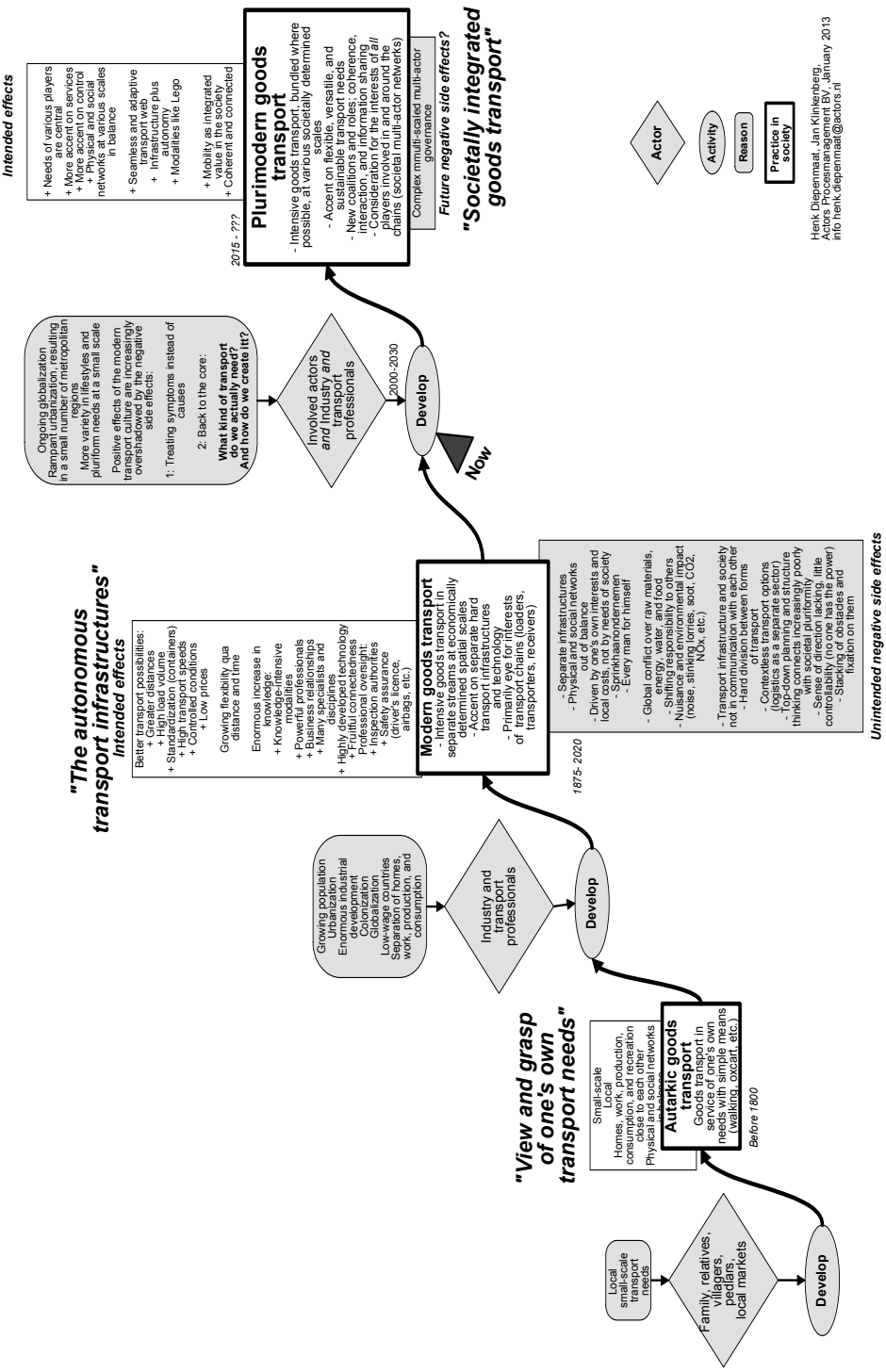
2: Juvenile healthcare



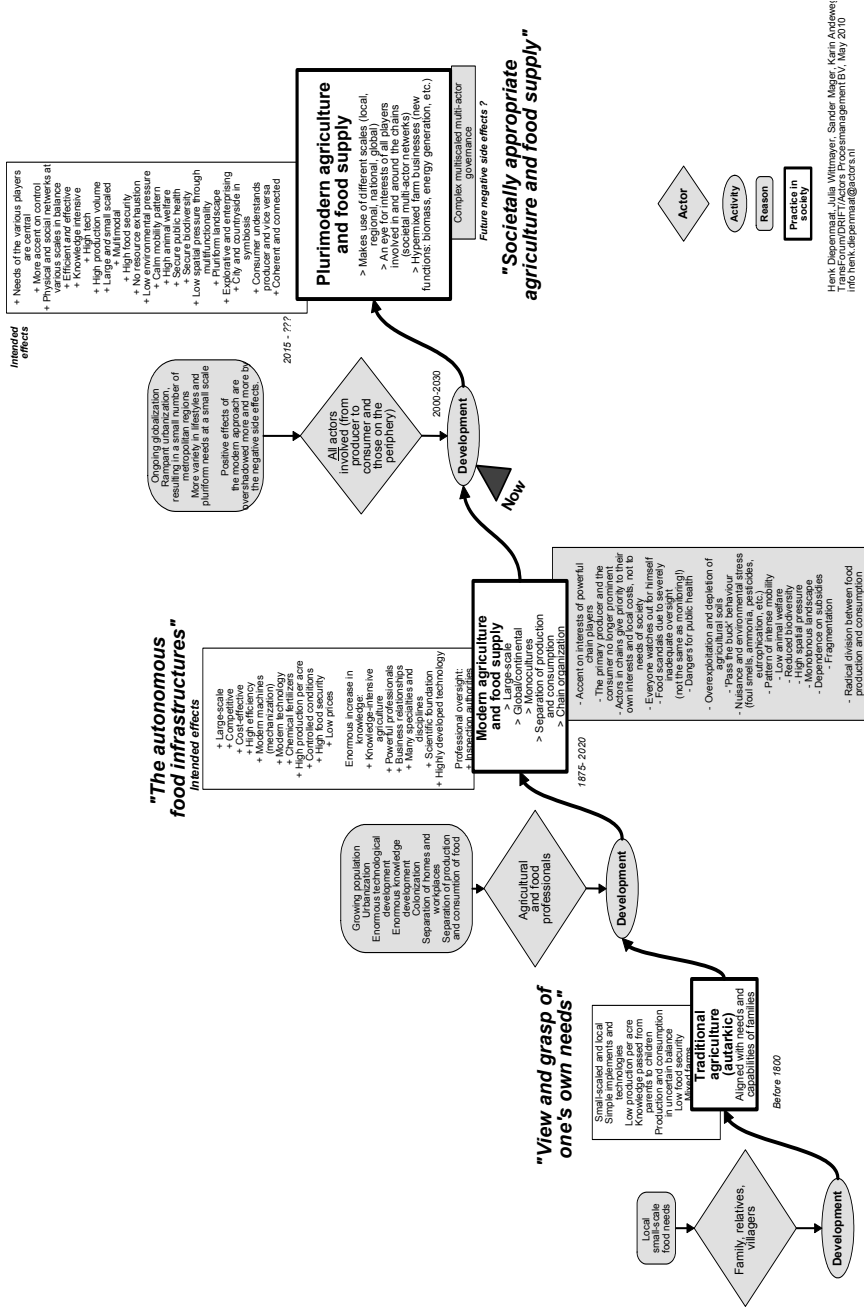
3: Personal transportation



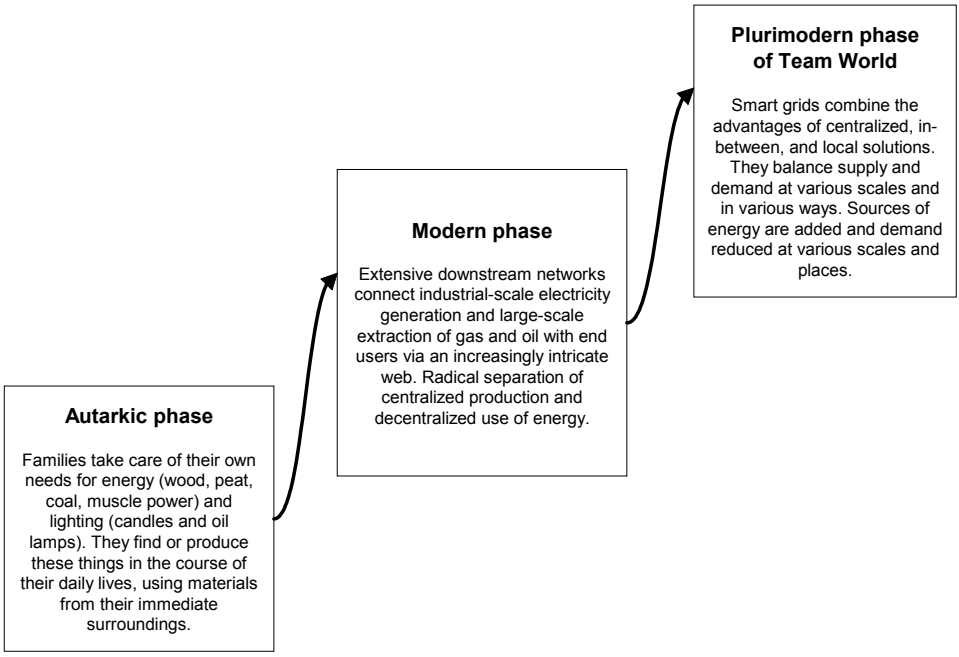
4: Goods transport



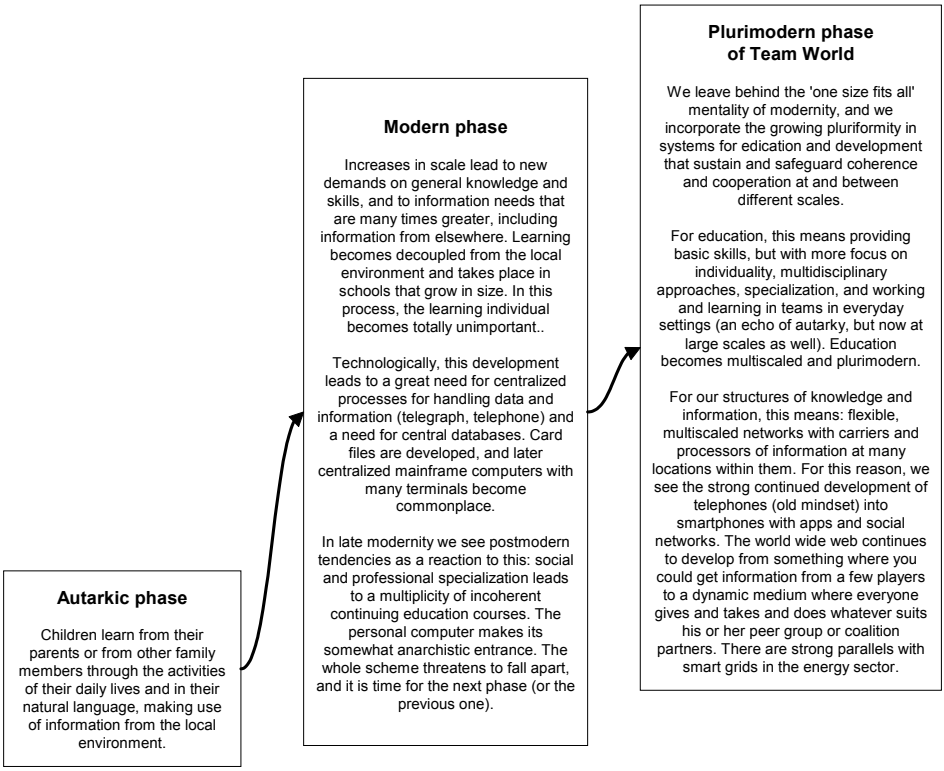
5: Agriculture and food supply



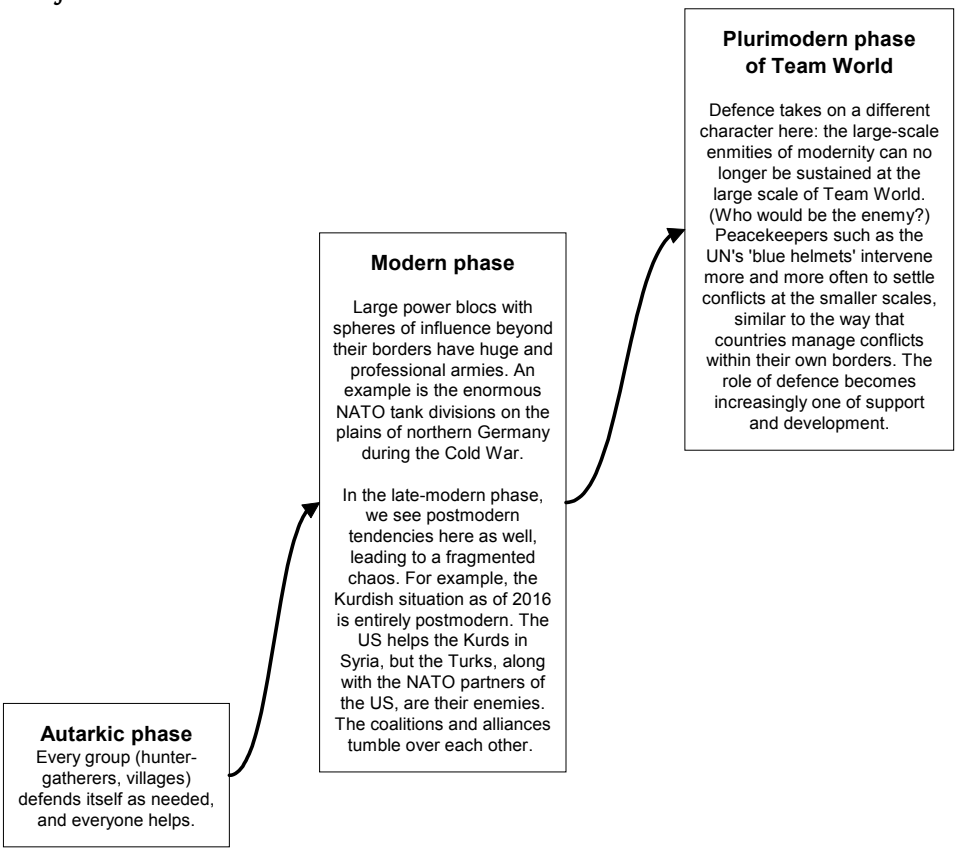
6: Energy


Autarkic phase
Families take care of their own needs for energy (wood, peat, coal, muscle power) and lighting (candles and oil lamps). They find or produce these things in the course of their daily lives, using materials from their immediate surroundings.
Modern phase
Extensive downstream networks connect industrial-scale electricity generation and large-scale extraction of gas and oil with end users via an increasingly intricate web. Radical separation of centralized production and decentralized use of energy.
Plurimodern phase of Team World
Smart grids combine the advantages of centralized, in-between, and local solutions. They balance supply and demand at various scales and in various ways. Sources of energy are added and demand reduced at various scales and places.

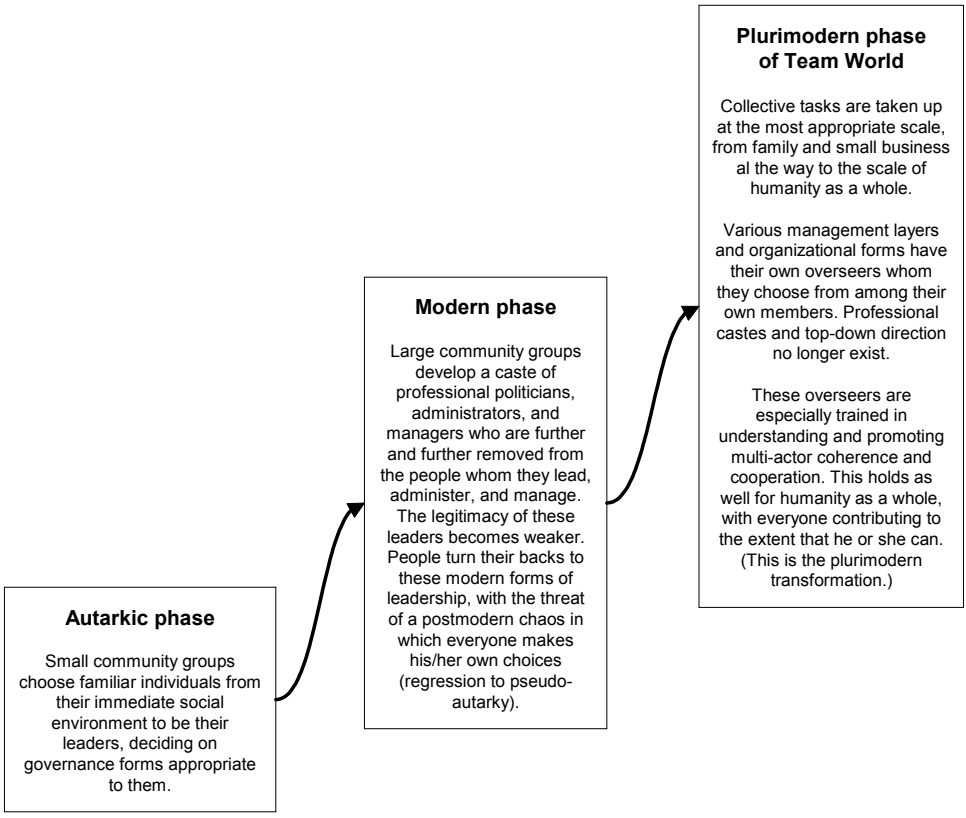
7: Learning, education, and ICT



8: Defence


Autarkic phase
Every group (hunter-gatherers, villages) defends itself as needed, and everyone helps.
Modern phase
Large power blocs with spheres of influence beyond their borders have huge and professional armies. An example is the enormous NATO tank divisions on the plains of northern Germany during the Cold War.
In the late-modern phase, we see postmodern tendencies here as well, leading to a fragmented chaos. For example, the Kurdish situation as of 2016 is entirely postmodern. The US helps the Kurds in Syria, but the Turks, along with the NATO partners of the US, are their enemies. The coalitions and alliances tumble over each other.
Plurimodern phase of Team World
Defence takes on a different character here: the large-scale enmities of modernity can no longer be sustained at the large scale of Team World. (Who would be the enemy?) Peacekeepers such as the UN's 'blue helmets' intervene more and more often to settle conflicts at the smaller scales, similar to the way that countries manage conflicts within their own borders. The role of defence becomes increasingly one of support and development.

9: Governance, leadership, politics, and management



4.3.7 The Leitmotiv in the sectoral explorations

The selection of nine sectoral explorations above is mainly based on my experiences over the last couple of decades in my multi-actor practice. The selection can easily be expanded to other sectors and levels of society. The Leitmotiv in the above explorations looks as follows (I am strongly schematizing here). In the *autarkic* phase (this is roughly the phase of hunter-gatherers and both of the sedentary phases, but mainly the phase including the villages), the social and physical networks are small, and are highly similar. The involved parties (people is a better term to use here) are well aware of each other's needs and possibilities. They form small but tightknit networks. In small groups, they each fill in their own needs and it is easy to keep oversight with simple activities. Autarky is small, transparent, self-controlling, trusting, and intimate.

In the *modern* phase, the number of parties and the size of these parties both increase dramatically. This results in a transition from small, tightknit pluriform networks to larger, homogeneous networks, which subsequently link to form sizable chains (think of the world-encompassing production and consumption chains and the corresponding trade). The characteristic of homogeneous networks is the *one size fits all* character: you either conform, or you are out. The characteristic of chains is that links that are not directly connected to one another are in no way aware of each other's needs and desires. When you maximize chains for efficiency, this even applies to links that are next to each other: the overlap becomes very small.

On one hand, this leads to an enormous level of quality control, production scale, and affordability. Products and services become available to many. But at the same time, the relations between actors become short-term, rational, and professional: all that matters is usefulness and added value, the relationships become harsh and cold. The modern phase doubtlessly offers more potential in terms of scale and efficiency, but we lose individuality, trust, and the transparency of autarky.

Sustainability issues (think of the climate and the environment, but in a popular interpretation this also includes people, profit, and planet) are a direct result of this combination of upscaled links, homogenization of links, and the formation of links into chains. Due to the ever-increasing modernization, social and physical networks become increasingly imbalanced, and networks give way to chains that are much less flexible. When nobody has oversight, let alone the power to manage these chains, we deplete resources and pollute the environment on an increasingly large scale (think of the *plastic soup*, planetary micro pollutions, climate problems, noise, and so on). No blossoming, social society can remain on the foundation of a worsening physical habitat. People are therefore starting to turn away from this rampant, modernist machine, searching for the smaller scales (postmodernism). In a way, this is a step back to autarky.

However, autarky is not a reasonable solution to the problems we face today: autarky does not help us feed and house 7 billion – and in the future 9 billion – people, or provide them with anything else they might need.

That is why we see more and more plurimodern tendencies: we combine the pluriformity, coherence and cooperation of the autarky with the scale advantages and the professional management of modernism, and in doing so we recognize the relevance of numerous scales, from global to individual. This leads to multi-scale networks, and every level has its own functions and management that correspond to that particular scale, as well as mutual relationships between the scales. That is how we connect the physical and the social chains in tightknit networks, as was the case in the autarky, but now there are multiple scales. We can see this in construction, in healthcare, in passenger and cargo transport, in agriculture and the food industry, in energy (multi-scale smart grids), in the developments in global communication (the enormous development of the multi-scale WWW), in defence and in governance/management. It is justifiably a wide pattern (in Section II, I will elaborate in detail on this development in recursive perspective).

The step from modernity to plurimodernity does not constitute an improvement for all individual parties. Monopolists and those occupying crucial seats in the modern societal chains will have to surrender their exceptional positions eventually, along with any privileges those positions held. In a plurimodern society, privileges are assigned based on transparent competencies and merits, in open mutual comparisons. This, too, has already begun: the notary sector, real estate agents, medical specialists with their own practices, managers of housing corporations and upper school managers in education have either already partially lost their privileged positions (think of the intense salary discussions), or are starting to notice that their positions are being scrutinized. The result is a much broader societal acceptance.

What we essentially see is that we start with small scale, tightknit pluriform networks of the autarky, and then graciously utilize the scale and technology advantages of modernity. Initially, this was an excellent move: the white box in the centre top of the first five sector plates clearly presents the sizable advantages of modernity for construction, healthcare, passenger and cargo transport, and agriculture and the food industry. But the radical mentality of chains and the diminishing understanding of and for chain actors quickly led to a growing list of imposing disadvantages (see the grey box in the centre bottom of the first five sector plates). In a sense, the modernity is failing due to the results of its own successes. A progressing modernity leads to a societal split of increasing advantages and disadvantages, and society has to choose: either return to autarky, or progress towards plurimodernity: a new balance between social and physical networks on and between a variety of scales.

The blockchain as an example of plurimodern thinking and working

All in all, plurimodernity has to override a special paradox: how to combine the advantages of the autarky (trust, intimacy, togetherness, self-control, transparency) and the modernity

(control, scale, similarity, …), without encouraging their disadvantages (autarky: vulnerability, small scale, and modernity: cold, non-transparent, selfish)?

A recent development that tries to tackle the hybrid combination of autarkic trust and a supermodern scale size is the *Blockchain*[136]. This innovation has the signature transition from modernity to plurimodernity, because it tries to restore the notions of the autarky that we lost in the modernization process, namely transparency and trust, on supermodern scales. That makes the blockchain a typical candidate for the plurimodernity. I will elaborate on this.

In essence, a blockchain is a type of ledger that documents transactions. In modern systems, data is often reduced to administrative information (is that a tautology?). That on its own does not merit a lot of excitement. But ledgers clearly document and manage important relationships between actors, which is an important function in modern societies. Every modern activity has its own 'ledgers' (think of 'big data', a typical late-modern phenomenon).

Ledgers keep track of all the accounts in the ledger by documenting their changes. The ledger is therefore nothing more than a collection of transactions and the corresponding changes to the accounts.

The Blockchain (note the singular form) is now a ledger that deviates from traditional ledgers in three essential areas. First of all, there is only one, but it is very large (or perhaps a few), the scale is massive. Secondly, it is widely distributed over many computers in the hands of many actors. Thirdly, it features state-of-the-art cryptographic encryption, and is therefore hard to manipulate for third parties. These three factors, scale, distribution, and encryption, changed the game entirely. I will detail them below.

1: Scale. Previously, literally tens of thousands of ledgers were in use, but the 'The Blockchain' has the potential to leap towards the scale of humanity in one go. That puts it in league with the internet and energy networks (to which it is intrinsically linked).

2: Distribution. Traditionally, a ledger is controlled by a single party, which you will have to trust, because they can change the ledger illegally for their own gain, or utilize it for all kinds of controlling and manipulative purposes (for example, the government when steering inflation, or a fraud in a company who favours his own accounts). Getting rid of a central manager therefore has the advantage of no longer dealing with a central administrator (and therefore also possible frauds or manipulators). The blockchain technology distributes the ledger over many parties, which makes it highly resistant to fraud and manipulation. The integrity of one's bookkeeping no longer depends on the morality of a single ledger manager, but on the degree of distribution. You can no longer change the numbers on some computers, and if you can, it is very difficult. (The blockchain

[136] I thank Marco Witteveen for an enlightening discussion on this topic.

will never be fully fraud-proof, because anything made by people can be manipulated by people).

3: Encryption. The third factor is encryption. The ledger account cannot be changed, or looked into, by third parties. Only the partners of a transaction can view the details of the content. But transparency can generally be a powerful tool as well. In any case: encryption has made the traffic between computers relatively secure.

Blockchain technology gained its fame due to the *Bitcoin*: a form of electronic currency. But the blockchain can plurimodernize many different activities (because that is what the blockchain essentially does). For example, at the moment, there are experiments involving the documentation of purchase, warranty, and insurance forms (receipts) in the blockchain, so that buyers can safeguard their warranty and other rights, even after selling the product on, without having to keep a box of receipts. The origin of gemstones is also registered with the blockchain. This comes in handy for second-hand sales as well: the purchase and origin are registered in the blockchain and are no longer up for debate. That can be applied to all products, such as clothing.

Why is the blockchain an example of plurimodernizing, of the step *after* autarky and modernity, and of combining the strengths of autarky and modernity? Because the blockchain respects the perspectivist balance a bit better than the ledgers of the modernity.

I named the three foundations of societability in both the Methodological base and in this Section I. Actors are all **the same**, and that is precisely why we can understand and sympathize with each other. Actors are all **different**, and that is precisely why we can choose our own course and mean something to each other, complete one another. And actors are **one whole, together**, and that is precisely why we can achieve a quality and strength that is beyond the reach of individual, isolated actors. Plurimodernity searches for balance.

Now, these three foundations were properly balanced in the autarkic phase, albeit at a very small scale (groups of dozens of people). Members of autarkic groups were perfectly the same, different, and one whole, together.

In the modern phase, we can see that both pluriformity and similarity have experienced enormous leaps, pluriformity possibly even more so in the late-modern phase. The modernist production and management processes have a strong *one size fits all* character, and they include many, entirely different chain actors. All **the same** and all **different** in late modernity have grown enormously fast relative to the autarky. But that is exactly why the third dimension, the societal coherence, the unity, suffers in the late modernity. **We are no longer one whole**. That shows in the self-optimizing behaviour of actors, and crises of trust. The scandals are far too numerous to keep track of in our late-modern time, and that is caused by this specific late-modern imbalance.

We have become less balanced during the modernity. If we wish to find this balance again, we will have to find coherence, cooperation, mutuality, unity, and trust in all that diversity. We need to be able to trust that others also care about *our* interests, as was more common and transparent in a small autarkic group. And that on scales that were previously unheard of.

This is exactly where a blockchain can contribute, in principle. You could say that managed and controlled ledgers are not necessary in an autarkic, small-scale society. Everyone knows exactly what the transactions are, how they change, how people relate to each other, what they owe and how they rely on one another. Everyone knows each other in a small community, you work together and see each other every day, you can see and know that immediately. The ledger exists in some sense, but virtually, between the ears of everyone around the campfire.

Ledgers became very important in a modernist society as the number of transactions kept increasing and the parties started to spread out. You need to start keeping track of transactions and deals in central administrative systems with the corresponding institutions. It is not without reason that the administrative employee is *the* profession of the modernity, par excellence. But as the modernist tensions start chopping away at the root of the societal cohesion, the contract became more important than the person, and all trust in these central administrative systems and institutions was lost. We grant authority to a controlling agency, and then appoint more to audit those agencies. Enron affairs, Volkswagen affairs, credit crises, food scandals, the bankruptcy of political leaders and bankers, there is no end in sight and they are all phenomena that contribute to the decline of the already deteriorating trust. We are in a time of transition, we can all feel it in our bones.

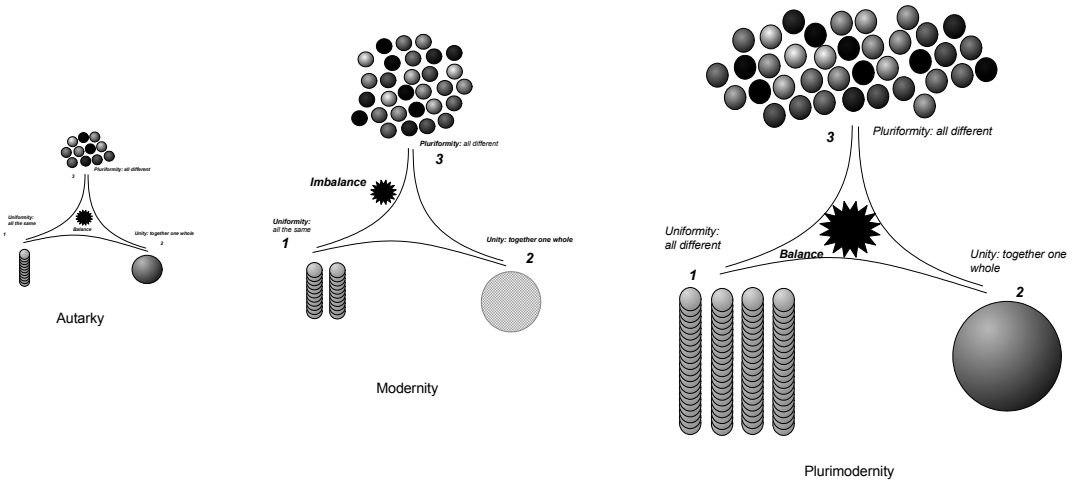
As the principle of the blockchain provides an alternative system of trust that operates on a very large scale, it could help to restore the balance between the three societal foundations, and on a much larger scale than people were used to in the autarky. People can no longer spend something twice of which there is only one (the *double spending* problem), and together we are responsible for the societal unity, coherence, and cooperation, without putting our trust in central administrators with a large, privileged status.

The blockchain might therefore help to restore the trust, the cohesion (an autarkic achievement), or perhaps substitution is a better description, in the sense of guaranteeing something else, and this on the large scales of the modernity and the huge scales and multi-scales of the plurimodernity. However, this does not come without a cost. Working with cryptographic encryption keys requires massive amounts of energy, and if this is not generated in a sustainable manner, the blockchain technology contributes to the climate problem (greenhouse effects). And if people use encrypted blocks for their transactions, benevolent auditors may not have access anymore (this is why Bitcoin was a popular currency for criminals, initially). Solutions will have to be put in place for these problems. That does not take away from the fact that blockchain technology is a typical plurimodern

approach. It will change a lot, and innovate, but blockchain-like approaches can be expected, in any precise form you can think of.

Plurimodernity restores balance

Restoring the three-fold societal balance on multiple societal scales, including the largest supermodern scales, that is the essence of plurimodernity (see figure).



The transition from modernity to plurimodernity is a matter of restoring the balance.

In the transition from the modern to the plurimodern phase, it is about the restoration of multiscalarity, coherence, cooperation, and mutuality. The blockchain can contribute to the restoration of the societal balance. Balance disruption (from autarky to modernity, especially the late modernity) and balance restoration can be seen in all societal sketches presented previously, that is the underlying societal pattern. This balance restoration negates the modernist tensions. In that sense, societal developments that are completely different in terms of content are structurally the same. A couple of examples of balance restorations are listed below:

- Construction: user orientation and BAAS (Building As A Service)
- Healthcare: the attention for the patient and his place in regular life.
- Passenger transport: the seamless linking of personal and public transport.
- Cargo transport: The IoT (internet of things), chips in packages and containers.
- Agriculture and food: origin transparency and metropolitan agriculture.
- Energy: *smart grids* (and a comparable but faster development in the world of the internet)
- Education: removing the massive education machines, a broader approach towards learning styles, and including the unique natures of students.
- Defence: the societal supportive deployment of armies.

- Politics, management, and leadership: distributed forms of subservient leadership.

As I am writing this, our journey reveals the *path of humanity* before us, with its ups and downs (as always, for anyone who watches broad and long enough). In Europe, at the exact moment I am writing this, discussions are flaring up surrounding Brexit (Great Britain's exit from the European Union, as decided by a referendum), and the refugee crisis. These are difficult matters. The journalist Arie Elshout concisely describes the fading of national borders in the refugee crisis in the main article on the front page: *"Europa splijt niet alleen, het gaat ook terug in de tijd.*[137]*" (EU-landen verwijten elkaar de chaos)*, which roughly translates to "Europe does not just crack, it also reverts back in time" (EU countries blame the chaos on each other), from *De Volkskrant*, February 26, 2016. That is a keen observation: apparently, we are not progressing, but backtracking along *the path of humanity*, because we surrender our coherence and cooperation. Nationalists pull out the national card with force. Those are political movements that possess a very modest plurimodern awareness, but national politicians often feel comfortable when only dealing with scales and borders on the level of a nation state. For professional national politicians, plurimodern scales translate to surrendering their 'own' sovereignty, both to larger and smaller scales. What we are witnessing here is the battle in the transition phase between nationalist modernity and a more plurimodern world, on the battlegrounds of European coherence and cooperation, and flows of refugees on the intercontinental scale.

The fact that we as humanity – if we carefully assign and connect the various scales – will only improve from plurimodernity, is an idea that has not yet taken root very deeply in national politicians and voters. It is not until *the path of humanity* becomes clear to us, that we can start to see the plurimodern consequences for what they are: direct contributions to prosperity and wellbeing for the coming generations. The *plurimodern transformation*, discussed previously, is a precondition for progression, but it is not an easy task. This book promotes the progression of this plurimodern transformation, in education and research, but especially in the integral societal practice.

This concludes Section I: The improvement path of humanity. It is now time for Theme II, The society in perspective, which includes a number of topics that further defines and places recursive perspectivism as an integral philosophy. I will put the above historical, qualitative story in a recursive perspectivist light. Then it will become clear that the development from autarky via modernity to plurimodernity comes down to more or less obeying the balance principles that can only be understood in terms of recursive perspective. Theme II will be followed by Section II: The perspectivist landscape.

[137] I can hear a similar observation as the one made by Thomas Thwaites, who tried to make his own toaster: he too reverted back in time due to downscaling and selfmanufacturing.

5

Theme II: Society in Perspective

5.1 The subject–object question in perspective

'Die Welt ist Vorstellung.'
Arthur Schopenhauer, *Hauptwerke Band I – Die Welt als Wille und Vorstellung*

'Modern man, seeking a middle position in the evaluation of sense impression and thought, can, following Plato, interpret the process of understanding nature as a correspondence, that is, a coming into congruence of pre-existing images of the human psyche with external objects and their behaviour. Modern man, of course, unlike Plato, looks on the pre-existent original images also as not invariable, but as relative to the development of a conscious point of view, so that the word "dialectic" which Plato is fond of using may be applied to the process of development of human knowledge.'
Wolfgang Pauli, *Writings on Physics and Philosophy* (1994)
16: 'Science and Western Thought' p. 142

The depiction of *the path of humanity* you read in Part 1 is the foundation of what is to come now: an interpretation of *the path of humanity* in terms of perspective, and a plea for us to consciously take this path together. As a consequence of the intensive interactions with a wide cross-section of the public described in the last section, you can expect a deeply rooted, familiar, and palpable narrative. The historical contours of *the path of humanity* and the examples I've worked out for various sectors of society will be something that many recognize.

However, the more I think and read about improving society and discuss it with others, the more I get the feeling that we don't really understand our society. Of course, this is partly due to its complexity, which is inevitable given the huge numbers of elements interacting with each other. However, I think that there is a much more fundamental hurdle standing in the way of a profound understanding of society than its complexity. It is the **subject–object question**: the notion that as individual people, we experience from inside (subjective) a world outside ourselves that we share (objective). I've already described it briefly in the methodology section, but it is such a strong component of the perspectivist basis of *the path of humanity* that I will go into it in much greater detail here. In a nutshell, in this section, the subject–object question will change from rigid and dual to flexible and spectral.

This requires some explanation, of course. In one of the very first paragraphs of this book, I wrote, 'The book calls on your will and your ability to look at our entire human development practically, theoretically, and philosophically.' In this part of the book, I call on your philosophical will and ability, and I will dive into the philosophical roots of recursive perspectivism.

One person looking at a painting of red, yellow, and blue shapes may think it's a masterpiece, while another will think the same painting does not even qualify as art. An

'objective' third person looking at the first two decides this is 'subjectivity'. Two people can actually experience a thing as two completely different things when, according to this third person, it is essentially the same thing. The degree to which we share a common worldview is then reduced. It can go so far that one father gives his daughter the best advice he can as she takes her first steps into sexuality, while another father murders his daughter after she's taken the same first steps, to restore the family's honour. The overlap is a very thin line – and almost absent.

5.1.1 Our society as an interaction of experiential worlds

This is all about context. Different people have different **experiential worlds**. As a first description, it will suffice for now to say that an experiential world is the part of our world that is actually experienced and felt, 'lived' if you will, by a person.[138] It is a combination of an environment and the thoughts, feelings, intentions, and actions of someone in it. Experiential worlds come in all sorts, sizes, and numbers. For example, think of the experiential world of an 18th-century farrier (a smith who makes horseshoes). Can you smell the dung, feel the hammer, see the sparks, and hear the horse snorting? Or take the experiential world of a Wall Street banker, the Netherlands' King Willem-Alexander, an average Western worker saving up a pension, a rice farmer, or the pilot of an unmanned drone dropping bombs on another continent. Each of us can only experience our own individual experiential world. There's little we can do to change that. Even if you immerse yourself in someone else's experiential world – one of the keys to a better world – it will of necessity be your *own* experience of *another person's* experiential world.[139] I am not an 18th-century farrier, and thus I can only superficially touch his experiential world. You can know everything about bats, for instance, but that won't allow you to experience what it is like to *be* a bat.[140] Nor can you have the exact same experiential world as your fellow man and woman, nor as groups that you interact with.

The vast majority of our late-modern individual experiential worlds remains unattainable for your own experience. The unattainable part is some seven billion other people's individual experiences, if we disregard your own. This inspires modesty, and it should keep people from extrapolating too much from their own experiential worlds and their own truths without knowing or caring much about those of others. It provides a lot of support to

[138] This is a preliminary dualistic mind–matter interpretation of the concept experiential world. It works superficially, but I'm not at all happy with it, out of deeper societal considerations that I will explain shortly. Further on I will therefore consider the concept of an experiential world as spectral (there are many kinds of experiential worlds on humanity's subject–object spectrum) and to deal with the complete spectrum, I'll explain it in recursive perspective.

[139] If everyone were to take that 'getting in another's shoes' to its extreme (which in practice is simply not possible), then we would all be exactly the same, and ultimately our entire society would fail, as I will discuss further in this book by way of a thought experiment. There is a societal limit to empathy.

[140] See also 'What is it like to be a bat?' by Thomas Nagel, *The Philosophical Review*, October 1974. He urges us to put consciousness at the centre, and criticizes the bleak world that goes along with a materialist world view.

the relativists in this world. It ought to definitively gag the rigid fundamentalists who revel in 'knowing' that they alone are right.

At the same time, however, we perceive that these experiential worlds, while sometimes extremely different, are all taking place on a single blue globe: our earth, spinning through our single universe (remember 'uni' means one). Isn't a relativistic worldview terribly wishy-washy, even a contradiction in terms (since what is that world if everything is relative?)? It gives ammunition back to the objectivists in this world, and unfortunately, also to the fundamentalists. After all, if there is just one world, and one universe, why not one truth as well? What are those noncommittal flaky relativists complaining about?

Thus both relativists and objectivists use the subject–object question to prove they are right. These people are incomplete human beings! (And even that gives them much too much credit.)[141] And the combination of trying to find a (single, universal, absolute, fixed) solution for the boundary between subject and object, such as in a mind–body dualism, or in the rivalries between the 'hard' and 'soft' sciences – could that give us a nice whole? For societies, of course, this doesn't work. A *flexible* approach to subject–object questions is an intrinsic aspect of and an essential condition for a societal aptitude and competence, and perhaps even its *central and defining phenomenon*. We have to treasure and value subject–object boundaries that shift, as well as improve our ability to explore and shift boundaries together, so that we improve as a society on every kind of scale. Societies develop along the perpetually shifting boundaries between the subjective and objective, the shared and particular. We must continually find appropriate ways to relate to each other as individual groups in coherence, and on different societal scales. Therefore, a hard and fast boundary between subjective and objective is not only *impossible* and societally *unfeasible*, it's actually downright *undesirable* since it makes it impossible for us to function as a society, and it certainly prevents us from developing flexibly as a society.

Within a pragmatic scope and use-by date, such as a particular discussion or a fixed societal order, hard and fast subject–object dualisms like fact–opinion, material world–thinking person, body–mind, rationality–feeling, and good–bad are fine as practical guidelines. In these cases, it helps to discover what you do and do not agree on. If you go beyond this scope or use-by date, however, these dualities can actually throw a spanner in the works of advancing societal development, leading to the progress stagnating at best, and in the worst case causing large-scale societal ills.

Every large step we take from now on along *the path of humanity* requires its own picture of society, and its own notions of subjective and objective. This is easiest to see on the very long time scale: rigid human-world dualisms used to be so valuable, boosting the scientific revolution enormously, but the farther we stride forwards and upwards along *the path of humanity*, the more they will obstruct our further societal progress. By now, the number of

[141] I'm rejecting another dualism; the question is essentially spectral. This will be explained presently.

parties acting in coherence is huge, and it will only increase. However, aren't we throwing the baby out with the bathwater if we get rid of these hard dualisms? What on earth could take their place? Aren't we trading in our modern world for a postmodern lack of commitment that only fragments us even more?

Considering the increasing number of parties and interactions, our late-modern society can therefore perhaps best (if rather radically) be conceived of as an interacting whole comprising different experiential worlds.[142]

This interpretation of society as interacting experiential worlds is actually not very remarkable at all. It has been widely accepted for some time among large sectors of the social sciences such as cultural anthropology.[143]

However, before the relativists among you break out the champagne and the materialists and positivists start ranting and foaming at the mouth, it's worthwhile to take a look at two societal singularities that this view inevitably brings to the stage.[144] The first is the notion of *individual experiential worlds*, and the second, *the shared world outside ourselves*.

By introducing experiential worlds, I do not at all acknowledge myself as a relativist. I even find it very hard to appreciate a far-reaching and individual relativism with regard to society. It's much too selfish, noncommittal, and vague for me. And I take the same position, but the other way round, with positivist materialism. It's too monolithic, dogmatic, and non-exploratory to apply to societies. I prefer to place our society neatly between these two extremes. I think that this remarkable intermediate position is partly due to my early training in both chemistry (the ultimate hard science) and as a knowledge analyst (the ultimate soft science). The chemist analyzes the material contents of a test tube (which are objectively and indisputably present in the test tube and can be experienced by everyone); the knowledge analyst constructs a picture of a human expert's expertise (that has arisen completely subjectively in a desolate and inimitable individual experiential process). If I learned one thing from this experience, it's that both the objective and the subjective (the material and the mental) positions have their strong and weak points. Also,

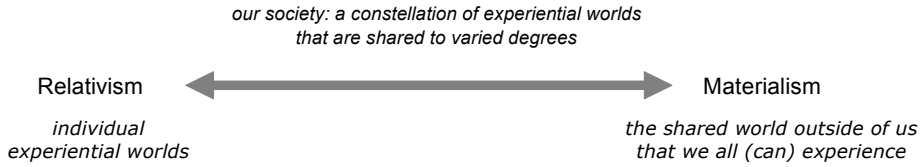
[142] Elsewhere (see Volumes 1 and 4 of this series), I've called this interpretation the *radical actor thesis*, since within recursive perspectivism (see further on), actors are the *bearers of experiential worlds*. Initially, I was sceptical about using the term 'experiential world', as I was unsure whether it would convey both the relativistic, subjective aspects and the material, objective aspects of this hybrid humans-and-world concept. However, I believe the reader will understand it covers all of these.

[143] See also various philosophers like Thomas Kuhn, Paul Feyerabend, and Jürgen Habermas. Bruno Latour also worked with it at the practical level. Peter Checkland's Soft System Methodology also uses this position as a basic principle.

[144] A singularity is a unique (singular) situation in which the normal properties of a phenomenon no longer apply. In a societal singularity, thus, the normal properties of a society are no longer there. It is miraculous how even the more physical and mathematical definitions of singularities apply to the two societal singularities explored here.

taken to their extremes, they virtually don't hold up with regard to society (perhaps a tiny bit, since they push the boundaries of the societal discourse, but more about that later).

I therefore reject *both* materialism/objectivism and relativism/subjectivism as images of society. Both are extreme positions, so-called limiting cases. To me, our society, in all its richness and variety, is right in between (see figure). Discussing the two singularities mentioned above will clarify this point.



Societal practice is located between the two outer limits

The first singularity is that of *the individual experiential worlds*. There are as many of them as there are people, which is about 7 billion right now. This notion is implied by the term 'different' in the concept of society as a system of experiential worlds (see above). Obviously, no experiential world (one set of experiences) is completely like another; many different experiential worlds exist within one societal practice. Since larger societal practices, in turn, consist of smaller societal practices, we can repeat this observation all the way down to its roots (a recursion to the smallest experiential worlds) until ultimately we come out at individual experiential worlds. A practical way for society to deal with this fact is to recognize situated individuals, since they are the bearers of individual experiential worlds and pursue situated improvement perspectives. Although we can go back even further to completely separate experiences, situated individuals usually have a good understanding of their experiences, since these are what make up their experiential worlds.[145]

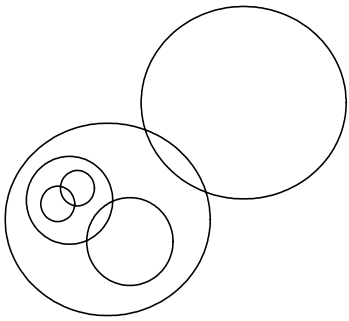
Individual experiential worlds essentially form a psychological notion. They are the foundations of relativism: the notion that *ultimately*, experiential worlds are personal, thus linked to individuals who experience things and have a consciousness.[146] Here, on this side of the spectrum of experiential worlds, are concepts such as *thinking* and an individual *self*, the individual human *identities* of you and me. This is where our self-images, our own unique identities, are rooted. Other people cannot touch them, and they cannot experience what we experience.

[145] Recursive perspectivism (more about that later) also gives every reason to do so. The unit of experience is a perspective, no matter its size.

[146] For the moment, I'll leave out mental problems such as dementia, schizophrenia, and Multiple Personality Disorder. For the sake of convenience, I'll even skip the fact that people can doubt, i.e. that an individual can weigh different experiential worlds before choosing to act or not.

The second singular point is that of *the shared world outside ourselves, around each of us*. This is implied by the term 'whole' in the concept of society presented earlier. Obviously, different experiential worlds may form one whole, in those cases that we can speak of one coherent societal practice. Because smaller societal practices, in turn, constitute larger societal practices, we can repeat this observation all the way up to its top (thus going exactly in the opposite direction as in the first singularity, a recursion to the largest whole). Through ever-more widely shared experiential worlds, we eventually end up at the ultimate shared single experiential world. A practical way to approach this is to call it 'the world, or the universe that we populate as individuals'. We can go further and postulate more 'universes', but societally speaking, they do not exist, since we cannot know them and our interaction with them is nonexistent (and if one should appear, then the new cluster would be the universe, as America became part of 'the world' for the Europeans at one point).

An ultimate shared experiential world is essentially a material notion. It is founded on the notion of objectivism: the notion that experiential worlds *ultimately* are shared, separate from individuals, and independent of a consciousness. They form an *environ-ment* (from Old French 'environ', surroundings) that we *popul-ate* (from Latin 'populus', people). Because why should you situate something that everyone experiences and what is perceptible for everyone separately within each of us?[147] This is the root of the concept of matter: the world outside us (as conscious people), the universe, the permanent possibility of sensory perception by everyone.



Experiential worlds are recursive: they consist of experiential worlds, and they, in turn, are parts of experiential worlds.

We thus have a smallest experiential world, namely each individual's particular inner experiential world, and a largest experiential world that we all share, namely our material

[147] It is interesting to note that dreams take place in space, while they also take place in the dreamer's experience. This indicates that space is principally just a subjective experience, similar to thoughts. They have a single basis, which is an essentially Spinozan concept.

universe.[148] With all sorts of experiential worlds in between, since experiential worlds are recursive. Playing and tumbling around on a spectrum of both increasingly smaller and larger experiential worlds, we find at the outer ends the familiar dualist picture of the thinking individual in the shared material world: the well-known mind–body or mind–matter worldview. However, it is crucial to remember that we have derived this duality from a concept of society that only postulates the existence of different experiential worlds on different scales. All in all, the resulting 'human–world' picture of society covers only the two extremes, the two outer limits of a theoretically recursive spectrum of societal experiential worlds (see the figure above). These two extremes involve societal singularities, borderline cases, and they are therefore especially incapable of carrying a useful picture of society. This is even more so in our late-modern society, which is bursting with actors and experiential worlds. A fleeting first glance at *the path of humanity* already shows that the number of actors and experiential worlds only increases, thus making mind–body dualism less and less appropriate, societally speaking. By contrast, the intermediate societal area between all these experiential worlds on all these scales is richer and more complete (another limit).

Societal experiential worlds are not some vague reflection of a single objective, material, or rational truth (an originally Platonic interpretation, like the metaphor of the cave, which concretely is still at the foundations of much of our modern concept of natural science). This last interpretation gives primacy to objectivity, i.e. to the right end of the spectrum. It fits in well with the analytical chemist studying matter, who – in the words of Sir Isaac Newton – thinks he or she is reading the book of nature. Of course the chemist is not literally reading anything, but in essence is trying to create an experiential world that in principle is transmissible and repeatable for everyone.[149]

Neither are societal experiential worlds necessarily based on the subjective ideas of individuals (a social-psychological interpretation). This interpretation gives primacy to subjectivity; it's suited to the knowledge analyst or psychologist who thinks they are revealing an individual's private inner world. Of course the analyst/psychologist is not

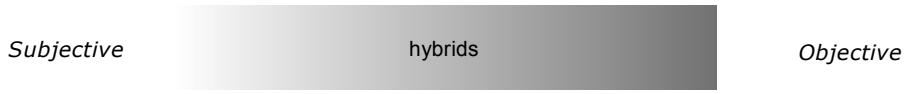
[148] This reasoning is of course highly inspired by the antinomies of Immanuel Kant, described in his *Critique of Pure Reason*, even though I cannot claim to fully understand his work. A fifth antinomy could be postulated, with the thesis that all experience is mental, subjective, and personal, and with the antithesis that all experience is material and objective. The reasoning above shows that both theses involve the result of extreme reasoning on a societal spectrum, in a different direction. The mind shuts down and one arrives at these two mutually inconsistent outcomes. It is slightly bizarre that the result of this procedure is a dual mind–matter world view that is found to be common sense. Thankfully, Einstein saw common sense for what it was: 'the collection of prejudices acquired by age eighteen'. I would call it 'acquired pre-ontology' (another contradiction in terms).

[149] The term "measurement error" by itself indicates that this is possible in practical terms, but theoretically speaking is a lost cause. I remember measuring fluoride levels near the limit of detection, and the entire time I was reminded of share-market prices when I saw the remarkably regular noise patterns in the recorder lines. There had to be a deep relationship behind this! As I know now, it's a question of perspective.

revealing anything, but is essentially trying to form an experiential world that can be articulated, or at least understood, from another person's particular experiential world.

Societal experiential worlds exist on all kinds of scales. At the two ends of the recursive spectrum are the unique identities that are individual people, and the material world surrounding all of them. Societal experiential worlds are not bad representations of an objective reality or an overlapping collection of individual experiences, but hold their own. They are the practical, dynamic, adaptive entities with which actors try to create value on all kinds of scales, from a single person isolated in their environment to all of humanity in its – our – world, again and again in a confused, changing, and increasingly complex society. And experiential worlds continually adapt as they search for value. Considered this way, changing experiential worlds are also the mechanisms that help to shape a societal development, whether positive or negative.

The result is a concept of society that radically consists of experiential worlds on every scale. Thus, experiential worlds are neither subjective nor objective. That only holds true for the absolute outer ends of the spectrum. Experiential worlds can be anywhere on the subject–object spectrum. By far the most experiential worlds have a hybrid subject–object character, in the sense that they are real for those who experience them (looking from left to right, see the figure below), and subjective for the outside world, i.e. those who do not experience them (looking from right to left). I used to deliver newspapers in a neighbourhood where later on, a statue of the Virgin Mary was said to weep. This was true for the believers, and false for everyone else. Only the two singular points are not hybrid: at the extreme right, you can't look any further to the right (thus, there is no room for subjectivity, ergo it is objective; material), and at the extreme left you can't look any further to the left (thus, there is no room for objectivity, ergo it is subjective).



Hybrid variants of subjective and objective

Experiential worlds can shift: facts can gradually become opinions, if they are accepted by fewer and fewer people (a shift to the left). Knowledge can even become matter, if the ideas are accepted by more and more people (a shift to the right). It wasn't so long ago that elements in the periodic system of chemical elements were only suspected to exist by a few brave alchemists, and this ultimately resulted in the ideas that cohered among the developers of the periodic system of the elements. The boundary between subject and object is continually being reset out of pragmatic considerations, and moved between the different experiential worlds on the various applicable scales.

Are you surprised by this view that absolute subjectivity and absolute objectivity are only unattainable limiting cases? I understand completely.[150] Yet if we listen to experience, it is the most pragmatic solution. If history has taught us one thing (and it has, again and again) it is that what at first was the opinion of one eccentric later becomes an objective scientific fact, *and vice versa*. I'm not talking about trivial things: this is exactly how we went from knowing the Earth was at the centre of the universe, guided by Ptolemy and Aristotle to replacing the central Earth with the Sun (quite a heart transplant!), following in the footsteps of Copernicus, Kepler, and Brahe, and more recently, guided by Einstein and his theory of relativity, we've bowled the Sun out of its central position. Around 1900, many physicists thought that physics had more or less sorted everything out, but Einstein had other ideas during his 'wonder year' 1905. This can happen at any age, in any place, or on any scale. Who can say whether we will still rely on the periodic system of the elements in 500 years, or if the elementary particles of physics will still exist as objective entities? We only realize just how provisional or limited most 'facts' are much later on, or if you can see many parts of the world today. Both facts *and* opinions are situated in time and space, which makes you wonder if there is still any *universal* difference between them. Even the conventional idea of the world as a material earth revolving around the sun (matter), populated by thinking people (mind), disappears completely on the temporal and spatial scale of our universe.[151]

Things like weeping statues of the Virgin Mary, executions of 16-year-old murderers, the problems the first natural scientists had with the Church, religious disputes, political debates, the increasing tensions in many places between field-crop and livestock farmers, and arguments about whether or not human activity causes climate change or whether or not tobacco causes cancer make it crystal clear that – societally speaking – there are no absolute universal subject–object dualities. They certainly have their practical value, but they also carry a lot of extremely vague fine print regarding applicability, side effects, and expiry dates. They are firmly posited, but they're like some of the building piles in the west of the Netherlands: driven into soft mud by accident instead of solid ground, their carrying power both overestimated and unknown (an annoying situation!). In the case of absolute dualities, simply driving piles deeper is not a solution: the concept of an absolute solid

[150] Most people have a firmly held dual mind–matter world view, and so everything in between mind and matter (our society) is a little unclear for them. Recursive perspectivism is based on experiencing perspectives, and comes to the conclusion that the ends of the spectrum, the home bases of the absolute notions of mind and matter and the foundations of dualism, are transcendental. 'Transcendental' means beyond human experience, or transcending consciousness. All the positions between these two transcendental extremes, however, are immanent (inherent in humanity; accessible to experience; remaining within consciousness). This turn-about will certainly surprise the hardened dualists, but ironically, this is precisely how a much more workable concept of society arises.

[151] Recursive perspectivism implies that all notions, including time and space, are only guidelines that emerge from recursive tissues of perspective. See Volume I of this series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation), section on 'Tijd en ruimte' (Time and Space), and the chapter 'De frontier van het ervaren' (the frontiers of experience).

underground is an unattainable limiting case. This shouldn't stop people from building, though: floating and suspended construction is possible, even in soft mud, as long as you keep a pragmatic eye on capacity limits.

The subject–object question is on the one hand a formidable societal hurdle; you cannot understand the whole of society, since by definition you cannot experience *other people's subjective sides*. On the other hand, the subject–object question actually gives us a societal reference point, societal structure, since the *objective side* is experienced by all those involved. Unfortunately, this reference point is not universal, since every duality has its own unclear boundary marker, uncertain expiry date, and shaky applicability. And as we have seen earlier, boundaries can shift.

Every form of fundamentalism therefore invariably leads to stagnation and societal conflicts sooner or later. This is precisely because ultimately everything changes, and therefore fundamentalism has to give way, something it abhors by nature. A convincing fundamentalism is an insurmountable obstacle to our fascinating journey further along *the path of humanity*; it will nail our feet to the road. And, in an inverse reasoning, every convincing relativism needs order and objectivity since otherwise it will sooner or later lead to societal randomness, lack of direction, and fragmentation, which will throw us further back on our journey on *the path of humanity*.

If we want to progress on *the path of humanity*, we should let fundamentalism and relativism in their absolute forms be as they are.[152] Recursive perspectivism, the notion of experiential worlds, and the dynamic multi-actor mentality based on it will generate value in the long term. This holds true on all societal scales, from a family to the United Nations assembly hall, as well as in philosophy, science, religion, and politics.

5.1.2 Societal tensions

A concept of society that acknowledges that there are many flexible experiential worlds is societally speaking both much more practical and more accurate than a dualistic human-world view based on a rigid mind–matter dualism. It allows for more colours and more shades of meaning, and can give our late-modern society the air and elbow room to take the additional steps to improvement that we want and need to take along *the path of humanity*. I will make a case for it again in this book as I have in my previous books.[153]

The cracks and tears appearing increasingly in rigid dualist people-and-world concepts as society develops further along *the path of humanity* are a central theme of this book and this *Society in perspective* series. Absolute and universal subject–object dualisms, such as

[152] I too am continually adapting my ideas, with the aim of making them work better.

[153] See also the other volumes of the Society in Perspective series, in particular Volume I, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation A Philosophy of Societal Practice in preparation), and Volume IV, published in Dutch as *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation.

humankind and world, mind and matter, fact and opinion, good and bad, validated knowledge and superstitious nonsense, no longer offer a workable plan for further developing our society. In addition, the more our society increases in complexity and coherence, the more inappropriate any plan based on them becomes.

Our current process of fragmentation as a society, because we are closing ourselves off from each other, chasing our own goals and fleeing into postmodern relativity, is a symptom of the late-modern phase we are in, and it is the writing on the wall. We can no longer take in all of our societal practices, which are literally larger than (anyone's) life. Whether it's unreliable food supplies, subprime mortgages, construction-industry fraud, money-grubbing accountants, vote-hungry politicians, or plastic soup in our oceans, all the major problems and scandals of our age always involve self-serving actors walking over other actors, either because they see an opportunity or do not see the problem – or often both. The healthy societal practices around us in which the parties do recognize and respect each other can give us a great deal of hope, but the warning signs are unmistakable, and the creaking of our societal practices is getting louder and louder. This is happening simply because these problems have started to outpace human comprehension.

Human-world dualisms may have been practical for hunter-gatherers; small bands of 10-30 individuals sharing a single environment. The description 'human–world' alone implies a dualism – it's almost a tautology. Remember the early hominids, whose first stone-tool designs remained virtually unchanged for hundreds of thousands of years, and whose somewhat more sophisticated hand axes lasted tens of thousands of years. Today a generation of smartphones lasts a couple of years before they're outmoded. Or take a family in a stable residential environment, like the one many of us grew up in. For children, the dwelling they share with brothers, sisters, and parents is just one large 'given', an environment where the letterbox is always next to the front door and the bathroom is on the upstairs landing next to the bedroom. A manageable number of members (the number of different individual viewpoints) and the dominant presence of the shared living environment are two practical frameworks in which the family lives its life.

In our age, however, the experiential worlds of the hunter-gatherers are no longer adequate to meet our societal needs. Our late-modern societies are filled to bursting with group actors, whose respective members by now are exposed to *almost totally differing environments and experiences*. The shared practical frameworks are becoming terribly thin. Actors keep entering into new and different forms of both competition and cooperation, on unprecedentedly large scales of coherence (such as our global production and consumption systems). What does a Wall Street banker have in common with an organic farmer in Holland's Flevopolder or a savings-account holder in Amsterdam? What does a politician in the bubble of The Hague share with an old man whose lungs are diseased from a lifetime of working in the coal mines of South Limburg? What does a miner in Africa share with a smartphone user in New York? Nevertheless, we are still increasingly connected societally and condemned to be with each other. It's not so odd that under these conditions, large coherent multi-actor societal practices such as healthcare, finance, education, food

production, energy, the environment, and in fact our entire production-consumption systems and all of our administration are increasingly showing their cracks. They are in danger of imploding under the weight of accumulated self-interest and now-bloated mechanisms for passing the buck to other actors (again, just look at the financial crises, climate-change issues and plastic soup in our oceans). It is both ironic and logical that our shared living environment (our planet) and our shared transaction system (our global economic and financial systems) are increasingly bearing the burden. This argues for more interest in a genuine shared experiential world on the largest of scales. If we all become different, then what can we be together, and who will take care of these largest scales? Or, to turn it radically around: why should we ignore the accomplishments of even this highest degree of organization?

It is in everyone's interest that we learn to better recognize the causes of these societal threats for what they are, namely societally undesirable constellations – configurations of greatly differing experiential worlds, which by now no one can either see or control any longer. These constellations form spontaneously and without any guidance from above along flexible subject–object boundaries at many levels of scale. That actors, as bearers of experiential worlds, have to seek each other out in new societal constellations is a timeless phenomenon, as *the path of humanity* so clearly shows us. Hunter-gatherers live with each other differently from the early agriculturalists, inhabitants of city-states, and those of modern states. In this era, we are simply facing a new, challenging step along *the path of humanity*.

The main things steadily increasing along *the path of humanity* are the scale of our society as a whole, the number of distinct experiential worlds that comprise it, and the differences between these experiential worlds. All three have risen to historically high levels. This latter observation is just what makes it possible to identify and address the particular challenges of the next steps we take along *the path of humanity*. It comes down to recognizing, understanding together (in coherence), and collectively changing societal practices as constellations of experiential worlds. This will require new experiential worlds on unprecedented scales. We will be given practical support by two central concepts: ***perspectives*** and ***perspectivist actors***, which I will now explain.

5.1.3 Recursive perspectivism and the radical actor thesis

'If one chooses an act of bravery, then one must combine bravery with caution, and this in turn with dialogue.'
W. van den Heuvell, *Neerlands roem, Historisch-romantische episoden uit den tachtigjarigen oorlog*, 1841

If we want to cultivate a better understanding of *the path of humanity*, then we will have to make the subject–object question manageable in practice and workable as an instrument. We can do so by using it as a marker for current experiential worlds and as a tool to push the boundaries of changing experiential worlds. This will require us to trade in the rigid, 'clear' and 'true' boundaries and citadels of our being right for openness, interest, curiosity, engagement, flexibility, and gradualness.[154] Using the subject–object question flexibly in a dynamic relationship with experiential worlds on every scale is precisely what opens up a world of additional opportunities for societal improvement. As *the path of humanity* shows us, this mechanism is at the core of human societal development, even though so far the majority of us experience it as happening to us instead of using it consciously and instrumentally.

Societal practices can very easily be thought of as constellations of experiential worlds on different scales. I've already explained that this interpretation sets a pragmatic course between the Scylla of an aimless, fragmenting relativism and the Charybdis of a rigid, dogmatic objectivism. For us to deal with experiential worlds professionally and instrumentally, they must have manageable forms. Precisely to this end, this series of books introduces a deeply philosophic yet at the same time extremely practical look at – or rather interpretation of – our society: **recursive perspectivism**.[155] Its raison d'être is strictly pragmatic: it is useful; I've been developing it more and more since 1990 because it helps me to understand how to improve things. It works. I will use it in this book to analyze the path of humanity and to depict it as a developing system of experiential worlds.

The central idea of recursive perspectivism is, unsurprisingly, perspective. Perspective is an experiential phenomenon, a pragmatic concept of change that functions as the building block of experiential worlds. This building block is recursive, meaning that perspectives are built from smaller-scale perspectives, and they, in turn, form other perspectives on larger

[154] Many socially engaged people have identified exploring others' standpoints as policy spearheads.
[155] Recursive perspectivism and its corollary, the perspectivist multi-actor approach, have two quite different bases: on the one hand, American pragmatism (see philosophers Charles Peirce, William James, Richard Rorty and others), and on the other, European (intentional) phenomenology, as seen in the works of Duns Scotus, Franz Brentano, Edmund Husserl, and Martin Heidegger. Very briefly, perspectives make up intentional phenomena, whose value becomes apparent in the practice of life (societal practice). Conversely, life (and thus our society) consists of experiencing recursive networks of perspective. Actors are emergent experiential spheres (experiential worlds) in the networks of perspective. See also Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation).

scales.[156] For example, Lego pieces can be put together to function as new pieces on even larger scales, and these larger pieces can be taken apart to reduce them to their smaller components. If an experiential world changes, then the recursive fabric of perspective making up this experiential world changes in essence. When the first building block emerges, the experiential world starts to exist, and when the last building block disappears, then the experiential world in question ceases to exist. For example, look at how ICT (information and communication technology) arose as a discipline and a sector in the second half of the 20th century, and how the hand-axe makers disappeared thousands of years ago.

For perspective to function as a building block in the entire societal subject–object spectrum, with all the hybrid forms in between the two extremes, we must design it carefully. Recursive perspective has to be truly and enormously versatile and flexible. In practice it must be able to express both facts and opinions, mental thoughts and material objects, incorrect and correct pronouncements, good and bad things, short and long episodes, truths and lies, small and large things, and simple and complex theories – in short, all kinds of dualities (and many, many more). In addition, it must be able to express combinations of them. Recursive perspective must even be capable of grasping and explaining the core of both temporal and spatial phenomena, two forms of contemplation usually considered a priori (already present before they are experienced).[157]

At the same time, recursive perspectivism always sees these dualities as the extremes, or the increasingly approachable but ultimately unreachable limiting cases of a spectrum (see 5.1.1). Recursive perspectivism is antidualistic. Dualisms only give us unreachable anchor points of pragmatic guidelines that help us experience and develop our society. In particular, the building block of experiential worlds must therefore be capable of expressing the whole world of hybrid intermediate positions on all these spectra using recursive perspective. It must also allow us to move along these spectra, for instance by allowing something first experienced as an opinion to become a fact, and go back again. How else could we change theories in e.g. the natural sciences?[158]

The above can easily be summarized. In essence, recursive perspective must make up everything that can be experienced. This is of course a tough design specification, but that's just the way it is. If you intend to assume the status of the recursive, flexible, and dynamic

[156] Recursive: self-repeating, at different levels as well. Related notions are systemic, fractal, self-contained, and multiscale.

[157] See also Kant's *Critique of Pure Reason*. Kant really had me thinking, but I do not agree with him that time and space are there *a priori*. They also emerge in fabrics of perspective. In recursive perspective, spatial experience entails that in principle, everyone can go to a given familiar place in a shared fabric of perspective, while this is impossible in the event of a temporal experience. I will come back to this in the 'Copernican reversals' section.

[158] Another example is the exchanges about paradigms between Thomas Kuhn and Imre Lakatos, the latter also a mediator between Karl Popper and Thomas Kuhn.

building block of experiential worlds, thus of all of what can be experienced, then 'noblesse oblige' applies.

As chance would have it, experiencing is all there is. By this I don't just mean 'empirical experience' such as seeing or touching a stone wall, hearing a voice, or perceiving the universe when you look at the stars, or the repetition of experience that results in the intuitive notion of 'having experience'. It includes all of these things, but I really mean *all possible experience*, thus also one single experience, or experiencing a feeling, say, of sadness or the longing to be with your kids. This broad interpretation of experience, which is the foundation of the notion of experiential worlds, also covers devising a theory or a thought experiment. There is only experiencing in this broad sense. What cannot be thought, done, felt, seen, resolved, anticipated, supposed, and so on does not exist, phenomenologically and pragmatically speaking.

There is only experience, and outside it there is nothing, in pragmatic terms. The best we can do as humanity, therefore, is to express one experience with another. It will help enormously if we opt for an experiential building block that on the one hand is as simple as possible, and on the other hand can express as rich a variety of experiences as possible (the spectra spanned by the dualities above only give us a taste of this diversity). A conventional way of expressing this kind of dilemma is that we want to name the recognizable structure and put it in a library containing the extremely rich variety of concrete experience. We have many of these kinds of dilemmas, and we adore them. A limited number of musical notes can be used to clarify the structure of a huge and diverse range of music, and these notes help us to compose and make music. Similarly, a limited number of letters can be used to explain the structure of a huge range of written texts, and help us to read and write. We use a limited number of elements to comprehend the structure of a huge diversity of chemical substances, as well as to analyze and synthesize them. We use a limited number of basic colours to make an enormous variety of paintings and to beautify other things, and these basic colours help us to mix and name other colours. We use a limited number of units to structure the field of physics (the SI system, more widely known as the International System of Units), and the list goes on and on. This process always involves using as few as possible building blocks to designate a wide range of phenomena. Einstein, a master of abstraction, put this strategy neatly with his famous statement 'A theory should be as simple as possible. But not simpler.'

Perspective arises from a split between structure and content. And the distinction and use of this division is a central idea of this book and of this Society in Perspective series. The concrete domain we are aiming for is the largest possible: our societal practices. In principle, of course, this domain encompasses all the divisions just mentioned, although this does not automatically give it the same disciplinary advantages (concrete and otherwise). At the same time, it makes the ultimate abstraction: there is only one element, that is, one building block that is used to clarify the structure of all these societal practices. That is perspective (including recursive perspective). I use an extremely minimal structure:

recursive perspective, to characterize an enormous library of diverse content: our societal practices.

By now you will no longer be surprised to know that I also conceive of experiential worlds and societal practices as recursive. An educational system consists of, among other things, different educational programmes, which in turn consist of consortia of schools, which in turn consist of individual schools, which in turn consist of classes. All of them are forms of societal practices.

How can perspective fulfil a role that creates so much structure? After all, this is quite a lot of abstraction, and if we want to be able to use the results to better understand *the path of humanity*, they need to be understandable. The crux involves two things: the internal structure of a perspective, and its recursive nature.

First of all, the internal structure. Every perspective consists of three connected components:[159] a *starting* situation, a *process of change*, and a *resulting* situation.[160] This puts a minimal but fitting structure before us that can be loaded with content on all levels of scale.

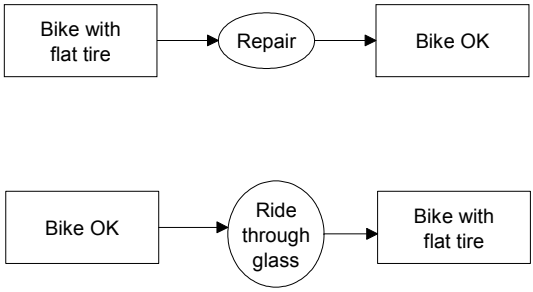
Precisely because of this triptych, a concretely charged perspective can represent *value*, in any form, since the resulting situation can be perceived as better or worse than the initial situation. Perspective without value is not interesting. Think of how you can turn away from an unpleasant image (*starting situation* repulsive image; *change process* you turn around; *resulting situation* another image). Think of the process of fixing a flat bike tyre (*starting situation* bike with flat tyre; *change process* patch the tyre; *resulting situation* bike in order again).

Perspectives belong to actors. Actors are agents that can redeem this value, in whatever form it takes, by connecting the change to the starting situation and thus to bring about the resulting situation. Below is an example of an improvement perspective and a deterioration perspective at relatively small scales.

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[159] See also my dissertation, as well as Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation), and Volume IV, published in Dutch as *Multi-actor procesmanagement in theorie en praktijk* (English translation *Multi-actor Process Management in Theory and Practice* in preparation).

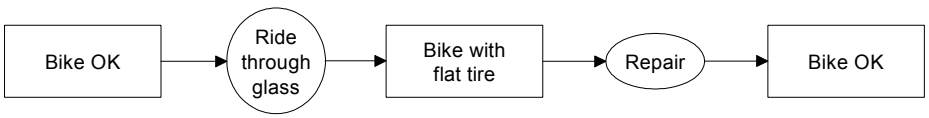
[160] At this point you may be thinking, 'wait, this is inconsistent – perspective is nothing more than a dualism of situations and changes!' But recursive perspectivism is emphatically not an absolute dualism. First of all, it is not even a dualism: perspectives constitute a triplet; the starting and ending situations are distinct from each other, and connected by means of the process. Perspectives are also connected between themselves. This is necessary in order to express things getting worse and getting better, in other words value. Second, and more relevantly, situations and processes are emphatically not absolute notions. Perspectives consist of perspectives, and also constitute perspectives, like Lego pieces: it is a recursive notion. This means that situations consist partly of changes, and changes consist partly of situations, on other scale levels. This is what makes recursive perspectivism a flexible and gradual value carrier – exactly the combination we were looking for. See also the chapter on 'Situations and Changes' in *A Philosophy of Societal Practice* (English translation of *Een filosofie van de maatschappelijke praktijk*, in preparation).



An improvement perspective and a deterioration perspective

If you're seeking improvement perspectives and avoiding deterioration perspectives, then you will treat value with care. The more valuable and thus the more important a perspective is, the more it is situated in the centre of experience, and the better it 'takes' (a form of learning in terms of perspective).

Then there's the recursive character (the Lego nature) of perspective. It is impossible to experience a single perspective in isolation. There is always an internal and/or external context that provides additional meaning, and usually it is huge. I'll give a couple of very simple examples. If a cake falls from the counter and none of the people present loves chocolate cake, then it is very important what kind of cake it is (the internal context has an effect on the external context; everything is linked and cross-linked perspective). If someone riding his bike to murder someone gets a flat tyre on the way, it will be an improvement perspective for the intended victim, and quickly patching the tyre will increase the improvement for the murderer and the danger for the victim. This context can also be completely explained in terms of perspective. Adding *recursive* to perspective emphasizes the fact that perspectives link themselves into networks, and that they also do so at various levels of abstraction. For example, the process of patching a bike tyre consists of an internal, partly parallel network of constituent perspectives (find tools, fill bucket with water, turn bike upside down, remove tyre, etc., all of which can be formulated as triplets of starting situation, change process, and resulting situation). At the primary level, encompassing all of these, the bike with a flat tyre is changed to a functional bike. Or imagine one afternoon a mother is wondering where her daughter is, and then hears to her relief that the child went to a friend's house after school (worried mother; hears news of whereabouts of child; relieved mother).



Linked perspectives

In this way, the entire experiential world of a cycle-racing team, a mother, a basketball team, a political party, or the Western human being can be seen as a recursive network of

perspective. In this way, recursive perspective forms the substrate, or the building material that experiential worlds are made of. It passes through (or rather in between) the supposedly well-defined boundaries between mind and matter, time and space, fact and opinion, and any other dualities you care to name.

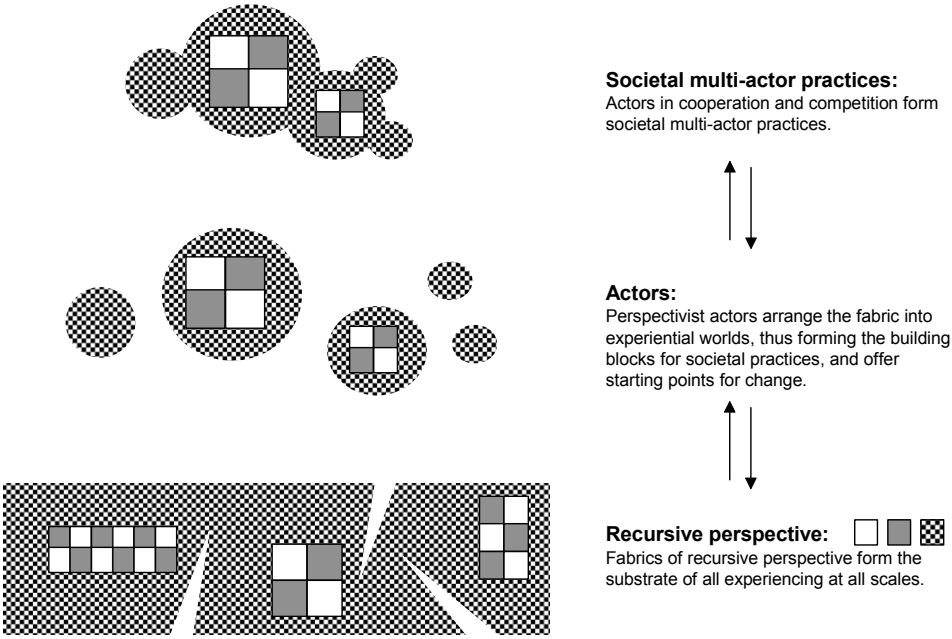
Since societal practices consist of experiential worlds, the same perspectivist recursivity holds true *mutatis mutandis* for all kinds of forms of societal practices on every scale. Take the course of the Second World War, or our production-consumption chains, or at the largest human scale of all, the entire *path of humanity*. Speaking on the level of societies, this results in enormous recursive networks, vast recursive fabrics of perspective that usually contain many different experiential worlds, on different scales. The meaning (the value) of a perspective is normally determined by either the internal composition of this perspective (like the chocolate cake), or the perspectivist context of this perspective (the cycling murderer getting a flat tyre), or (almost always) by both.

It is therefore helpful to organize perspective into ***actors***. Actors can be thought of as the hosts of experiential worlds. Take a particular baker, or all French bakers, or Republicans in the United States. Experiential worlds are partial or smaller networks of perspective, hosted by the actors who make up a societal practice.[161] These perspectivist actors, who found the experiential worlds, participate in societal *multi-actor practices* in all kinds of ways. Since actors consist of recursive perspective, and societal practices consist of actors, societal practices, in turn, consist of recursive perspective (a transitive relationship).

In this way, recursive perspectivism thus leads to a flexible and dynamic image of society that is completely made up of perspectivist actors.[162] The coherent result is an extremely simple three-layered view of society in which actors arise from fabrics of perspective, and societal practices from constellations of actors (see figure).

[161] If you think deeply about the relationship between actors and experiential worlds, you'll come to the conclusion that they ultimately must be equivalent. Kuhn was accused by his dualistic opponents of confusing scientific paradigms with the researchers who used them. I personally do not think this is the case. Practically speaking, you can say that a scientist is the bearer of a paradigm, but you automatically run into the boundary (unacknowledged by most people) where the bearer ends and the paradigm begins. In any case, they are mutually implied; certainly for the actors themselves, their experiential worlds are barely distinguishable from their actorship. They are distinguishable, however, for someone viewing an actor, since the viewer sees something different from what the viewed actor sees. Remember Nagel's bat: you can know everything there is to know about bats, but not what it feels like to be one.

[162] In the recursive-perspectivist conception of society, societal practices vary incrementally (by at least one perspective at a time) and there is no observer-dependent society. Notice how the relationship between a perspectivist concept of society and a dual human-and-world (mind-and-matter) concept of society is congruent with the relationship between quantum mechanics and classical mechanics. In quantum theory, physical quantities vary incrementally (by one quantum at a time) and there is no observer-independent reality.



A three-layered vision of society

Recursive perspectivism rejects the claim that either mind or matter (or a combination of the two) can provide an a priori foundation for a productive concept of society, and in fact, it rejects any claim coming out of any absolute and universal dualism.[163] Mind and matter are only the unattainable outer edges of a philosophical subject–object spectrum. Although these limits explain why we think that there is a single universe, and why we think that we lead our own unique lives in it as thinking and feeling individuals, they are inadequate as foundations of a complex and rich concept of society, or as aids in our conscious endeavours to improve society (both devising and actualizing ideas). They cannot handle the dynamism and range of colours of societal developments along shifting subject–object boundaries, within constellations of experiential worlds.

Recursive perspectivism and the ***multi-actor concept of society*** based on it are in turn the basis of a deeper understanding of *the path of humanity*. I am anything but an adept of societal 'makeability', and I respect and am awed by the staggering complexity of the whole of our societal experiential world.[164] However, an actor-driven approach, i.e. multi-actor process management, certainly enables us to better study and understand our societal

[163] Antidualism is a common theme within the philosophical school of pragmatism. I also like to tackle rigid dualisms, but I'd rather use Heidegger's hammer than Thor's. Recursive perspectivism has both pragmatic and phenomenological foundations.

[164] Societal makeability: the position that societal practices, like bridges or houses, can be simply and linearly designed and brought about.

practices by placing them in recursive perspective.[165] We can still take many, many steps from here. Doing so will make it possible to develop more appropriate societal practices on an increasingly large scale together, and adapt them as we go, instead of being passively subjected to them as if they were autonomous changing biotopes in which we lead our individual lives. In this way, we do the best we can to place our societal practices in improvement perspective.

The figure above makes it clear that actors are the link with which we distinguish understandable societal practices (the *top*) in complex weaves of recursive perspective (the *base*): they are a crucial *middle layer*. This is expressed with the ***radical actor thesis***, which states:

> *If we want to be able to understand, discuss, improve, or deal in any other way with societal practices together, then the best way to do it is radically, in terms of interacting perspectivist actors.*

What is radical is thus not the *actors*, but the *idea* that societal practices consist of perspectivist actors, and *only* of perspectivist actors, as hosts, managers, and intentional changers of experiential worlds. *Preconceived* (a priori) dual mind–matter or fact–opinion notions are unnecessary, and they can even be obstacles to change. Cooperation between actors as adaptive recursive-perspectivist experiential worlds, and allowing them to act from within these experiential worlds are enough.

Cooperation and competition between actors, the two primal forces of a society, both occur near the boundaries between objective (the shared value created, or perhaps disputed) and subjective (the various standpoints). It is these very boundaries that help us to designate actors as clusters, as partial fabrics, and as webs of recursive perspective.

Recursive perspectivism has both pragmatic and phenomenological roots. It does not offer ready-made predetermined solutions to the subject–object question. It unmasks the insoluble tension between absolute notions of subjectivity and objectivity, inherent in rigid dualisms, as a non-problem. It's also an absurd idea to strive to solve this tension: we're supposed to be walking, but our feet are fixed to the ground by rigid dualisms. It does, however, allow for a flexible and pragmatic societal relationship with the subject–object question, since it supports our interacting consciously with shifting subject–object boundaries. It breaks open the often-misunderstood area in between, which is exactly where it finds the enormous range of colour, as well as the flexibility and power of the many possible positions between what turn out to be two pitfalls when we talk about society: on the one hand an objective, sterile objectivism based on absolute truths and on the other a subjective, non-committal, friable, and thereby crippling 'anything goes' relativism. Experiential worlds in these intermediate positions emerge because they generate value,

[165] For more on multi-actor process management see Volume IV of this series: *Multi-actor procesmanagement in theorie en praktijk*.

shift position at will, and disappear again once they stop doing so: they are emergent phenomena. The broad middle ground between these two pitfalls makes up the societal playing field where new societal competences that will help us take the next steps on *the path of humanity* are developed and put to use.

Misunderstanding, indifference and ignorance, and *constant* competition between actors on every scale are for our society what the sabre-toothed tiger was for the early hunter-gatherers. Understanding, consideration, interest in each other, and joining forces even more are the weapons with which we can further improve our societal practices as perspective-based systems of actors. In doing so, we must give primacy to value-creating coherence and cooperation, and a supporting role to destructive competition. It is time that we shaped our societal thinking and action to be much more in line with these observations. This book makes a case for these ideas, and gives them additional substantiation as it attempts to illuminate our next steps along *the path of humanity*.

5.2 Copernican reversals

'Your friend is close by your side
And speaks in far ancient tongue
A season's wish will come true
All seasons begin with you
One world we all come from
One world we melt into one'
Jon and Vangelis, I'll find my way home

If you touch things that are deeply rooted, you'll shake something lose. Better keep your hands off them, says the conservative in me. The innovator in me, however, would really like to grab the bull by the horns. The astronomer Nicolaus Copernicus (1473-1543) knew all about this dilemma. Shortly before his death, he had published his heliocentric theory. *Helio* refers to the sun; this theory placed the sun at the centre of (what we call today) our solar system. The conventional wisdom, supported by the Catholic Church, was *geo*centric, with the earth at the centre, which goes back to the Greek philosopher Ptolemy. Copernicus knew his theory was a revolutionary reversal of what was accepted truth, and given the Church's attitude, he was expecting trouble with the authorities. His publisher had proactively put a note in the foreword of the book stating that the heliocentric model had no relation to reality, and therefore should be primarily considered a mathematical model. Publishers and clergymen of the time easily grasped the model theory and the practical use of pure mathematics, and a riot was prevented.

Yet the reversal occurred, and today we all know that the planets revolve around the sun. If you want to shift the earth's location like that, you need very solid arguments. In this case,

they were there in abundance. It is not an exaggeration to state that this Copernican reversal was one reason why the natural sciences, in which objective empirical observations were linked to rational thinking, could take such an enormous flight in the next few centuries.[166] Galileo Galilei (1564-1642) put Copernicus' theory back at the centre of scientific interest of his age, based on observations. He could do so because the first telescopes had just been invented. Despite a tweak in the preface similar to the one written by Copernicus' publisher, Galileo paid the price in the form of a vehement dispute with the Church, and subsequently house arrest. It could have been worse and cost him his head, but apparently and fortunately, science wasn't taken quite so seriously yet. The German-Polish astronomer Johannes Kepler (1571-1630) gave the Copernican heliocentric model a few more empirical foundations and a mathematical representation (Kepler's three laws of planetary motion). Isaac Newton (1643-1727) produced the physical theories that further substantiated this worldview, and then there was no more stopping it. The sun took centre stage, and Earth was bowled into orbit. Our planetary system became a 'solar system' – a matter of perspective.

The idea that the universe has a single specific centre has been shaken up yet again, this time in more recent physics. Albert Einstein (1879-1955) made observation relative again, that is, dependent on the position and motion of an observer in relation to the object observed. Again, this was a formidable reversal. Now the expression 'Copernican reversal' means any grand U-turn of our understanding.

Taking the next steps on *the path of humanity* requires that we think about another Copernican reversal: from the dualist mind–body worldview,[167] in which a firm and universal distinction between knowledge and matter (subjectivity and objectivity, mind and body) prevails, to a recursive perspectivism, that by contrast flexibly does justice to the many individual experiential worlds of actors on different scales, in coherence with each other (without degenerating into absolute relativism, which is just as undesirable as absolute objectivism). Both the experiential worlds and their coherence are subject to continual change.

As society, we no longer fit into our 'modern' clothes. If we don't change our clothing, then going backwards down *the path of humanity* is a real possibility. Dualism will fit even worse than it does now as we take our next steps on *the path of humanity*, since we'll really need much more coherence, cooperation, and team spirit between many more actors.

Modernity is coming under increasing pressure because its straitjacket can no longer contain the ever-growing diversity of actors (and their experiential worlds), who have their own bio-, psycho-, socio-, and technotopes, and their own roots, methods, and practices. What still remains of shared foundations is determined by the experiences we share, just

[166] Science uses specific observations as the basis for universal, rational thinking.

[167] Or heavy-handed pseudodualisms that try to explain one sphere as an emergent property or consequence of the other.

like it used to be. When we were small bands of hunter-gatherers, our shared experiences used to be acquired together, in a single real world immediately surrounding us, but with today's large scales, our experiences are more and more virtual (like the media and internet) or from a great distance (like the Twin Towers), and their relative share of our total experience is less.

The 'real' shared world is revealing itself in increasingly confrontational ways. They can be very specific, e.g. global environmental and climate-change issues, or more general, e.g. shortages or even depletions of resources. One of my favourite Dutch proverbs translates to 'knowing everything means forgiving everything.' It conveys, at least in recursive perspectivist terms, that if you really look into the backgrounds of other actors, you'll understand what's behind their intentions much better. It was the *condition humaine* of the hunter-gatherers, since they experienced virtually all the same things that the other group members did. Today the proverb functions as a plea for putting yourself in other people's shoes. Its opposite (knowing nothing means forgiving nothing) fits a society that extrapolates what it 'knows' to be right more and more, is less and less forgiving, has less solidarity, ever-more-voluminous contracts, and ever-greater litigiousness. We see it happening around us frequently, and it's food for thought.

The mind–body dualism is a marginal phenomenon in terms of recursive perspective, and thereby is especially unsuitable for describing the whole societal multi-actor space. It can be compared to the way Newton's classical mechanics is a marginal phenomenon of Einstein's special theory of relativity. Newtonian mechanics appear in Einsteinian mechanics under specific circumstances, namely at speeds far slower than that of light. Close to the speed of light, Newtonian mechanics is completely inadequate. By analogy, mind–matter dualism appears in recursive perspectivism as individuals (often very few) experiencing a single environment (it's almost a tautology). With large numbers of people in completely different environments, mind–matter dualism is grossly incomplete, and therefore inadequate, as a foundation for a concept of society. As an image of the whole of society, dualism has simply passed its expiration date.[168]

If we continue with dualistic thinking, our increasingly plurimodern society will more and more come to resemble a fish out of water. Dualism is an increasingly worse fit with the steps we need to take for further improvement. It destroys the flexible plurimodern fingerprint of Team World before it can even get started. By contrast, the radical actor thesis outlined earlier fits our current position and the next steps to take on *the path of humanity* very well. *The path of humanity* in recursive perspective makes it clear why it's precisely the radical actor thesis and its perspectivist concept of actors that provide a much more suitable worldview and will much better equip us to take the necessary and desirable next steps on *the path of humanity* together.

[168] Recursive perspectivism shares this antidualistic position, which opposes knowledge as the *re*presentation of a material reality and seeks a more actor- and improvement-oriented course, with other pragmatic philosophies, such as the work of William James and Richard Rorty.

The world today and the world of tomorrow are much easier to see and understand in recursive perspective, and they fit much better with the radical actor thesis. To substantiate and position the nature and necessity of this U-turn from mind–body dualism to recursive perspectivism, I will explain recursive perspectivism and its relationship to dualism and the path of humanity in several ways in the following chapters.[169]

5.2.1 From dualism to recursive perspectivism

'The layman always means, when he says "reality" that he is speaking of something self-evidently known; whereas to me it seems the most important and exceedingly difficult task of our time is to work on the construction of a new idea of reality.'
Wolfgang Pauli, quantum theoretician (1900-1958)

As thinking, feeling, and experiencing people, we live in a shared material world that surrounds us all. In this world, when things fall, they fall down. We get out of bed in the morning, and can stub our toe on a chair leg as we walk through the house without shoes on. The door to the kitchen is at the end of the living room (and tomorrow the kitchen will still be there at the end of the living room). We can all take an aeroplane to Reykjavik. The world 'just is' there, we say. It's a given, it consists of real things and facts, outside ourselves, objective. It is material.

By contrast, things that we do not share, either because they're deeply personal or because we have different opinions about them, are called mental, or of the mind. Our thoughts, our own interpretations, and our models (as long as there are more alternatives, as long as they keep rattling around) are only opinions, not facts. These are our inner worlds, and they are different, private, and subjective for each of us.

The distinction made above between mind and matter, and between opinions and facts, places us in a shared material world as pluriform thinking people. It causes the conventional way of looking at our world: the mind–body (or mind–matter) interpretation.[170] This dual (two-part) interpretation usually works just fine in practice, or at least on a small scale, in a shared environment, and in the short term. These are more or less the conditions under which we have evolved, lived our lives, and developed our societies over the last 200,000 years, and under which we still grow up as young children. The mind–body interpretation of the world is so deeply embedded precisely because it works so well most of the time. We cannot imagine how things could be different. Yet we need to, because our present society can no longer be interpreted this way.

[169] This description is of necessity superficial. For an extended description of recursive perspectivism (in Dutch), see *Een filosofie van de maatschappelijke praktijk*.
[170] Also known as the individual–world view. See also e.g. Godehard Brüntrup, *Das Leib-Seele-Problem* (2012)

5.2.2 Kant as a turning point

Copernicus moved heaven and earth, but stayed neatly within the dual mind–matter distinction. The philosopher Immanuel Kant (1724-1804) began to dissect the relationship between mind and matter. He distinguished empiricism (I would say 'sensory experience') and rationality (I would say 'thinking experience') as the two relevant domains.[171] He was impressed by the original 'Copernican revolution' (Copernicus' own turn from geocentrism to heliocentrism), and in his own words, he followed the latter's example. According to Kant, Copernicus sought the observed celestial motions not in the planets, but in their observers. Kant turned the same principle loose on the relationship between humankind and the world. According to him, objects in nature are necessarily subject to the structure of our cognitive ability, or more precisely the a priori properties of our cognitive functions (an epistemological or knowledge theoretical point of view). We gather knowledge, after all, with our cognitive ability, and therefore can only behold things under the conditions that our cognitive ability imposes on us, and with the distortions that this cognitive ability brings about. Our cognitive ability is like an invisible pair of glasses that we cannot take off. Before Kant, no one even suspected that we *could* have these lenses (since the world was just an objective given around us). According to Kant, our cognitive ability works with the dimensions of time and space (a priori[172] forms of observing), as well as twelve categories including causality (cause-and-effect relationships; see the previous chapter and further on). Whether it's an apple, a radium salt, or an elephant, the object only has to conform to, nay, it already has *made itself conform to* the subject, as soon as we perceive it. A possible reality *prior to our experience of it*, thus before we have turned our cognitive ability on it, is impossible. Kant called this reality prior to perception *das Ding an sich*, the thing in and of itself, or 'dDas' for short. According to Kant, dDas by definition lies outside the limits of our experience (it is *transcendental*).

Kant says that the identities of things do not exist in the world outside ourselves, but that things only acquire these identities once we become aware of them – a Copernican reversal in a class of its own. With this statement, Kant put objective observation, an anchor of science, in a new light. Our entire empirical and rationalist concept of science is based on the belief that we can *objectively* observe a reality-outside-ourselves (empiricism), and organize the true and repeatable findings thus acquired into abstract theories. He shot down the idea of a material world outside ourselves, inspired by (although not per se agreeing with) one of the great sceptical philosophers of his time, David Hume, and his arguments are convincing.

Now then, if we all have the same cognitive ability, it does not seriously affect either our relationship to dDas or our practising science. Speaking strictly pragmatically, there is no

[171] Empirical means observed, but note that for Kant, this was not the same thing as what objectively exists outside ourselves, since our cognitive ability distorts *das Ding an sich* (see further on).
[172] Preconceived, postulated

difference between all of us having the same abnormality and all of us being objective.[173] However, it brings up many questions.[174] Do we really all have the same cognitive ability? How can you test that? And what is that exactly, a cognitive ability?

5.2.3 Do we know the world?

Cognitive ability revolves around knowledge. Knowledge is the basic ingredient, as well as both the process and the input/output of thought processes.[175] Knowledge focuses, guides, and supports purposeful action. Thinking implies that there is a consciousness, and thus a knower having this consciousness sneaks onto the stage.

There is a relationship of knowledge between the mental knower and the material object that is known. In our knowledge economy, this is as plain as the nose on your face, and there is no doubting it.

Knowledge relations between subject and object

However, I do doubt it. For now, let's assume that the relationship of knowledge is decisive in the relationship between the person (subject) and the world (object). Many epistemological questions arise. To put it bluntly for the knower: if the knower knows the world, is he then himself *not* of this world? Can knowledge really be objective at all, if knowledge belongs to a knower? And if knowledge makes up our subjective relationship with an objective world, what is that objective world? What is the object? We cannot know this, because we cannot know more than we know, can we? These are questions that Kant asks too, in a sense, and which he starts to answer with his *Ding an sich*: we will never *know* whatever it is (or even *whether* it is).

However, I do not actually want to bow down to cognitive ability at all. I don't think that I relate to the world as a knower. At least I think it's completely far-fetched to define my life as a person on this earth in terms of knowledge. Am I *knowing* while I'm shopping, hiking in the mountains, participating in a meeting, talking with my sons, loving someone or something, working in the garden, or anything else? Are we *knowing* while we live our lives as a family, or our professional lives? Are we *knowing* while we cause our economy, as the

[173] I'm also thinking of the Thomas Theorem here: "If men define situations as real, they are real in their consequences" by the sociologist William Thomas. See Thomas, *The Child in America: Behavior Problems and Programs* (1928).

[174] In both asking and answering these questions, I've been much inspired by Heidegger's *Being and Time* and Kant's *Critique of Pure Reason*.

[175] Knowledge is an intriguing notion. I was playing with it intensely, even in my dissertation, but in retrospect I wasn't quite ready to make the ultimate generalization, namely that both knowledge and the environment (and in fact all experience) consist of, and emerge from, networks of perspective. Page 38 of my dissertation has the phrase '… but rather the environment induces (or perhaps even is) a subset.' I remember thinking about it for years but never finding an answer at the time. Sir Winston Churchill's motto – never give up! – helped me to persevere.

term 'knowledge economy' seems to suggest? Do we *know* as we shape and compose our society?

To me, this is nothing more than a grotesque overstretching of the concept of knowledge. Admittedly, sometimes I present myself as a knower, for instance if I'm consciously studying something else. I'm creating a detachment, a reflective distance between myself and what I'm studying. Then I objectify what I'm studying; I slip around it, subjectively exploring it to understand it better. I separate subject and object, and introduce a model relationship[176], becoming a dualist for a moment, if you will.[177] However, this is a distance that I do not always experience as I live my life, and in fact I rarely experience it. I don't usually experience distance at all; I'm actually splashing about in life enjoying it, and I am an immediate and unmediated participant in it, as a situated person taking action, partly deliberately and partly stumbling along. Knowing is not the truest, most basic, or realest relationship between me and my world. It's an indirect relationship: for the most part, I live my life first-hand, not second-hand. This is true for actors at all levels of abstraction. 'Knowing' is an unusual, somewhat detached part of the whole of how we as people relate to the world (a relationship better known as living life).

The mind–matter position is excellent when a 'relationship of knowledge' with a material object is appropriate. It is fine if *different* actors (different experiential worlds or consciousnesses, or different standpoints or possibilities of one person, like the state of doubting or considering something) agree that an object exists in their *common* environment, an object that they want to study and understand better, for example, the scene of a murder. What we do then is to call the things we experience the same way 'objective', 'environment', and 'fact', and call the things we experience differently 'subjective', 'internal', 'individual', and 'opinion'. This works excellently for a matter that has different standpoints (as there are in politics, science, murders, and in fact all interpersonal interaction). Actually, these are the situations in which there is a slight disorder: subject–object distance arises if there is more than one subject with one object.[178] If you're driving on the motorway late at night, lost in thought, you do not experience subject–object tension at all; your driving is one unity that you're barely aware of. A similar feeling can come over you if you lie on your back looking up at the stars: an intense feeling of connectedness, linked over an enormous distance. However, a reflective distance, like a crack arising now and then in something that can be seen as one connected whole, is very different from two pre-existing rigid spheres – such as the subjective and objective spheres in the mind–body worldview – or the idea that because of this dichotomy, we thinking people would

[176] For model relations in perspective, see Volume I of this series, A philosophy of societal practice (in Dutch).
[177] Of course I can also reflect upon one of my opinions, and thus temporarily objectify something subjective. However, both subjective and objective collapse once you make absolutes of them.
[178] See also *Een filosofie van de maatschappelijke praktijk* p. 214: 'De vergissing als venster op de objectieve werkelijkheid'.

necessarily relate as subjects to material things from the objective sphere by means of a knowledge relationship.[179]

We live in a shared, goal-less, material world as thinking, feeling, goal-oriented, experiencing people. There's not really anything to argue about, is there? Kant remained faithful to dualism, but burst the bubble of our naive belief in a material world outside ourselves by claiming that all our observation is necessarily coloured by our cognitive ability. However, mind–matter dualism is really shaking on its foundations. Even the monopositions derived from dualism, for instance those that conceive of the mental as a (so-called emergent or epiphenomenal) property of the material, or the other way round, often lead to the sad situation that both spheres are still fundamentally different, rigidly defined and rigidly separated from each other. And, as mentioned earlier, that does not fit well in our society, which is becoming increasingly complex and changing more and faster than ever. This is why it's time for another Copernican reversal: that from a dualist mind–matter worldview to recursive perspectivism.[180]

Recursive perspectivism does not presuppose a relationship of knowledge

Remember that a perspective is (the experience of) a triplet consisting of an initial situation, a change, and a resulting situation. Recursive perspectivism does not presuppose any mental or material spheres having their own laws and properties. Neither does it presuppose three-dimensional Euclidian space, continuously ticking Newtonian time, or causality and other categories (as Kant does). Recursive perspectivism only presupposes that perspectives are experienced. Strictly speaking, recursive perspectivism does not even presuppose recursivity (repetition, at different scales as well) because that emerges and develops, while being experienced, in consciousness ('perspectivism' is sufficient as a name, while 'recursive perspectivism' only gives extra emphasis to iterations and scales; the recursivity is emergent).

Because, and as soon as, perspectives are experienced, there is consciousness (or vice versa: if there is consciousness it expresses itself by experiencing perspectives). In perspectivism, thus, consciousness is identical to experiencing perspectives. Since a consciousness can experience continually new and different perspectives, and at many levels of abstraction, there is a dynamic interplay. I'll explain this a bit later by using a football (soccer) team as an example, and I'll compare the team identity with the sparkling of a diamond. I can call it a team consciousness, a 'multi-actor', since that's what it comes down to.

[179] You cannot derive the pre-ontological existence of the two spheres from the existence of a knowledge relationship (any more than that you can conclude from a model relationship that model and referent are identical), since the knowledge relationship can also create the spheres.

[180] Or leaning dualisms that attempt to explain one sphere as the quality or consequence of the other.

Recursive perspectivism is a homologous philosophy: there is one sphere (instead of two, such as mind and matter), everything is connected, recursive perspective.[181] A homologous philosophy is, in essence, a Spinozan idea: Baruch Spinoza often wondered if there was a deeper way of understanding our world, one that preceded the distinction between mind and matter (the dual mind–body or mind–matter interpretation, which was given a good boost by René Descartes and the success of the empirical natural sciences). I found and still find this idea irresistible, and I think that recursive perspectivism answers Spinoza's question with a resounding 'yes'. Recursive perspectivism provides a substrate (an underlayer) that can explain the origins and the emergence of mind and matter (without presupposing either, or deriving one from the other). Recursive perspectivism thus comes prior to epistemology (the study of knowledge, focused on thinking) and ontology (the study of material being, focused on things). At the edges of recursive perspectivism, the objective, material worldview and the subjective, mental worldview rise up neatly and naturally (they emerge). However, like a badly functioning football team, they only constitute the outer edges: mind–matter interpretations of our world and our society are bleak and empty, since most societal identity and societal consciousness are found in between mind and matter, and are not easily seen by dualism. This is an important argument for presenting recursive perspectivism as an alternative worldview: from a societal point of view, it is much richer and more flexible than a rigid mind–matter or subject–object dualism. It gives you all the potential of individual minds and shared matter at the two outer edges plus an entire societal multi-actor world in between them. Recursive perspectivism thus does complete justice to societal competence, where a dual mind–matter view results in incomprehensible rifts.

5.2.4 On causality, anticipation, and confrontation

David Hume's (1711-1776) ideas about causality deserve discussion here, since they are what eventually led Kant to his Copernican reversal (talk about cause and effect!). According to the thoroughbred empiricist Hume, all our ideas about realities have their basis in the relationship of cause and effect (or 'causal relationship').[182] But Hume did not think that causality was so unusual. If one event is always followed by the other, there comes a point when we see the first one and expect to see the other. It is an empirical association; there is nothing preordained about it. The causal relationship can end or change at any time, the

[181] One could say that situations and changes are also other spheres, like the mental and material spheres, which would make perspectivism dual as well. However, situations and changes are certainly not other spheres. They are quite intensely interwoven with each other. A situation after all, derives its meaning from the fact that it is enclosed by processes, and vice versa. Also, changes consist partly of situations, and situations consist partly of changes. They can flow into each other. A draughty window, for example is a situation that can result in you having a stiff neck, and the ink reservoir of a pen viewed under a microscope is one big Brownian motion of ink molecules. Recursive perspectivism is Spinozan; it precedes mind and body.

[182] Hume's most famous work is *A Treatise of Human Nature*, which he published at the age of 28.

way you think that all swans are white until you see a black one.[183] Kant's idea that causality arises out of our cognitive ability and is an a priori category of it was a reaction to this idea of Hume's about causal development.

This idea of Hume's is especially interesting because recursive perspectivism sees a consciousness as experiencing perspectives or even a stream of perspectives. If it recognizes causal patterns, a consciousness will start to anticipate the effects by itself as soon as it experiences the cause(s) (perspective is linked in the front of the stream, as it were). Thus, anticipation is just experiencing perspective, like all experience. Causality is nothing but a variant of perspectivist repetition. *The recognition of the 'cause' part of causality shifts the stream of experienced perspectives in a consciousness in such a way that it anticipates.* Causality revolves around repetition: once you've experienced the cause several times, you'll anticipate the effect (at least until it goes wrong). However, there is nothing fundamental or inevitable about it. An old Dutch proverb says '*A jug keeps going to water until it breaks*', something the sceptic Hume himself could have said. Nothing holds forever. It's all perspective, I say as I bring up the rear.

Although perspective can express a causal relationship very well, repetition offers many more opportunities. In most interpretations, causality is limited to material processes that unfold over time (a cause is followed by and ensures an effect). If you knock a vase off of a table (cause), it will consequently be lying in pieces on the ground (effect). Causality is fine with *time*, but doesn't get on well with *space*, strictly speaking. We don't say that the meter closet being next to the front door is a causal relationship. Perspective does not have these limits. Experiences consist of recursive perspective. The triplet of beginning situation, change (possibly an action, but it can also be a mental step or any complex combination at all), and ending situation keeps recurring. Thus, if you recognize a beginning situation, you can anticipate the action and the ending situation. If you perform the action, you can anticipate its ending situation. If I know that the meter closet is next to the front door, I experience that as a spatial relationship and I can also anticipate it in the way I can anticipate a causal relationship. I see the front door, turn around and see the meter closet (a simple perspective). Or I do not turn around, and I know that the meter closet has to be there (the essence of spatial awareness). And it's nothing to do with matter if I know that thinking of my father helps me to bring his telephone number to mind more easily, but it's something that I can anticipate anyway. So perspective can express all changes: material and mental, temporal and spatial, causal and casual, and any other categories you think necessary. But they are not there beforehand. They develop in recursive networks of perspective. And if we have new kinds of experiences, then our anticipations neatly adapt themselves.

[183] Besides an inveterate empiricist, Hume was a tremendous sceptic, and although he preceded the falsification theory of Karl Popper by more than a century, I believe he would have greatly appreciated it.

Thus, I don't share Hume's view that our thinking has its cause in material causality, which is a temporal process in a material world. I do agree with Hume that experience takes the form of a stream, and in my opinion, this happens as experiencing recursive perspective. As soon as an actor recognizes the initial situation of a perspective, the perspectivist process naturally brings the change and the ending situation to the fore, and the actor's consciousness experiences this too. This ending situation can, in turn, be the beginning of a subsequent perspective. This is the essence of an anticipating effect. The alternative to anticipation is confrontation: anticipation wasn't adequate, or at least another perspective is filling the actor's consciousness, and the process begins again, or goes further if you like. There are thus two extremes of experience along this dimension: experiencing in anticipation (causality, spatial thinking, and all other variants of perspectivist meshing make this possible) and experiencing in confrontation. There is also a whole spectrum of blends in between, ranging from almost completely in anticipation to almost completely in confrontation, but usually we lead our lives in the middle ground in between, in a whirl of experience that includes both anticipation of structures of, and confrontations with, recursive perspective.

5.2.5 How knowledge becomes matter (and goes back to knowledge)

I can distinguish many dimensions in experience this way. Take thinking and material processes, which, like anticipation and confrontation, are two extremes with a whole spectrum of blends of the two in between. If certain perspectivist patterns keep repeating themselves, without exceptions, and observable for everyone, then we can call that 'the material reality around us'. That's even obvious, since why should we take *in* perspective that we all experience and not see it as *outside* ourselves? 'Objective' means nothing more than involving perspective that everyone can experience, thus it is located outside ourselves, around us. Perspective that can be observed by everyone is 'objective' and material. Perspective that can only be observed by one consciousness is then 'subjective' and mental. This works excellently in a small group of people with highly similar experiences (such as the hunter-gatherers, or children growing up together in a family). But imagine if, in the year 500 AD or so, a loner from the Rhine Delta in the Low Countries sailed off to Australia, and came back many years later with a story about kangaroos and how they keep their babies in a pouch in their bellies. I think the community would consider this person a weirdo. Or let's say you hit your head and 'see stars'. Your senses perceive the stars, but they are particular to you – as much as you try to convince your neighbours they exist, they can't enjoy them themselves.

In this regard, it is intriguing that modern brain research claims that more than one consciousness can visually observe thoughts and even predict them using brain scans. 'We are our brain' is the translation of the title of a very interesting and commendable book by Dick Swaab that takes this confusion of mind and matter quite far. You can only think you are your brain if you think that thinking is an established, real a priori category, besides material things, or in other words, if you are an inveterate and fundamentalist dualist, or perhaps a material monist (but certainly not if you're a recursive perspectivist), and if you

think that matter precedes thinking. A title like *We Are Our Garden Gate*, when looking at this gate, would express this idea even more clearly.

If, on the other hand, you assume that the only perspectives that deserve the name 'thoughts' are those that can only be experienced privately, and that perspectives that can be fully experienced as verifiably shared are 'material', it quickly emerges that brain scientists looking at scans of people thinking are just all looking at matter. This is terribly useful, by the way, and I really don't want to say one negative word about it. However, by looking at brains together, the scientists are not thinking thoughts, but experiencing matter. The person thinking (the owner of the brain) just keeps on thinking. In the same way that a meteorological model is not weather, brain activity is not thinking. In a sense, brain scientists are making substance of thought by experiencing as multiple observers. Isn't that incredibly special? No – Copernicus did it ages ago. That eccentric's crazy idea that it was not the earth at the centre of the universe, but the sun slowly but surely became a planetary reality, and today we recognize his scientific genius (Einstein reduced it to one of many possibilities).

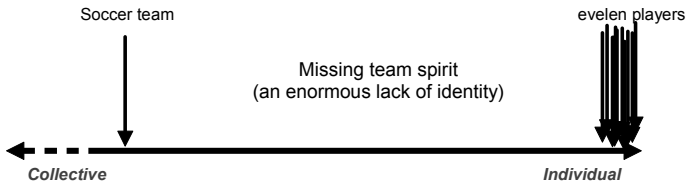
If I awaken from a vivid dream, I'm always astonished by how lifelike it is. I'm moving around in a spatial material world! Then I wake up and realize that I'm just lying in bed (apparently one cubic metre is not the other) and that no one else has shared my experiences, not even the people in the dream. In an instant, something I experienced as genuinely spatial and material turns out to be a figment of my imagination. Waking up completes the process. Once I'm awake, I'm in the real world and no longer in a dream world. This real world has the important distinction from the dream world that other people also experience *their* perspectives in it, just as I do. Because only perspective that in principle can be experienced by everyone is part of our real, objective world. The astonishing way that dreams seem real shows well that we can experience a completely spatial–temporal societal setting using only our *own* consciousness. This gives us serious food for thought regarding how authentic our environment is.

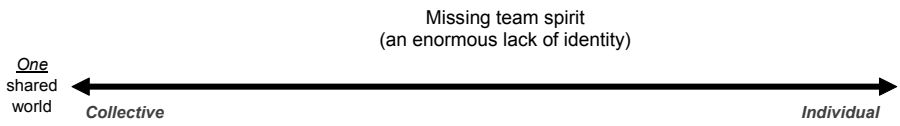
5.2.6 A necessary reversal

This batting about of worldviews and Copernican reversals may look like a lot of meaningless philosophizing, but it has enormous practical relevance for how we organize future societies. If we better understand how the dual mind–matter worldview develops in recursive perspective, we can also better understand why dualism fits so well for people in small groups in a shared environment (like the hunter-gatherers), and why dualism is such an obvious interpretation of the world for people who grow up together in the familiar and manageable environment of a family or small band. Accordingly, though, we can also better understand why dualism is such a poor fit with this late-modern phase of our society, and why it will fail even more as we take the next steps along *the path of humanity* towards Team World.

I think that, to follow *the path of humanity* further, we will have to interpret our world and our society differently. We can carry on using mind–matter dualism on the limited scales where it works well, like thinking about furnishing your house, weighing a bag of potatoes at the greengrocer's, or jumping out of the way of an oncoming truck. We must realize, however, that dualism is simply not adequate for designing the complex multi-actor societies of the future, and that we must return to the original form of recursive perspectivism, out of which dualism arose as a practical simplification for specific situations.

To better appreciate this reversal, let me point ahead to the second-worst definition of a soccer team. Further on, I'll show how the concept of a team as eleven individuals who play with the ball together in a shared world is a poor and meagre one. It fails as a definition of a team. A team like this has no team spirit at all! There are so many crucial identities between these two intermediate positions: the left wing, the forwards, or two players who are attuned to each other. I use the sparkling diamond as an image for how the different identities, which we now know to be different consciousnesses, spread out over the entire spectrum, alternating and resulting in an electrifying match.





Both the soccer team and Team World require a spectral consciousness instead of a dual consciousness

Now then, this lousy definition of a team is for the soccer team what the dual world interpretation is for our entire late-modern society. It is sparse, limited, poor, and empty in the middle. Humanity in a dualist world lacks team spirit and team consciousness, and we cannot fill this gaping hole by continuing to maintain the dualistic worldview either. If we cling to it, our society will never start to bloom and instead will keep collapsing under its own weight.

The societal situation is even trickier than a soccer team, and not only because of its scale. The members of a soccer team each have a full view of the playing field even if it is only a general one; for example, the striker knows what a goalkeeper's tasks are. The members share a number of well-defined rules imposed by an outside authority, and there is a central authority (exercised by the referee). All these things are still absent on the scale of Team World (and they cannot exist in exactly the same form). People on this earth live under very diverse conditions. They can be said to be living in totally different biotopes, in different social and professional spheres, and they have completely different past experiences. Of course, the distinction between mind and matter stays intact on the world scale. The law of gravity applies to everything that falls, and people everywhere experience love. But clinging rigidly to only these two categories is simply naive. It is time to honour the fact that different groups of people live, work, and think in – i.e. experience – totally different worlds, experiential worlds, influenced by increasing social and professional differentiation.

In a previous book, I introduced the world spectrum:[184] a spectrum ranging from the most personal, individual thoughts of each of us to the shared world that we all experience around us, and therefore have also 'tipped' outside ourselves. Dualism in its strictest form recognizes only seven billion unique mentalities (seven billion minds) and one shared material world (matter). These are the two ends of the world spectrum; in the shared world outside ourselves the sun rises and sets, and in my own private world I'm writing this book and I love my wife and kids. However, the vast majority of the societal world is somewhere between these two extreme positions. That is where society plays its multi-faceted, structural, multi-actor symphony, in a colourful coherence of actors on every scale, connected in many different ways. Anyone with any cultural and political awareness accepts this as an inevitable given. And this middle area, where our society is a multi-actor practice, becomes stronger and more important the further we go along *the path of humanity* toward increasingly complex social patterns. I think that many of our current societal problems (climate change, resource depletion, our healthcare and financial systems, loneliness, greed, the underside of the labour market and schooling spectrum, the list goes on) are largely connected to the disturbing gaps in large parts of the spectrum between the two ends.

Team World is certainly possible, but the first step we'll have to take will be to shake off the mind–matter worldview and embrace the radical actor thesis. This thesis is rooted in recursive perspectivism, and makes this spectral view possible. Only then can we flesh out the complete societal spectrum and ascend to new peaks, together.

[184] *Een filosofie van de maatschappelijke praktijk*, p. 77.

5.3 Shifting panels

'Contraria sunt complementa'
Niels Bohr and others

What is the relationship between the dual mind–matter worldview and the recursive perspectivist worldview? Many people recognize a subjective, mental sphere and an objective, material sphere. The former is 'of us' and the latter is outside us.[185] They see the mental and the material as two completely different spheres. This Cartesian dualism is the fundamental form of dualist thought. Since these two spheres are strictly separated from each other, their relationship to each other is problematic. John Searle expressed the mind–matter problem (he used the term 'mind–body problem') succinctly this way:

> We think of ourselves as conscious, free, mindful, rational agents in a world that science tells us consists entirely of mindless, meaningless physical particles. Now, how can we square these two concepts? [186]

The Copernican reversal[187] from a mind–matter dualism to a recursive perspectivist homology can be summarized in three steps. I'll link each step to an important and appropriate philosopher. First I'll provide a brief introduction to these three philosophers (who have already been mentioned in the book), and then I'll discuss the three steps.

The first philosopher is René Descartes (1596-1650). He was one of the founders and advocates of a clear distinction between a mental and a material substance (*res cogitan*s and *res extensa*). He made a very clear distinction between these two spheres (which helped the natural sciences tremendously, but it gives us, and exacerbates, the mind–body problem above).

Then we have Franz Brentano (1838-1917), one of the founders of phenomenology. Phenomenology does not make presuppositions about the existence of mind and matter, but focuses completely on that which is experienced (the phenomena). Brentano's philosophy was inspired by religion. Does God exist in our heads or is he outside in the world? Brentano thought it was wrong to assign God to only one of the two realms. His solution to this dilemma was to place a third realm in between the subjective

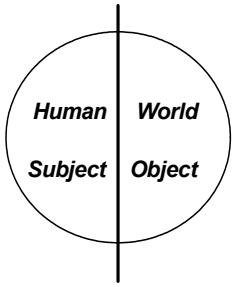
[185] Parts of this section appeared in early versions in *Een filosofie van de maatschappelijke praktijk.*
[186] John Searle (1984), *Minds, Brains and Science*, Harvard University Press, p. 13.
[187] Copernicus saw that it was not the earth that was the centre of our solar system, but the sun. The turn from dualism to recursive perspectivism is also a Copernican reversal: instead of dualism being the basis and perspectives the effect, recursive perspectivism is the basis, and dualism one of the possible effects (and a fairly small one too).

representations of people and the objective in-themselves-ness of things. This third sphere consists of the intentional objects that bridge the gap, being neither purely internal (subjective) nor external (objective), but always human representations (subjective) of something (objective).[188] They connect subjective to objective.

The third is Baruch Spinoza (1632-1677). He was not in favour of dualism as a fundament or of phenomena as an intermediate form (he was primarily fond of logic), but suspected there was a uniform, homologous basis underlying everything. This quote by Thomas Nagel gives a clear idea of Spinoza's view:

> Why should the possession of physical properties by the body not be compatible with its possession of mental properties – through some very close interdependence of the two? (Perhaps, as Spinoza believed, the properties are ultimately the same, but that would have to be at a deeper level than either the mental or the physical.)[189]

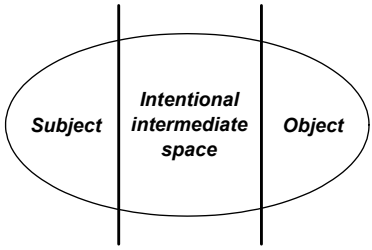
The three steps are the following.[190] I'll start with Descartes' dual human–world (or mind–matter or mind–body) concept of society (see figure).



The starting point: a dual world view
(human–world, subject–object, mind–matter).

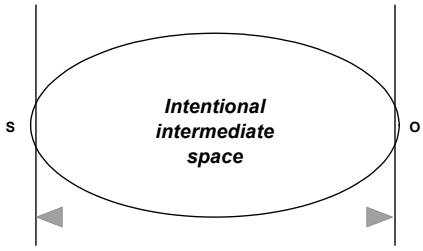
In the *first* step, as a modern Brentanist, I seek the intentional space between the objective and the subjective worlds. This is where the 'bridge' is made between an objective material outside world and a subjective human inner world. At a first glance, this looks like regression, since we are coming from a two-part worldview (human–world, or subject–object) into a three-part worldview (subject–intermediate intentional space–object).

[188] See also Rudiger Safranski, *Martin Heidegger: Between Good and Evil* (originally published in German as *Sein und Zeit)*. Brentano was one of those who inspired Heidegger.
[189] Nagel, *The View From Nowhere,* Dual Aspect Theory (p. 31).
[190] Here I am following *Een filosofie van de maatschappelijke praktijk,* Volume 1b: *Perspectivisch structuralisme.*



The results of step 1: from a dual to a three-part worldview.

The intermediate space is what is central in life, in human experience. I do not have much patience for what we do not experience. If it emerges as purely subject or purely object, then it's only at the outer limits of the intentional middle space. As the second step, I therefore maximize this intermediate space by pushing the two interfaces as far out to the edges as I can.



The results of step 2: the panels shifting outwards result in a (near) homology.

By shifting the boundaries, the middle space has become virtually equal to the complete worldview; the boundaries hardly matter anymore. The solutions to Brentano's religious dilemma together with Spinoza's faith result in a worldview that, from a pragmatic point of view, still consists of just one sphere. A Cartesian dual world view has gone through a Brentanese tripartite middle step and has become a Spinozan homology (see the previous three figures).

With the concept of 'perspectives' at hand I have exactly the kind of *shared* starting point for both the mental and material domains that Spinoza suspected to exist, since I can now understand both mind *and* matter as recursive perspective. Perspective connects subjects with objects, and is intentional par excellence. Step 3 further defines the intentional middle space as a huge, recursive, networked, complex, and ever-changing structure of perspective.[191] Out of this structure emerges the individual thinking person on the left, and mindless matter on the right. And in between there is the concept of the actor, on every

[191] I also use the terms fabric or cloud instead of structure, since they're more expressive.

scale and in all kinds of capacities, just like in the soccer team and in Team World. By now, the forward-looking viewer can see a spectrum becoming visible in steps 1 and 2, with at the left the deepest origin of 'being there',[192] as individual, experiencing, conscious, and willing[193] subjects, and on the right an environment that we all share, an objective environment, thus an environment outside ourselves. We have seen this spectrum before, with the discussion of the soccer team as eleven individual members kicking ball around a shared playing field, and with Team World.

The homologous middle space is the space bridging 'being-there' (our deepest consciousness that we exist as unique individuals with our own experiences, a Heideggerian term from the existentialist school on the left side), and the world-outside-us (Kant's *noumena*, *Dinge an sich*, the world that is independent of our perception, on the right). This is how the next worldview, people-in-the-world, arises. On the left side are thinking individuals. On the right is a shared material world. In between them is an intentional world of intermediate societal identities: it is the world of the radical actor thesis, the world of the perspectivist actors who collectively constitute societies, and the world in which we can develop Team World. It is a flexible societal arena with an enormous variety of actors and partly shared identities, a world in which opinions shift over into facts and back again, a society in continuous motion that is difficult for rigid dualists, handicapped since they operate at only the outer edges, to fathom.

How exactly does the dual mind–matter worldview arise on the edges? 'Mental' is that perspective that by nature is private and individual, found at the far left of the spectrum. 'Material' is that perspective that in principle is accessible, observable for all of us, and at the far right of the spectrum. Do you find these last two sentences a bit thin as a basis for postulating our material environment? *It's simply there, isn't it?* The natural sciences don't exist by majority vote, do they? Nevertheless, the natural and social sciences are first and foremost a bastion of the link of rational thought and empirical observations. Empiricism is nothing more than experiencing by observation or measurement. And if empiricism is sufficient grounds for the natural sciences to study matter, who are we to want additional evidence for reality beyond it being something everyone can observe and experience? Experiences and perspectives that we all share for pragmatic reasons are better lifted outside ourselves, since they are universal, valid, and accessible to all. They are subjects for everyone, thus they are objects.[194] Then we get 'the material world around us all'. Of course experiences and perspectives that are unique can be assigned to one individual for pragmatic reasons, since they are particular to that individual and only valid and accessible for him or her. An object for only one individual becomes a subject. Then we get 'the

[192] A wording inspired by Heidegger's *Sein und Zeit*.

[193] Also remember Arthur Schopenhauer, *The World as Will and Representation*.

[194] Universal subjectivity is the same as objectivity, and partial objectivity is subjective. And all sorts of blends between them occur as well. Rigid dualism cannot handle this.

private, mental world'. The two spheres, mind and matter, arise already experiencing, at the absolute outer edges of the spectrum.

All possible intermediate spheres (such as the many shared identities in a soccer team) arise just as easily. They are somewhat difficult to assign, since we don't agree on them, and since groups and actors keep changing. In dual terms, we solve this by saying that different people and groups have differing knowledge of this one world around us. This works just fine for hunter–gatherers, living in small bands of 10-30 people in an outside world that they all can experience. Most of the threats and opportunities come from outside, after all. You hunt animals and gather berries, and defend yourself against animals and other groups of people. The shared identities are still very easy to take in with a small group, especially if the hand-axe design stays virtually the same for 50,000 years.

If a society develops itself as it follows *the path of humanity*, and villages arise, followed by cities, nations and a world community, then this dual view of the world and of knowledge starts to become more and more problematic. As a result of social and professional differentiation, different groups of people with a strong indirect connection to each other understand each other less and less (a common problem in systems like food-production chains). They no longer only differ in what they know of a shared world, but they each literally live in their own world, and have their own experiences there.

In increasingly complex societal connections and states of coherence, the mind–matter worldview no longer works. It only captures the two extremes of the entire societal spectrum of Team World. According to dualism, these two ends should 'just' be there already, but according to recursive perspectivism, they actually emerge as limiting cases at the outermost edges. They are there because we agree they are. They are what they are because we experience it that way together. They are not there because they are supposed to exist objectively and without any doubt outside ourselves (after all, how could we ever experience that?). Thus, they are not rigidly separated from each other. If the sciences make one thing clear to us, it is that our interpretations of the real material world around us and this private mental sphere have changed hugely over the centuries. Copernicus gave us the model par excellence of how one stubborn individual's opinion could become reality for pre-Einsteinian science. The original Copernican reversal was no more and no less than the shaky, subjective *opinion* of a solitary individual transforming first into a reality endorsed by more and more people, and then into an irrefutable, established, universal, and empirically verified *fact*. At the same time, Claudius Ptolemy's (87-150AD) geocentric view transformed from a reality accepted for hundreds of years into an increasingly dubious view and then into an outdated, dogmatic, and empirically refuted opinion. Dualism cannot handle this kind of gradual transformation from fact to opinion or the other way round. Something is either a fact or an opinion; dualism is rigid and binary. Recursive perspectivism instead offers all kinds of space for the transition, including all the possible stages and gradients in between.

5.3.1 A baby in its cradle

'Common sense is the collection of prejudices acquired by age eighteen.'
Albert Einstein

Recursive perspectivism sees the dualist worldview as the result of a development in recursive perspective. However, other views of the world and society – views that are a better fit with our current position on *the path of humanity* – can develop as well. The entire recursive perspectivist structure encompasses everything that is experienced, after all, and therefore is enormously complex. It is difficult to grasp just how complex it is. If I give examples of experiencing perspective in this book, or explain aspects of them, these examples and aspects are necessarily dilutions of the whole (of everything that is experienced); they're either tiny snippets or huge generalizations.[195] Although I certainly don't think that the perspectivist structure in its vast scope is so simple, simplification is the way in which we relate to it.

Many of the people I speak with think that the dual starting human–world situation from the 'Shifting panels' section above is the most intuitive, and that the recursive perspectivist interpretation is much trickier. By now, some dualism has been completely integrated in our concept of the human body as the result of evolutionary processes. For example, we automatically conceive of our senses as windows to a shared material world (matter) belonging to us as thinking individuals (mind). We change our material world with our hands, move ourselves around in it with our feet, look at it with our eyes, and listen to it with our ears, and we each think about our shared world outside ourselves with our brains. That all makes sense too; the dual world view many of us consider irrefutable and established is the result of what we experience growing up. On the scale of growing children it works quite well, even excellently. However, that in itself does not make it a primordial philosophical starting point, let alone the best one for our late-modern societies to work with. The dual image may be very familiar for adults, but it is neither primordial nor fundamental. It *develops* and *is learned*. As far as we can tell, a newborn baby doesn't understand it at all.

Essentially, the sequence of the figures in 'Shifting panels' reflects many people's lives in very large steps but in reverse: we know we are well embedded in a shared world as thinking adults. However, in order to understand how our dual human–world interpretation came about, we have to go back and 'unroll' our experiences, and then we'll automatically get rid of dualism.

[195] What we can say about almost everything borders on nothing. And we can say a lot about almost nothing; it's just the way it is. Considering everything that is experienced to be a cloud of perspective provides a perfectly conclusive explanation for it, by the way. We only have the entire cloud to explain. If we want to say something about most of the cloud, then all that remains is the remaining perspective. If we want to say something about a little wisp of it, then almost the whole cloud remains.

This reasoning turns conventional thinking upside down. You may find it intriguing, but a bit odd as well. 'He has a right to say that, but why should I agree with it?' 'Isn't he making it unnecessarily complicated?' These are legitimate questions. Therefore, in the following sections, I will try to demonstrate that, and how, experiencing perspective precedes the distinction between thought and action, and in a mental and a physical world. Thinking and matter are essentially not so different from each other. Both our thoughts and those 'mindless, meaningless physical particles' of John Searle's consist of perspective. We *experience* the world and us in it, we-in-the-world, *in* and *as* recursive perspective. But even if you've got mind and matter covered, you'll still miss the very largest part in between them: the social and societal element. Because it's precisely between those two outer edges where our life in society takes place.

5.3.2 The concepts of physical, mental, and social

A baby is born. As duality-preoccupied adults, we say *it comes into the world*. A baby with a mind, and with a body too, in a material world. A baby will see things differently. Actually, I do too: I think that the baby is beginning to find a correspondence between the most basic origin of 'being there' as an individual and the strange unfamiliar world outside its experience (see 'Shifting panels'). The baby is lying there in its cradle, first looking surprised, and then moving its little fingers (what are those? Are they mine?). It moves its arms (hey, they're gone!), and then has to turn its head to see them again (hey, they're back!). (Shall I try that again?) At least these are the projections we make as adults.[196]

It experiences, goes through a stream of perspective, and somehow stores these experiences and can call them up again, and it all gets easier and easier. I'll project a bit again: 'I see a hand; I move hand away; hand gone. I don't see hand; I move head; hand is back.' And it remembers it as it experiences it: if I see a hand; and if I move a hand; then hand is gone. It learns that many small actions together make up one large one, and conversely that one action consists of smaller actions. Just from trying things out, a recursive web of perspective is created as the consciousness of the baby.

The material, spatial world around us

By continually trying things out and going through perspectives, the baby's recursive network of perspectives and thus its idea of the world gets bigger and bigger. This is the essence of learning. The result of perspective 1 becomes the potential point of departure of perspective 2 (and so on, if it gets further). The baby practises and practises. It learns more and more, and its world literally grows. Its world is the cloud, the network of perspectives

[196] In no way am I implying that every child comes into the world as a *tabula rasa*, and then only learns mentally and grows physically (as two separate processes). On the contrary: every child has its own arms, motor skills, and opportunities for running through perspectives. The 'nature and nurture' debate is developing simultaneously during this process of life in a long wild double spiral. In this sense, the nature and nurture discussion is just as flawed as an *a priori* distinction between thinking and acting.

that it can experience. In its most basic essence, it is a discrete world; it is assembled out of perspective that is continually being added to the baby's existing network. It kneads this network so that it fits it better. Bits that no longer fit are forgotten. It moves with its hands, learning that this results in particular 'sensory' experiences. It grabs the rails of its crib. It looks around, and sees that the crib is on a parquet floor in a room with yellow wallpaper and with teddy bears on the curtains. What we call *material* is running through perspectives that can be sensorily and otherwise experienced by us all. What we (subjectively) experience as *spatial* has to do with running through perspectives that we experience when we move what we experience as 'ourselves' in space. If the baby is looking at the closet door, and then moves its head to the left, it sees the teddy bears. If it focuses, then it sees the details of the teddy bears. If it moves its head to the right, then the closet door shows up again. If this happens every time, from whatever side it approaches the matter (sic), a stable partial recursive perspectivist structure arises. And what is more natural than to assume that the perspectives in this structure are also there when the baby isn't focusing on them, or in other words that these things are there separately from its 'I' (see next section)? Something you have blind faith in is real and true. The baby experiences the entirety of this stable perspectivist structure as space, enabling it to experience perspectivist structures spatially. Later it learns that others in its immediate environment also experience these perspectivist structures. Then it becomes a *shared* spatial experience around us all.

The mental world and I

'The earth is sliding past you and your most fundamental feeling is that you belong there, not in space. You're literally disconnected from your roots, which is amazing and frightening at the same time.'
the late Wubbo Ockels, astronaut.

The baby learns how to reach eagerly for a toy, and how to take the toy from, well, from what? The 'what' will turn out to be a parent or caregiver, which again are parts of the baby's recursive web of perspective. It also learns that if it only *thinks* about reaching for the toy, it won't get the toy. The result of perspective 1 becomes the possible point of departure of perspective 2 (and so on, if it gets further), just like the first example. It doesn't get the toy if it only thinks it wants the toy (hmm, that's funny!), and it learns that its parent doesn't respond to the perspectives that it only *thinks*. Gradually, it develops a consciousness of the mental domain, and learns that it has its own strictly private mental domain, its mental 'I', distinct from all the other domains, because no one else can experience it. This going through perspectives that are not sensory and over which others also have no control is what we call a *mental* process.

The core of this perspectivist process is not a presupposed distinction of mind and matter, of thinking in an a priori material environment. The notions of mind and matter develop, or emerge in terms of recursive perspective.

The social world

The baby gets a toy put in its hands, and then gives it back. This is how perspectives arise in which another human consciousness plays a part. The baby learns that when it smiles, its mother (or father) smiles back and makes noises; it forms expectations with regard to its parent's mental perspectives, *his or her* 'I', which turn out to be partly similar to and partly different from its own perspectives. In short, it forms perspectives that incorporate the intentions and perspectives of another person. Besides a physical and a mental world, it becomes acquainted early on with a social world as well. *Social* is what we call going through (experiencing) perspectives in which others participate who themselves go through (experience) perspectives.

5.3.3 Experience something – go through perspective – learn

You may argue that there is a large obstacle in the description of the perspectivist process. I'm trying to describe after all how a baby makes *our* world more and more its own, in a jargon that *belongs* to our world. In any case, this is not how the baby experiences it; that much is certain. However, it's the only way we can understand it. I've essentially outlined how a baby learns to construct physical, social, and mental worlds, assuming a simple perspective and based only on its own consciousness, its own experiences, running through perspectives.

We learn to define the physical world later on as a material, spatial world. In the social world in which individuals and groups of people operate, we learn on the basis of complex analogies to label others as similar to ourselves, or as totally different, as beings in a pluriform community. In our mental world – which is personal, since others cannot enter it – we can imagine anything. Only when we are acting in the physical and social worlds do we experience the physical and social effects of our actions. The entire societal world (including all the others) develops in this way over time.

For the baby, the distinction between the mental, material, and social spheres (domains) lies not in the fundamental nature of what is experienced – that is all perspective. The distinction is much more in the thing's place in and nature of a complex network of perspective. Others can directly refer to physical perspectives – this combination of one's own perspectives with perspectives in which others participate implies a social domain – and not to mental perspectives. *Domains (spheres) therefore become primarily assigned to perspective, and not the other way round.* First there is perspective. That perspective grows and changes and adapts; it rearranges itself; a network arises and *during* that process, the distinction arises between the material, social, and mental worlds. These differences have many pragmatic consequences, but no fundamental causes.

The amazing thing about human consciousness is that it learns. A consciousness continually uses perspectives that it has previously experienced to have, combine, and construct new experiences. The perspectives from the past are continually used to construct our experience of the present and to be able to anticipate the future. Perspectives

of the future roll back through the present into the past and in turn, change our future way of looking at things. We learn, whether it involves the experience of a material, mental, or social world, and whether you're skipping rope, calculating something in your head, or taking part in society. The most important thing is that there is a fabric of perspective developing. The core of this perspectivist process is not a presupposed distinction between mind and matter. The core of this process consists of anticipation and confrontation in terms of recursive perspective.

We learn what mental, physical, and social are, and we do this in perspective. We learn not only cognitively, as people in the world learning about bits of that world. No, we learn by ourselves, we learn about the material world, we learn about the social world around us and with us in it. We even learn societal life, us-in-the-world.

Panta Rhei. Everything flows (Heraclitus).

You are not consciously aware of your own birth. Not like the people around you, in any case, like your parents and the midwife. The radical differences between the experiences of the baby and the bystanders is extraordinary. They see you enter the world, as the arrived dualists they are. Every time a living being is introduced, a new flow of perspective arises. The bystanders mainly see a lot of matter, and a lot of helplessness. The living being itself is not at all aware of those categories yet. You could even wonder whether he is already there, given our perception of personalities. Experience takes place, which occurs in a flow of recursive perspective. Gradually, a recursive network of perspective forms in which an 'I' and a 'surrounding' start to appear. But somewhere around that time, probably sooner, a special process has started. A new source, a new flow of perspective started to reveal itself.

5.3.4 Things

How does this all work with things? The things we encounter on the street or see in the living room? It may be intuitive to see someone scoring on a penalty kick as a series of perspectives, but what about the ball itself? Or a squirrel? The table and chairs? A *thing* isn't a perspective, is it?

The conventional interpretation is that you have things, for example a soccer ball, and these things have properties. The soccer ball, for example, is white and round and about 30 centimetres in diameter. This works very well in practice. 'I've lost my soccer ball!', 'What does it look like?', 'White, round, about 30 cm.' The question is what remains of the ball once its qualities have all been summed up. It may work fine in practice, but if you think

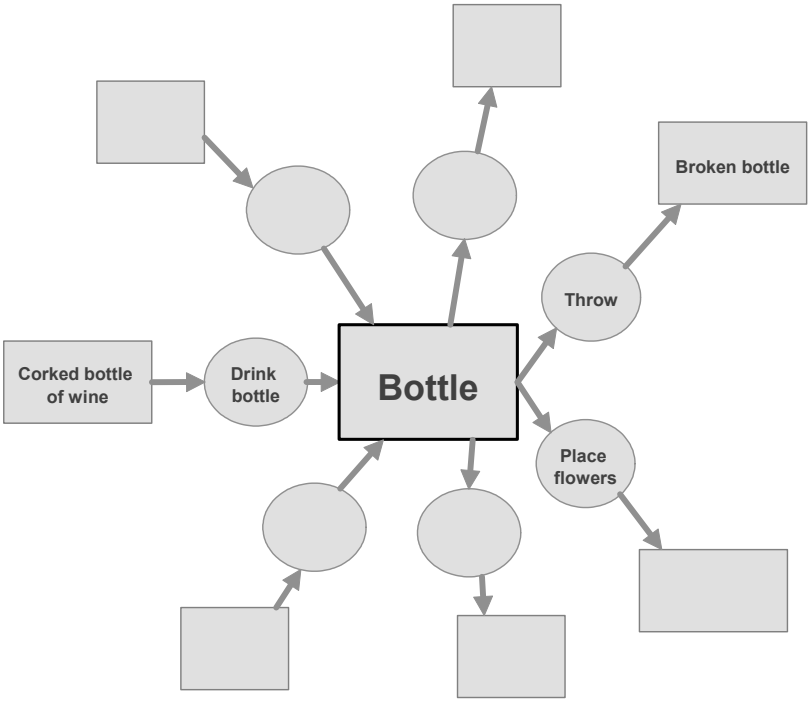
long and hard about it, the distinction between things and properties is rather shaky. Isn't the ball (the thing) simply the same as its properties? And what are those properties in essence? Aren't those properties just as many perspectives?

What is that soccer ball there on the ground, really? It's that thing we bought for 10 Euros, (ball on shelf; *purchase*; ball now a possession), that we kicked around (ball at location a; *kick*; ball at location b) and that was already flat after two weeks (new ball; *kick around for two weeks*; ball flat), and many more perspectives. That soccer ball is the product, the overlap, the focus of a huge number of perspectives. The ball is *perspective*.[197]

As another example, let's take an empty wine bottle. It started out full of wine, then we opened it and drank the wine (full bottle; *drink wine*; empty bottle). You can break the empty bottle (empty wine bottle; *throw on ground*; broken wine bottle). You can use it as a vase (empty wine bottle; *place flowers in bottle*; vase of flowers). The label fades in the sun (colourful bottle; *weeks in the sun*; faded bottle). There are many more perspectives that together form the thing 'empty wine bottle'. This fits in nicely with the definition of a perspective: a situation changes into another situation. A thing is a situation in the physical, material domain. All sorts of perspectives can result in it, and depart from it, in all kinds of recursive compositions (see the figure below of a thing as a first-order web of perspective).

Can all kinds of properties of things be identified in terms of perspective then? I suspect so; in any case, you can do this with many properties. For example, a wine bottle is made of glass, is green, has a certain hardness and melting point, contains red Merlot, costs € 8.99 in the supermarket, tastes good, and is mine. What does that look like in perspective?

[197] This description was emphatically inspired by Heidegger, who in his lectures ingeniously showed how a thing manifested itself, not by 'being there' but by 'worlding'. The example of how Heidegger has a lectern come to life is quite something. Also see Rudiger Safranski's *Martin Heidegger: Between Good and Evil* (originally published in German as *Sein und Zeit)*.



A bottle is a cloud of perspective. If you think of a bottle, then you experience this web in your consciousness. It may be more correct to say that the experience of this web is your consciousness.

You can look through glass (take bottle; *look through it*; see green world). Hold it next to a green cupboard door and you see a similarity (wine bottle and cupboard door; *compare*; they're similar). You can measure its hardness with a scratch test (take wine bottle; *perform scratch test*; hardness determined). You can measure the melting point with an instrument (take sample; *determine melting point*; melting point determined). You can know it's Merlot by tasting it (pour; *take sip*; grape variety determined) or performing a chemical analysis. You may like it or you may not. You can find out the price (go to wine shop; *find bottle and read price*; price known). And you can know the bottle is mine by trying to take it from me.

Here as well, properties of a completely different magnitude (melting point, financial value, ownership) are all indicated using perspective. Ultimately, the bottle of wine is the overlap, or perhaps it's even better to say the focal point of this kind of perspective and a great many more perspectives. You have experienced these perspectives during various episodes of

your life, and in one way or another you have taken these experiences out of their temporal and spatial settings[198] and combined them into the thing called 'bottle of wine'.

The examples only assume a first-order approach, but in principle the network or cloud of perspectives can be expanded further, for example, to combine one perspective with a second following it in time as a single more abstract perspective.[199] As you start drinking the wine, you can imagine losing control of your car on a curve, or worse, hitting someone with it. (You're looking truthfully into the future, which is hanging by a thread that is the bottle of wine). In this way, a bottle of wine becomes a case of wine, a whole vineyard, and a wine-making nation. The price of a bottle of wine becomes a failing financial system. The essence here, however, is that bottle is a very compact way of referring to a group of perspectives (a huge one by the way), and to something that in principle is 'delocalized' in space and time (but again, that's actually turning things upside down, since time and space emerge in and out of recursive perspective). Ultimately, a bottle derives its entire meaning from its place in, its being composed in, and its being a part of a huge recursive web of perspective.

If we extract one perspective, such as determining the hardness of glass (or the determinability of its hardness), then we call the degree of hardness a property or quality of the bottle. We're setting off one perspective against the entirety of perspectives, and in fact we are cheating a bit. Previously, the bottle was that thing including that property (that perspective), and afterwards, it's lost it. How much perspective can you actually remove from a bottle and still have a bottle? And how much can you add? There is only one satisfactory answer to these questions, and that is practice. Practice requires us to relate to the bottle in the whirling, enormously complex network of recursive perspective also known as our lives, our world, and our society.

5.3.5 On thinking and acting

Recursive perspectivism proposes that we experience tangible things, like a bottle of wine on the table in front of me, as a cloud of perspective. But does the same hold true for a concrete (i.e. real) wine bottle that is not within reach or sight, but in the cellar, and thus something I'm *thinking* about? Or the more abstract concept of 'a' wine bottle? Or the even more abstract concept of 'packaging'? In the 'real' world we share with other people, we cannot directly act with things that we are only thinking about or with abstractions. We first have to place the thing in a web of perspective, say by walking to the cellar (and we also experience this walk in and as a perspective).

[198] Have you really lifted them from their temporal and spatial settings and combined them? I'm simplifying things here a bit. Time and space are also emergent notions that arise on the developing fabric of perspective.

[199] See my dissertation, figure 6 on page 96, chapter 4 in its entirety, plus figure 9 on page 148 and the notes around them, for a complete theory.

What is the difference, then, between thinking and acting? It's purely the interlinking of the perspectives that make up the network or cloud of perspectives. If I only *think* about a bottle (even if there is not a bottle to be *seen* for miles around), then I can also think about how I could throw it at a burglar's head and what the result of that would be. (Burglar detected and bottle in hand; *throw at burglar's head*; burglar KO). As long as the story (the sequence of perspectives) keeps playing in my mental world, it's fine. Thinking, after all, is a mental notion, while seeing and feeling are sensory notions. *Thinking* about a bottle in my hand and *really having a bottle in my hand* literally makes a world of difference: the 'shared' world. But that doesn't change the fact that the *real* bottle and *my ideas about the bottle* are largely in the same cloud of perspectives. What they have in common is the mental part of the cloud of perspectives; they differ in the part of the cloud of perspectives that we call physical or social (which the imagined bottle lacks).

Precisely the same consideration applies to a puppy that really exists versus thinking thoughts about one. The real puppy can jump on me playfully and cut my fingers with its sharp teeth. The imagined puppy cannot (although I can imagine it doing so; I won't have a sensory experience of real pain and I won't need to be bandaged.[200] That manifests itself later when, say, I or someone else actually gets out the plasters and sees that there are just as many left as the last time we looked). The real puppy can bark, making someone else nearby come closer. The imagined puppy cannot (although I can think about it; the other person will not respond, and I know, because of this kind of consideration, that this is not a 'real' or socially actualized perspective).

The common basis of thought and action, and of any and all other experiences, is one of recursive perspectivism's essential and fundamental points. The following story shows how closely entwined they are. I wrote it when both of my sons were still small (thus it involves perspectives from my personal past).

> I awaken slowly, my eyes still closed, and hear the sounds of the day as it begins. In my house, the first sounds are from upstairs, of children starting their day. Two sets of feet coming down the stairs (four in total), then sounds downstairs as they make their breakfast. I lie half-asleep with my eyes closed and smile, thinking the day's off to a good start, but then I realize that it sounds better than it is, because if they're making breakfast, I'll have to clean up afterwards (and I hope they're not juicing oranges). I hear the juicer.
>
> Although I'm lying with my eyes closed, I know I'm in my bedroom. I open my eyes and see a part of it there already. I turn over (there's another part). I look out the window, there's a spot on it. (Spot: I can talk about it, I can wipe it away, it's all perspective).

[200] This discussion also sheds some interesting light on the phenomenon of phantom pain, in which someone missing a leg can still feel pain in their toe.

What is the point here? The point is that a substantial portion of my *thoughts* about the room, my *image* of the room (while my eyes are still closed) and actually *seeing* the room are exactly the same – *the same* cloud of perspectives for thinking and acting. Substantially the same, but of course they're not completely the same. This is apparent from seeing the spot (I couldn't see it with my eyes closed of course; it's new, probably bird poo, since I can't *think* a spot – one that others can see – *into being*). With my eyes open, I add new perspectives to the existing cloud (talking, wiping away). I remove a couple of perspectives as well (I *thought* that I'd hung my clothes on the chair) and add some (some of them are *lying* on the floor).

Now I'm lying in bed with my eyes open, but I feel close to the activities happening downstairs. The same as above applies now. I have an extensive amount of perspective about what's going on downstairs. I 'see' it happening in my head, I circle over it with the lens of my consciousness. I get up, walk downstairs, and see concretely what I thought was happening. Of course, I add much more perspective (the orange-juice situation is even worse than I thought) and remove some too. And actually *being* there is much more intense (more concrete, if you like) than *thinking* about it based on background noises, or even without them. But why is that more intense? Because downstairs, I can link many more pragmatically productive perspectives than upstairs.[201] After all, I'm standing in the middle of it (but more about spatiality later).

If I'm in bed, I can only *think* about how they're juicing oranges downstairs, but if I'm downstairs, I can *really see and smell* it and concentrate in detail on the little faces doing it. I can also choose to talk to them about it, join the social process, which also links a world of perspective. And by acting, I can add myself to the shared world, which will induce new actions from them. And these lie partly outside my consciousness.

Thinking and acting have the same foundation and are essentially no different from each other. A consciousness experiences; it only goes through perspective: a giant recursive perspective. Thinking and acting differ in their pragmatic consequences. However, if you look at their ultimate consequences, there are not separate mental and physical domains with differing origins, which are therefore ruled by totally different laws. There is only perspective; consciousness experiences perspective, partly in anticipation, partly in confrontation. We call part of this domain physical, another part mental, and another social. This has to do with the way in which consciousness links perspectives: other people do not respond to mental perspectives, but they do to social ones, and sometimes to physical ones; we experience the latter sensorily.

5.3.6 Space and time in perspective

The baby in its cradle experiments using its fingers and hands, experiencing tactile, auditory, and visual perspectives. We look at the baby from within our spatial worldview,

[201] Productive perspectives are those that lead to additional meaningful cross-linking.

which has literally grown over many years, and see its arms moving around in space. As the baby's collection of experiences increases, the net closes, and for the baby, a situation arises as well that more and more resembles our 'intuitive' three-dimensional interpretation of space.

We ourselves have explored much more than the baby has. We move over much greater distances, in many more directions. By the time we're adults, our worldview has been stretched by innumerable perspectives. The more our cloud of perspectives grows, the more it looks continuous, since we learn how one movement can follow another. To think that space really is continuous and has three dimensions is so obvious that we no longer question it: it becomes reality. We can walk around a tree either to the right or the left. We send people into space based on the assumption that reality is spatial, that space is reality. We never run into 'holes' or gaps in our spatial reality (it even sounds strange if you say it; of course we don't! But remember the story of Achilles and the tortoise!) An ever-present, continuous space in three dimensions looks like an excellent working hypothesis, which always appears to hold true, time and again. *Yet spatiality is not original, and more importantly, it is in essence discrete*.[202]

Time

We have limited time capacity available for consciously thinking, acting, and communicating. In other words, it's a situation of scarcity, and I have to choose between my activities. Sometimes I notice that I have two urgent things to do and only enough time for one. Two pieces of china fall from the table and I can only catch one of them. Tonight I can either go to a party or go to bed early. 'I don't have enough time', I say. What I'm doing, in fact, is weighing different interpretations (or courses) of perspectives against each other. I experience temporality in terms of these alternatives. If I could run through all the perspectives that I can imagine, in any random order, then temporality would simply not exist.

Time goes by very quickly if I'm busy doing 101 things. There is no capacity to run through more perspectives (and it's actually necessary). Time goes by slowly if there is enough space to run through other perspectives. I read in the paper that in Greece, some of the older people express the walking distance between two villages in how many cigarettes it takes. What is actually happening here is that people are expressing put-together perspectives, using a self-repeating perspective as a unit of time. The expression 'it's a three-day walk from here' does something similar; the daily cycle of the sun takes the role of the cigarette. It's no different with months (lunar cycles) or years (four seasons). This is how time arises, out of a pattern of an increasingly complex collection of coherent perspectives.

[202] Discrete as distinguished from continuous. Something discrete has boundaries, while something continuous, well, just continues.

Time-space

That time and space do not exist originally and independently of each other is obvious just from the way we identify and establish them. *Every* composite perspective, *every* mental step, action, communicative, social, or societal activity with a starting situation and an ending situation has both spatial and temporal dimensions. However, the two notions cannot be separated. There cannot be only time or only space. This sounds crazier than it is in everyday life.

We measure time using equipment varying from a sundial to an atomic clock. Sixty seconds corresponds to *one sweep* of the second hand around the dial of an analogue clock. The jump from 11:59 to 12:00 on the digital clock is also a *spatial* difference. Measuring time *always* implies a spatial component as well. And if we measure space, we can use water to measure a volume (Archimedes' principle) or a measuring stick to find out the length of something. A metre of fabric is the amount you have if you hold the one-metre measure along the bolt. You measure space, but *inevitably* the action of measuring takes time. Thinking of spatiality also takes time, even if thinking of a distance space goes a lot faster than physically travelling it.

There are perspectives where the accent may be more on a spatial dimension, such as moving a cupboard. With other perspectives, the accent is more on time, such as scoring as many goals as you can in 90 minutes. But space and time always occur together, since moving a cupboard takes time, and the ball has to go in between the goalposts.

The distinction between time and space

What changes and what remains the same? Time and space develop on an underlayer of perspective. You're sitting on a bench looking at an intersection, and you see a group of kindergarteners crossing it; a little later, there is a completely different situation, as a magnificent Ferrari passes through the same space. The place changes over time. You also know that if you leave your house in the morning to go shopping, your house will still be there when you get back. There is only the flow of perspective. Both time and space are experienced in this stream of perspective; both time and space are experienced within the context of perspectivist change. But then what is the essential and fundamental difference between time and space?

Spatial experience has to do with situations – the two outer ends of a perspective – that stay the same. You can *return* to your house again and again, and you experience that place in space as a constant factor. It's also a given that our space has three dimensions: you can build on it and it stays the same, just like the length of the standard metre or the average diameter of an orange.

Thus, the essence of spatial perspectives (compared to temporal) is that you can go through perspective both from the starting situation to the ending situation, and from the ending situation to the starting situation. If you go there and back again, you end up in the *same* situation. This is *circularity*. Let's say I get up from my chair and walk towards the picture on

the wall behind me, and back to my chair again. I've come 'circularly' back to the same situation. (Not completely the same, since the leather of the chair seat will have deteriorated just a bit more. More pragmatically, the situation of perspective 1 is identical to the ending situation of perspective 2.)[203] The essence of spatiality is that the processes may change, but the beginning and ending situations stay identical within certain pragmatic boundaries.

Temporal experience has to do with the opposite: the process or the change remains the same, but the situation changes. First you're looking at the mountaintop in the sun, then *a little later* you're looking at it again (the process) and you see it darkened by clouds. Or say that every day you walk from your chair past the painting, just to enjoy it, and back to your chair. The changeable parts of these perspectives are the same each time (as are the situational ones, incidentally). But if someone has taken the chair while you were looking at the painting, or has set fire to the chair, you won't come back to the same situation. The essence of temporality is that the processes may spatially stay the same, but the situations change.

The conclusion is now unavoidable. Time and space are not primordial, but are constructed on the continually developing fabric of perspective.[204] A perspective consists of a starting situation, a process (change), and an ending situation. In the notion of time, the perspectivist mutability manifests itself in situations with immutable processes. In the notion of space, the immutability of situations manifests itself in mutable processes. There is a quantized time-space, with the quantizing taking place on the basis of and in terms of perspective.

5.3.7 Situations and changes in perspective

The terms 'situation' and 'change' are closely related to our awareness of time-space. There is a lot that changes during a walk in the woods: my thoughts, the woods I'm walking in, my experiences during this walk. A lot remains the same: gravity, and the sun that rises and sets. Something only changes against a backdrop of immutability (meaning it cannot change), and vice versa. Both unchanging situations and changes are necessary for you to experience *at all*.[205] This is precisely why the definition of perspective as a building block of experience is based on these foundations (*initial situation, activity [change] and resulting situation*). The inescapable conclusion seems to be that situations and changes, statics and

[203] The changes between them, let's take the outward journey and the journey back – these parts of the perspective are not identical. If I get up from my chair and walk to the painting of Jan Makkes on the wall behind me, then I do not walk back to my chair in exactly the same way. (Now that I think about it more, that would be a very strange movement. It would be a mirror image in time, like playing a film backwards.)
[204] Time and space are perspectivist dimensions: at their outer limits, they exclude each other, but at those limits they are unattainable. This is a large spectral middle field.
[205] Being and changing are also perspectivist dimensions: at their outer limits, they exclude each other, but at those limits they are unattainable. This is a large spectral middle field.

dynamics exclude each other. Bike is parked upright (situation); *bike falls over* (change); bike on the ground (situation). It looks crystal clear. But situations and changes are problematic notions, philosophically speaking, and certainly so if we are working from within a superficial, objective observation.

Four aspects of situations and changes are worked out below, from the viewpoint of perspective: experiencing situations and changes; what makes something a situation or a change; the fact that situations consist of changes (and vice versa); and the question of whether you really can be in the same place twice.

Experiencing situations and changes

Everything you experience is *perspective*. Seen from the viewpoint of recursive perspectivism, even situations and changes are not completely different from each other. They arise; they each, in turn, consist of one and the same foundation: perspective. So where is the difference?

I'll go back to the example of the wine bottle. Earlier in this chapter, I explained how the thing (or the concept of it; it doesn't matter) 'wine bottle' has to be seen as an extremely compact way of referring to a wisp of perspective. 'Wine bottle' unmistakably has a certain permanence as a cloud of perspective; it can be conceived of as a situation.[206] The previous figure also made this clear by positioning the situation 'wine bottle' as the hub of this cloud of perspective. Even if you are aware of a puppy, a societal ill, or a work of art, your focus is always actually on other elements sticking out of a cloud of perspective, but you keep coming back to the central situation before experiencing another aspect. That's where you are situated, as it were. This central situation derives its meaning from the perspectivist network of which it is the centre.

In the case of a change, there is also a cloud of perspective, but its structure is of an entirely different kind. The following paragraph puts the change 'patch a bike tyre' in perspective (the changes are in italics).

Bike with flat tyre – *remove inner tube* – bike with inner tube out – *find leak* – bike with position of leak known – *patch tyre* – bike with patched inner tube out – *put inner tube back on rim and pump up tyre* – bike with functional tyre.

If you are aware of a change, you are thus continually moving from an initial perspective to the next one; the situation resulting from the first perspective is the departure point of the second, and so on. Thus you are always differently situated, in other words, your position changes. The situation 'wine bottle' is right in the middle, like Paris is at the centre of all

[206] Unmistakably you will also learn about the concept of 'wine bottle'; the bit of perspective will develop from smaller to larger in a nonmonotonic process, and you can also forget it, partly or completely. For the sake of argument I'm assuming a 'snapshot', a moment in time: I'm reasoning on the assumption that you know what a wine bottle is.

those motorways connecting it with other places. By contrast, the change 'patch tyre' is described as a trip in which you go from one small perspective to another (as we go from Paris to Orleans and then to Montpellier). In the situation 'wine bottle' you in fact experience a large number of perspectives spaced close together, as a situated whole (the temporality is less important; the constituent perspectives are also very close together then). In the activity 'patch tyre' you experience a series of perspectives as a changeable and temporal whole (the situatedness is less pronounced, since it is changeable). Situations are centred in a network of perspectives, like a spot with a centre; changes are decentralized, nonsituated (situated differently every time), and visualized as a path.

If you experience a situation, then you actually resonate a bit, crisscrossing over a given point in a network of perspectives; you remain there hanging out as it were. If you experience a change, then 'you cover distance'.

Is something a situation or really a change?
The above discussion seems to give us some firm ground to stand on: looking at a network of perspective, we see situations and changes as clearly distinct from each other, like train stations and train tracks. But it's not that simple. Whether something is a situation or a change depends on whether we see it as a spot in a network of perspective where we remain, or as an element of a path made up of perspectives. To stick with the metaphor: Paris can be both a residence for someone who lives there, and a place someone else goes through on a longer trip. Here are another couple of intuitive examples that illustrate the shaky objective foundations of situation and change: let's say you have a very nice bike. It's standing on the pavement (situation); *it falls over (activity)*; it is lying on the ground (situation). But what if you're the designer of an innovative, greatly improved kickstand? The bike falling over is then the starting situation; *putting on your bike a new kickstand* (activity) results in it no longer happening, since the bike now stays up (resulting situation). And what if you leave your bike parked at the seacoast, in the salty air? It slowly rusts away – that's also a change.

Or take a ball-point pen. I have one here in my hand. It's a piece of plastic filled with ink. I can take it with me when I leave, and when I come home at the end of the day I still have it. The pen is a stable and durable piece of matter (or a 'situation'). But if I use it to write today, it's another story. The pen was full when the day began, and at the end of the day it has less ink in it. The pen suddenly turns out not to be a situation any longer, but subject to a slow change. Let's look at the same pen using an electron microscope. What was first a durable piece of matter, and later a slow change, now changes to a rough and dynamic whole. What goes 'wrong' here in objective terms (a situation turning into a change) is that we're leaving the observer out of the picture – that's also in line with the definition of objective: an observer who always looks at something differently is subjective par excellence. Objective is from outside, subjective from inside. You can't say if something involves a situation or a

change if you don't know the orientation of the consciousness experiencing it, that is, the intention of the observer.[207]

Take our current society, which you could describe as one big mass of change and dynamism. However, if your starting point is the wish to make a transition to a sustainable society, it's only a situation. Or imagine that you're sitting at an open window. There's quite a draft, an unmistakably *dynamic process* since the cold air molecules are speeding through the gap and past your neck. You feel your neck getting cold and stiff. You now recognize the draught, which was still a process a moment ago, as an *undesirable situation*, and you get up, turn around, close the window, and sit back down. What was just 'objectively' still a process, turns out intentionally to be a situation. If your colleague had just opened the window before you noticed the draught, then improvement will be at issue (i.e. your colleague may not think the situation has improved). From a molecular point of view, a draft is a process, while for someone concerned about getting a stiff neck it's an undesirable situation, and for the colleague who had opened the window, it's a desirable situation.

The world is experienced as a network of perspective; depending on how you move in it, situations and changes play leapfrog with each other. The ultimate consequence is that situations and changes cannot exist separately from each other. See the definition of perspective: it always entails two situations *and* a directed process. They even exist separately (I'll elaborate below). Consciousness makes the difference. Intentionality, situations, and change have a fascinating interplay within a consciousness.

Situations consist partly of changes

The final point with regard to the distinction between situations and changes involves their internal composition. I've explained several times that the notion of perspective is recursive. Recursivity implies that something consists of building blocks that are similar to each other. A Lego set is a prime example: you can put smaller building blocks together to make larger building ones, which you can in turn connect and make into even bigger building ones. Conversely, you can take large building blocks apart, and somewhere you have to stop.

Perspective is recursive. A perspective consists of a starting situation, a change, and a resulting situation. But a situation can also be unravelled into a constituent starting situation, change, and resulting situation. And a change can be unravelled into a change, an interim situation and another change. Similarly, perspectives can be put together to make a composite perspective. For example, a ball-point pen can be seen as a situation. Once you write with it, however, the starting situation is a full pen and the resulting situation an empty one; the process (activity) in the middle is writing. This writing process can be unravelled into many writing processes, each with an emptier and emptier pen as their starting and ending situations.

[207] This relates to the role of the observer in quantum physics.

Twice in the same place?

'You cannot step into the same river twice, because different waters are always flowing past.'
Heraclitus

You cannot be in the same place twice, as the Greek philosopher Heraclitus said. But, you may protest, surely it's possible to be in the same place at two different times *in real life*? Actually, it's not possible in real life either. Even the pyramids are slowly but surely succumbing to erosion. What is possible is that – for specific intentions – situations or activities *pragmatically* speaking stay the same. The ice-cream parlour, next to the fishmonger's in Zeist where I live, remains the same as far as buying ice-cream cones goes. That's interesting: a specific intention is a limitation in terms of perspective. You're snipping a wisp of perspective away from the whole network of perspective, as it were. In this way, all men are the same, or all elephants, or all size-M4 nuts. Here we're touching on the core of the generalization, and of the analogy. But you also know that every man or woman is an individual, just like every elephant, and sometimes you even get an M4 nut with the threads stripped.

What it comes down to is this: everything is the same and everything is also different – the ultimate paradox. Everything is the same, because everything is perspective. But everything is also different, because every perspective is also uniquely situated in the network as a whole. Here we see the roots of the three dimensions of society. They are actually the three dimensions of human experience: everything is the same, everything is different, together it's one whole.

Wait a minute – didn't I just say that you *can* repeat the experience of buying ice cream in the ice-cream parlour? That's right; with this restriction in mind, you *can* do the same thing twice. But if you place buying an ice-cream cone in your total network of experienced perspective and take a look using the wide-angle lens, you'll see that you never do the same thing twice, since its place in your total network of perspective is different each time you do it. If we expand the network of perspectives, then sooner or later it will turn out that that something is different, and that there has been a change. The fact that you know that it's the second time that you're at the 'same' place by itself proves that it's a change. You can only see this with the wide-angle lens.

5.3.8 Dualities in perspective

There are some major parallels between the dualities we've discussed so far: matter and mind, time and space, situation and change, cause and effect, and anticipation and confrontation. They are all based on the notion of perspective (starting situation, change, ending situation). According to recursive perspectivism, they do not exist primordially, i.e. beforehand (a priori), and they are not clearly separated from each other. Only at their limits do they exclude each other, but these limits are inaccessibly and unattainably far

away. They can easily flow into each other. They arise or emerge in consciousnesses as patterns in developing recursive perspective. Thus something is not *either* one thing *or* the other beforehand.

With *matter*, the material perspective can at least in principle be experienced collectively (Miller says that matter is the possibility of *permanent* perception; I'll add *collective*, or at least *by everyone*, to this definition). With *mind*, the mental perspective can only be experienced individually.

With *time*, the situations change in which the processes remain the same. With *space*, the processes change in which the situations remain the same. (Remember the chair with the painting on the wall behind it).

Situations are characterized by the fact that the fact that many processes are attached to them (spatial and temporal). *Processes*, on the other hand, are characterized by the fact that they lead from one situation to another.

Anticipation is at work if the starting situation of a durable perspective (say a causal perspective, or a spatial perspective) is experienced by an actor, since the actor will anticipate the outcome. The alternative involves *confrontation*.

Causality is a variant of the above: causes are invariably followed by *effects*. *Effects* are invariably preceded by *causes*. If you have one, you can assume the other (at least in case of causality).

We've been talking about systems of perspectivist dimensions here. The three dimensions of society (pluriformity, similarity, and unity) also form one such system. The essence of a perspectivist coordinate system is that the axes together form one whole, and exclude each other at their limits (extremes), but in between these limits, they flow into each other spectrally. Here, we've stumbled onto a similarity with uncertainty relationships from quantum mechanics, that you cannot exactly know all the constituent dimensions. The more you focus on one, the other one fades more and more out of the picture. This flowing into each other, as well as this fundamental uncertainty in this book, have everything to do with discrete inverse proportionalities, all of which I'll discuss later in this book.

5.4 Identity of actors in perspective

'We make our decisions.
And then our decisions turn around and make us.'
P.W. Bornum, nineteenth century

Both cooperation and competition take place between actors, working from within their own identities. This is true for both apes and people. Teams are also actors, multi-actors to be precise. They consist of team members, each of whom has an identity. The team as a whole is also an actor with its own identity. So what is an actor's identity then? How can an identity define an actor and at the same time be vulnerable to change?[208] Recursive perspectivism gives us a special way to see it.

5.4.1 Perspective

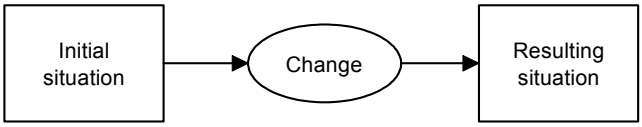
All things change by themselves, including things of value. The only thing necessary is time. Your colleagues, your garden, mountain ranges, and even continents and planets change. Given enough time, everything you value crumbles to dust. Change is very simple. Just wait for it![209]

Improvement is a very different story. Improvement is an unusual variant of change. Sometimes improvements just come to us or are handed to us on a silver platter. Enjoy them! Unfortunately, these events are exceptions. Improvement doesn't usually happen all by itself. It takes effort.

Make some effort and you can certainly change your environment. We can even make improvements in complex situations that involve many different parties – if we do our best. There are no hard and fast guarantees of success. On top of that, what looks to us like one and the same situation may be good for one person but horrible for another. One person's improvement may be fatal for another person. However, given these conditions, we can still make many more improvements than we usually think we can, and we can also do so with others. It's a matter of perspective.

In essence, every change, great or small, short or long in duration, can be clearly understood as a coherent whole with three components: a starting situation (1) changes (2) into a resulting situation (3). A three-part set like this is what I call a perspective.

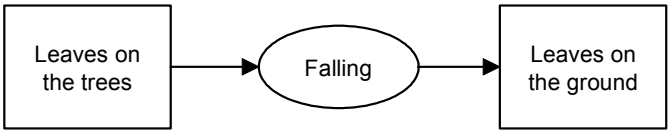
[208] This chapter is partly an adaptation of Intermezzo I in Part 3 of *Multi-actor Procesmanagement in theorie en praktijk.*
[209] Whether you always have the time to wait is another question entirely.



The structure of a perspective (repeated).

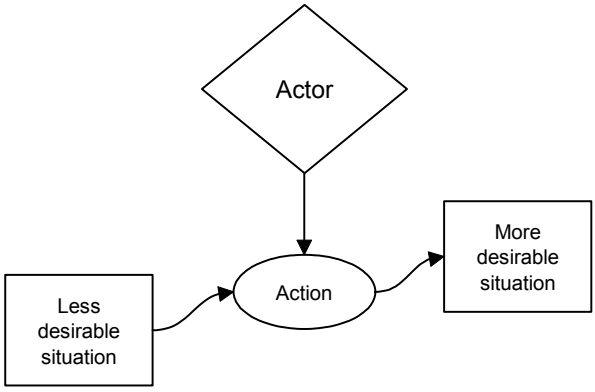
Perspective describes a change in three neutral terms: an initial (starting) situation, a process, and a final (ending) situation. The arrows indicate a relative chronological order. As a whole, it's an autonomous activity (i.e. an actor is missing, or in any case is not getting any attention at all).

As an example, let's take the situation of leaves falling in autumn. It happens all by itself, and you don't have to attach any value to it: it's an autonomous value-neutral perspective. It looks like this:



An example of an autonomous perspective.

Every perspective consists of these three elements. Improvements, however, add a normative element to a change perspective. The owner of a perspective *has an opinion* about it. Thus, here the actor enters on stage. A *less* desirable situation changes, often through intervention, into a *more* desirable situation, at least from this actor's standpoint. What you then have is an intentional *improvement perspective* (see the figure below; the difference in height between left and right suggests the improvement).



An intentional change perspective.

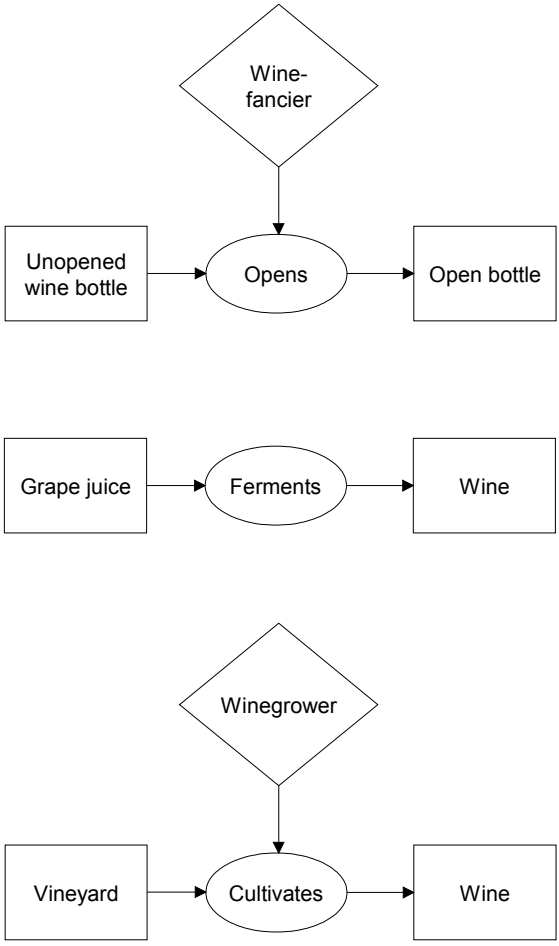
Improvement perspective adds a normative element to change perspective, and presupposes an actor. The whole is an intentional activity (an actor consciously causes or facilitates the change).

Perspective is the foundation of this *Society in Perspective* series. We experience perspective. A consciousness experiences perspective. During our lives, we make recursive networks of perspective, we use these networks if they are good enough (anticipation), and we adapt them if we are off balance (confrontation).

Thus all three – an intentional act, an autonomous change, and combination of the two – can be described as perspectives. (See the examples below). But so can calculating something in your head or solving a riddle. If an actor is intentional and chooses to act purposefully, then this action is accompanied by an improvement perspective, whether the actor is an onion farmer, a greengrocer, a ministry, or a world leader and his/her entire staff. Selling onions is action, tripping and falling is not action in this sense (since it's not intentional). Tripping and falling can therefore easily be described as an autonomous perspective. Deliberately *tripping someone* is another story, of course.

Recursive perspectivism is a philosophy that views our experience of the societal world as a network of perspectives at different levels, in other words self-similar, self-contained, or fractal.[210] They work the same way as Lego pieces, so you can put several smaller perspectives together to make a larger one or vice versa. You can think and work at different scales. For example, the perspective of patching a bike tyre can be unravelled into various smaller perspectives. An astronomer, a world leader, a civil engineer, a train conductor, an onion farmer, a painter, and a quantum physicist all choose their own domains and scales. It's a question of perspective.

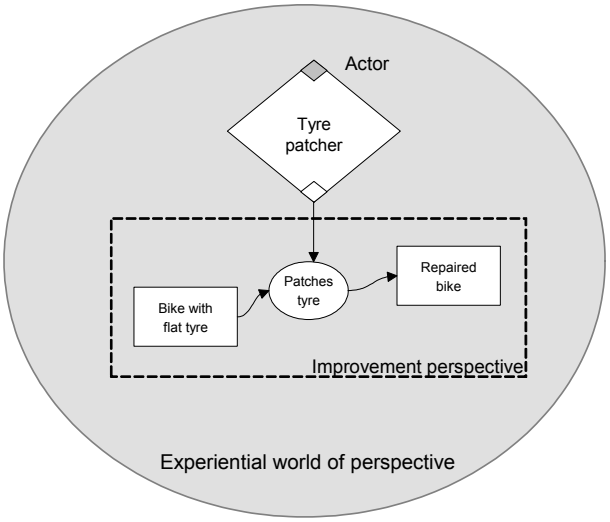
[210] We owe the term 'fractal' to Benoît Mandelbrot.



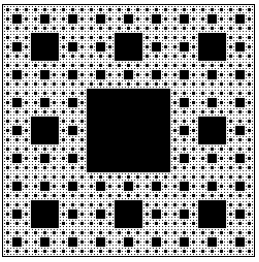
Three perspectives: mainly intentional, mainly autonomous, and mixed.

5.4.2 The perspectivist actor

Every conscious intentional (value-seeking) action, in any order and on any scale at all, from fixing a flat bike tyre to consciously putting our world in order, is based on perspective.



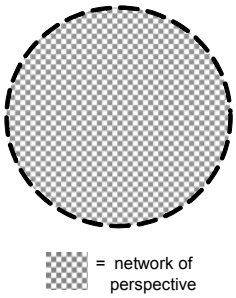
One perspectivist actor in his/her experiential world.



Fixing a flat bike tyre can, in turn, be split up into a long series of smaller perspectives (turn bike upside down, remove inner tube, fill bucket with water, etc.). An actor can, therefore, be easily described as a more or less structured web, a **recursive network of perspectives** (like Lego pieces, the Sierpinski carpet at the right, or the famous 'Mandelbrot set' of fractal specialist Benoît Mandelbrot). This network is a package of perspectives of which part is personal (private, intentional, and mental) and part is public, in an environment shared with other actors. Seen from the viewpoint of the actor it may be more accurate to say that he or she (or it) is in ('situated' in)[211] a given place in a recursive network of perspective and takes decisions and takes 'perspectivist steps' in any domain, whether mental, physical, communicative, or another. As a philosophy, recursive perspectivism provides a homologous (uniform) foundation, from which various dualities (diptychs such as matter and thought, time and space, and situation and change) and multi-dimensional scenarios (p, s, u – more about these in the next chapter) emerge.[212]

[211] See also *situated cognition*: knowledge cannot be seen as separate from action (by an actor) in a mental, social, cultural, physical, etc. context. Recursive perspectivism unifies all these contexts as recursive fabrics of perspective. For a fascinating historical/scientific discussion of *situated cognition* see William J. Clancey, *Scientific Antecedents of Situated Cognition*, in the Cambridge Handbook of Situated Cognition (Cambridge University Press, pp. 11-34, 2008).

[212] Recursive perspectivism explains how knowledge and action are connected to each other in a single environment as part of a fabric of recursive perspective. Recursive perspectivism is homologous (in essence



The recursive perspectivist actor.

5.4.3 The radical actor thesis and intentional logics

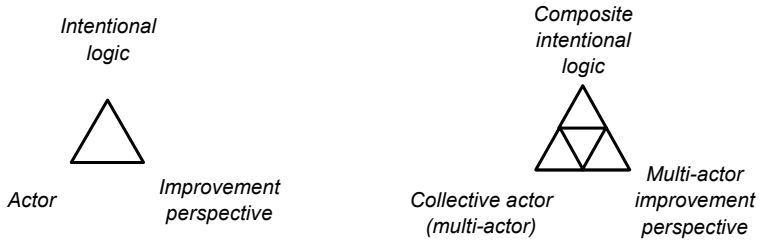
Mental, material, and communicative perspectives usually intertwine with each other in a complex flow, fading in and out and taking turns with each other in an inimitable way. There are many mental, physical, and communicative perspectives in, for example, figuring out an equation with a calculator, looking up a contact in a smartphone, designing something down to the details, starting a relationship, and tackling climate change. We thus distinguish between the inside and outside of an actor (or multi-actor), and the environment in which the actor or multi-actor acts. If we involve an actor, we address that actor on all of these elements (things not consciously experienced by any actor do not exist). The result is a worldview built completely of perspectivist actors. I call this concept of the world and of society the *radical actor thesis*.[213] It boils down to this: societal practices consist of recursive perspectivist actors. This concept is necessary, and it is enough, for us to understand our world and our society from a viewpoint of intentional improvement.

The figure at the left below shows how an action arises from the combination of three things: an actor, an improvement perspective, and an intentional logic. At the right, we see how a new collective action can arise from cooperation.

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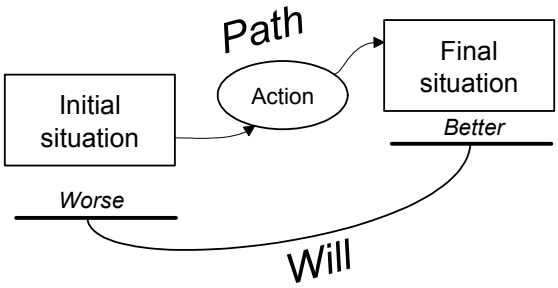
a Spinozan idea), and thus avoids the pitfalls of dualist world views (e.g. the Cartesian mind–matter issues). See *Een filosofie van de maatschappelijke praktijk* in its entirety for a philosophical guide to recursive perspectivism, and in particular p. 99 ff., the section on Copernican reversals (for a philosophical positioning of recursive perspectivism with regard to positivism and relativism), p. 105 ff. for an explanation of material, mental, and social in terms of recursive perspective, p. 115 ff. for a discussion of time and space in perspective, and p. 126 for how the dualities mind–matter, time–space, and situation–process dualities emerge similarly from the recursive fabric of perspective. See my dissertation section 2.4 Philosophy for an early formulation of these ideas.

[213] See e.g. *Multi-actor procesmanagement in theorie en praktijk* p. 94 ff., *Een filosofie van de maatschappelijke praktijk* p. 227 ff.



Actors, improvement perspectives, and intentional logics, separately and in coherence.

An *intentional logic* is the urge, or the will that arises in an actor experiencing a genuine improvement perspective: this will depend on the improvement, and causes the actor to attempt to make the improvement, although the required action of course plays a part.[214] Once this will is there, and the path (the course of action) is considered feasible, the actor goes into action.[215] 'Where there's a will, there's a way', as the saying goes. Together will and path (way) enable a targeted and substantiated attempt to realize the improvement potential, to make good on the promise of the improvement perspective, and to perceive its experiential value.



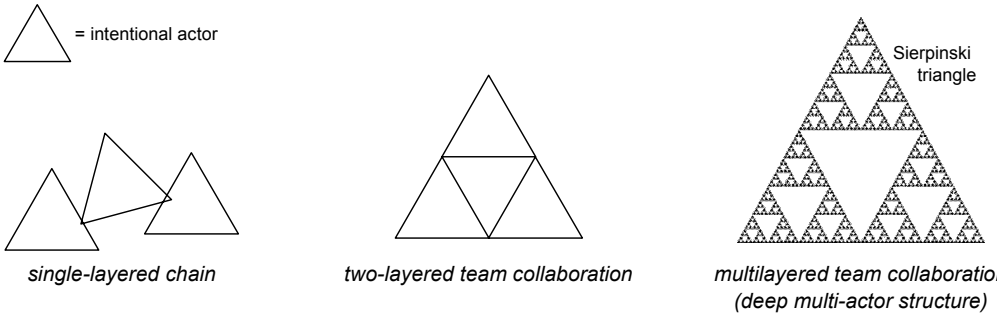
Intentional logics require will and a path. The actor then attempts to carry out the action.

Actors, improvement perspectives, and intentional logics occur at different levels, in random complex states of coherence, just like Lego pieces. Lego has a lower limit: it cannot be smaller than one Lego block. This limitation does not hold for perspective, which can be expanded upwards and downwards, or even better, outwards and inwards as much as you like. What of course still holds true is that changing a perspective has consequences for the

[214] The notion of the will that arises with a perspectivist actor, which one can play with and combine in collective intentional logics, was clearer to me after reading Arthur Schopenhauer's *The World as Will and Representation*.

[215] People are extremely good at thinking through, combining, judging, testing, and adapting improvement perspectives. Atoms and molecules are not. In this crucial regard, then, improvement perspectives are different from autonomous perspectives.

perspectives it itself is a part of (upwards) and the perspectives it consists of itself (downwards). I can only drink up a particular bottle of cola once, and if I take the bottle from a full crate, the crate is no longer full. The figure below illustrates the recursive, fractal nature of the triptych of actors, improvement perspectives, and intentional logics. The figure is somewhat imperfect, since the choice of the triangle (guided by Sierpinski) limits it to three actors per leap in scale, but it's a good way to illustrate how individuals can form a group that in turn can be an actor on a larger playing field (and the other way round). A recursive perspectivist view arises of chain-like groups of actors (what we would call cooperation), two-layered partnerships (what we would call collaboration), and multi-layered associations (resulting in profound and stable societal structures).



Recursive actors form strong social structures

Above all, the occurrence of various strong scales gives deep structure to societal practices. The expression 'to have one's finger in several pies' (in Dutch we say 'playing chess on several boards at the same time') is depicted in a remarkable way in the recursive, fractal Sierpinski triangle. In a robust society, people have their fingers in lots of pies. This has very little to do with strong top-down control: every pie has its own perspective. Recursive perspectivism shines a novel light on, for example, the surprisingly rapid fall of the Soviet Union and the surprisingly difficult birth of the European Union. Shared perspectives and intentional logics, as well as collective actors, were lacking at crucial levels. With the Soviet Union, the largest scale was there, but it was not supported by the actors at the scale directly underneath it or the scale underneath that one, so it did not survive. In the European Union, adequately embedding the largest scale is still proving to be difficult today. I don't consider myself sufficiently informed or competent to analyze these issues in any more depth, but I think it's obvious that a recursive-perspectivist team collaboration leads to robust social and societal structures. The relationship of this observation to *the path of humanity* will be worked out in detail further on.

Make mine chocolate. At this point, you may be thinking that 'recursive perspectivist actors', 'radical actor thesis', and so on is a bit abstract. If so, you're not alone. However, the recursive perspectivist worldview is really worth taking the time to understand, as it

is enormously practical in its operational consequences (see also chapter 9 of this book, 'Societal Innovation'). Ultimately it has only one building block: perspective, including improvement perspective (in combination with an actor and an intentional logic), and plays with it like kids play with Lego. But at the same time, the recursive perspectivist worldview includes the conventional two-part worldview of thinking people (with free will) in a material world (that is just there as a given) in the same way that a 100-euro note includes a 20-euro note. You give up nothing, you only gain, and you can do a lot more with what you get.[216]

I often use a little experiment when I talk to groups to illustrate the radical actor thesis and the recursive perspectivist, intentional actor. I fiddle with a bag I have with me, while looking at everyone with a friendly expression (this is essential). I put it away, then pick it up again (watch the films of Alfred Hitchcock to understand what I mean.) Then I promise the group the following: if two people from the group stand up, come up to me, and take the bag, then give it to a third person, then the group can keep whatever is in the bag. This is fun! The people in the room don't know what's in the bag. They may have ideas, but mostly they're incredibly curious. And I've outlined an improvement perspective for them, one that they may not completely understand, but one that they cannot resist, and they want to know what's in that bag. Since I was looking so cheerful, they know it won't be something dangerous, and the path is crystal clear.

People giggle and look at each other. There's a whiff of 'we're not buying into this, are we?' in the air, but human nature always wins. Two men (almost always men, and almost always seated close up but not in the first row) look at each other, nod, and smile (sealing a pact), then walk up to me. They take the bag, and look around for someone to give it to. This is usually a woman, who at first looks willing, then surprised (she has to go along with it; what else should she do at this point?). She opens the bag, gives a cry of delight, and passes out the chocolates, because that's what's in the bag. Everyone is happy, everyone is enjoying the chocolate (everyone is participating).

I then get the group to tell me what has happened, and I never go into any psychoanalysis about why it's usually the men who get the bag and the women who distribute the contents. However, what unfolds here – what naturally arises (emerges) within the group under these particular circumstances – is an instance of pure multi-actor cooperation, based on a large number of coherent improvement perspectives at various levels. I'll list a few of them:

1. *The group*, who wants to know what's in the bag.

[216] Perhaps I should add some nuance. If you've ever had a 100-euro note, then the world from before that time, of *only* the 20-euro note, is gone – you've lost that.

2. *The two men*, who come up to me to take the bag.

3. *The woman* who receives the bag to open it.

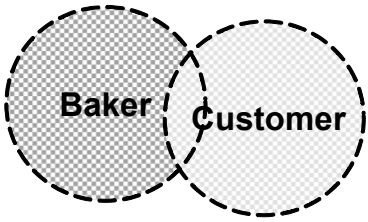
4. *The woman* who divides the spoils among the members of the group.

5. *The group members*, who put the chocolates in their mouths contentedly, partly feeling it's a reward.

6. *The group as a whole*, including the subactors (two-layer cooperation), who are happy to participate in the experiment.

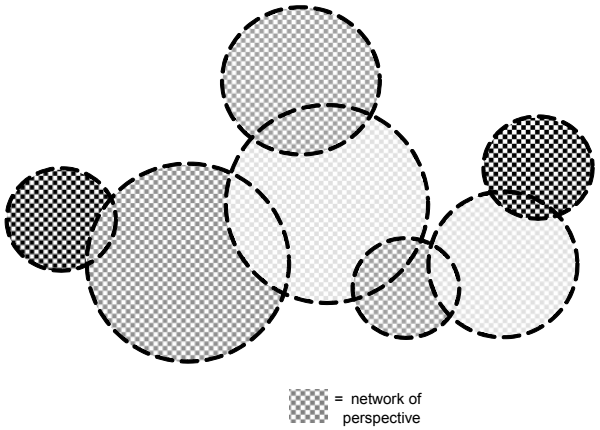
This is recursive perspectivism fully in action. The key to understanding what's going on, and to accomplishing something, is to distinguish between actors (the radical actor thesis) and their improvement perspectives (the perspectivist actor) in mutual coherence.

5.4.4 Actors in interaction



A simple example of two perspectivist actors in interaction is the transaction between a baker and a customer. The baker bakes bread and sells it to the customer. The customer buys the bread from the baker and then eats it. This interaction comprises mental, physical, communicative, individual, and shared perspectives. Some parts of the network belong to the baker (the bakery, the recipes, etc.). Others belong to the customer (the breakfast table, the others at the table). Some parts are also shared (aspects of the shop, and the money that changes hands).

Societal practices are more complex versions of this kind of interaction. Various actors interact with each other. Each actor has a particular network of perspective and has particular interactions with particular other actors. All together, this results in a more complex multi-actor practice. It is not necessary for every participating actor to see the whole. What do you know about exactly how your pineapple is grown in Costa Rica, or the details of the strategy meetings of a political party? The figure below illustrates the emergent, fragmentary, and chain-like nature of complex societal multi-actor practices.



A multi-actor practice

It can be done differently; for example, we can also strive for a coherent pluriformity. I'll come back to that in detail in the next chapter, using a soccer team and Team World as examples, but at the moment it's not the dominant mechanism.

Actors in perspective

Take the baker. He shares general baker knowledge with other bakers, knows his own bakery like the back of his hand, and shares his store with the customer. He is also the father of his children and a husband to his wife. Treasurer of the pool club. Co-resident on our earth.

It comes down to this. The baker is a complex network, a complex cloud of perspective. Some parts of this perspectivist network are completely private and his own. Other parts he shares with his wife and children, or with the members of the pool club, or with all the other bakers on this world. And some parts he shares with all fellow human beings on this earth (like the realization that things fall downwards, and that the sun rises, and that he has a heart and lungs).

We are thus all perspectivistically related to our fellow human beings in a kaleidoscopic game, or unique because we're different from all the others. And the positions in between also appear in all shapes and sizes. This spectrum of actors is mentioned in Part I of this series, *A philosophy of the societal practice* in preparation, and it is called the world spectrum.

5.4.5 The identity of an actor

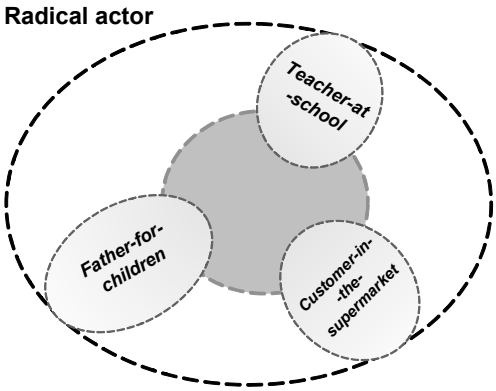
An identity is the most individual quality something can have. The relationship between the fact that something is there and what it is was eloquently expressed by W.V.O. Quine with his 'No entity without identity'. An identity (*what* something is) is invariably part of an entity (*that* something is). Everything that is thus has its own identity, including actors. Actors are entities in our societal practices, and they have unique identities. In their radical definition, actors are little clouds or wisps of recursive perspective, part of which is shared (accessible to others) and part is individual (personal, singular to that actor). That's interesting: what part of that perspective makes up an actor's identity?

Anticipation and confrontation

When we find ourselves in a web of known perspectives, we anticipate. We move around perspectivistically in a known environment. When something unexpected happens, something we did not foresee or understand, we suddenly find ourselves at the edge of a perspectivist web. We are then working overtime to put this development in perspective, so that we may stand closer to the centre. Like a child, during a first visit to the fair.

I extensively discussed the perspectivist identity of an actor in Volume I of this Society in Perspective series, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation). *Identity* is the way in which an actor is 'in the world' at a particular moment and in a particular way: focused, situated, and connected with the world, and able to develop as an element of social activities. [217] An actor is a schoolteacher, for example, or a supermarket customer, or a father. Note that one person or group can easily have three or many more partial identities. This extremely mild form of schizophrenia is something we all have. Some people can keep their different partial identities separate in remarkable ways. We call these actors unstable. They lack a recognizable and coherent foundation (see further on).

[217] This formulation was strongly influenced by Heidegger (see Heidegger, *Being and Time*) and Maturana (see also Winograd and Flores, 1986, *Understanding Computers and Cognition: A New Foundation for Design*).



An actor, always differently situated, manifests as a person-in-the-world in various ways.

We base all kinds of images and expectations on an actor's identity; all of our intentional logics with regard to an actor are based on this concept of identity as well. We therefore *expect* that a bus driver will stop for us at the bus stop and open the door, we *expect* that a pickpocket will pick our pockets, and we *expect* that a leader will lead, even though we are sometimes deceived. Conversely, the way we orient ourselves in a given situation is characteristic of our own identity. It informs the way we ourselves will act and how others will anticipate our action. We take on a role, as it were. This mutual game of accepted and presupposed identities makes it possible for us to get along in society.

5.4.6 Identity and development

'Yes, there are two paths you can go by
But in the long run
There's still time to change the road you're on'
Stairway to Heaven, Led Zeppelin

If we are aiming to move in a given direction in a multi-actor situation, we explore the field where the actors are. We identify the entities (the actors that are there) and then focus on their identities (how they work) and their interactions (how they interrelate to form a whole).

You are all familiar with the situation of an actor rigidly holding onto convictions and preferences! After all, actors are characterized by **foundations**, deeply felt values that have a strong influence on what they do or don't do.[218] Actors differ in their foundations. Examples are transparency, loyalty, short-term personal gain, money, modesty, sharing, responsibility, Bible or Koran, unpretentious fun, taking care of yourself first, and caring for others.

[218] See also the Canadian philosopher Charles Taylor and his book *Sources of the Self*.

Actors also have their favourite **methods**. These are mannerisms, routines that are familiar and ingrained, as well as their knowledge and experience, and the things with which they've arranged their environment: materials, contacts, and diplomas, on the grounds of which the rest of the environment is arranged (training, laws, etc). Examples are traditional construction, types of contracts, medical specializations, and types of agriculture and transportation.

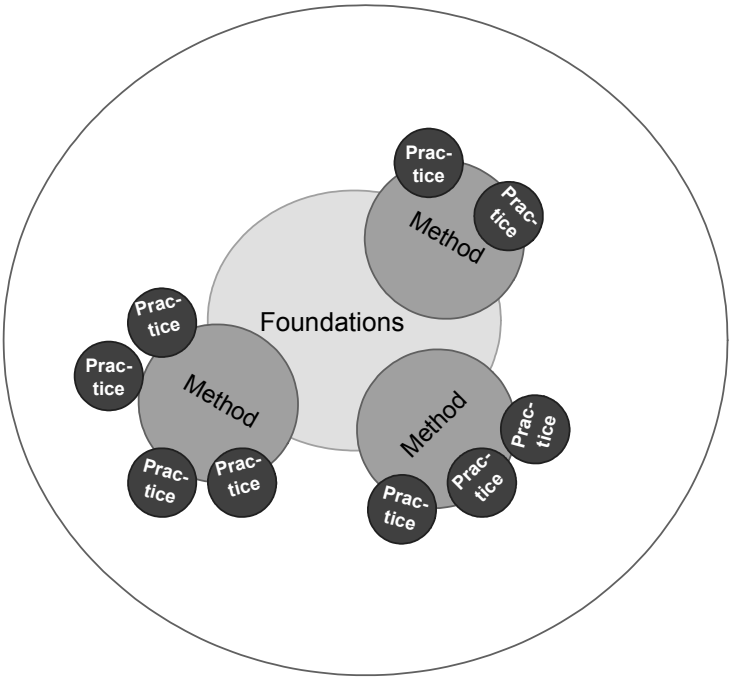
Time and again, it turns out in daily **practice** that actors conform to deep foundations and favourite methods. You want something different from him or her or them, but they don't budge! Where does that come from? How can we explain it? How is an actor's identity created? And, more essentially, can we change it?

To answer these questions, we need to keep two things clearly separated. One is the way in which an actor arises, develops, emerges, grows, and changes *over time*. The other is the way in which an actor participates in a societal practice, *situated in a given place at a given moment in time*. Thus, we are distinguishing an actor's *process of becoming* (a path, spread out in space and time) from the *moment of action* (precisely situated in space and time). We use the foundations-methods-practice triplet (a triplet that is closely related to the philosophy-theory-practice triplet at the foundation of the methodological framework of this book and this series; see the 'Methodology' section earlier in this book).

5.4.7 The development of identity

First, let us look at the process of becoming. In Volume I of this series, *Een filosofie van de maatschappelijke praktijk*, I described how a process in the past naturally results in an identity in the present, and in expectations with regard to the future. The key to understanding an actor's identity is understanding the actor's past. This past causes the present identity, which consists of a recursive network of perspective. This identity was created in the past, and continually anticipates the future. An actor's present is that part of their perspectivist identity that is active.

The figure below shows how a perspectivist actor shows many other faces and completes many other actions in his or her environment *over time*. He or she participates in continually changing smaller micropractices, working from the foundations and methods prevailing at the time (always in perspective.) The multifaceted practice hones various methods, which in turn form and underpin foundations. A method is something that has proven its value in various practical situations, sometimes many situations that are more or less similar, or at least related to each other. Foundations, in turn, are the experiences from various methods that can remain unchanged in these methods and that are no longer an issue, such as a sacred book for someone from a strict religious environment, or gravity for someone living on this earth. This is why methods are quite robust and foundations are terribly stubborn. They've been shaped and honed in many experiences (in the case of methods), and a great many experiences in the case of foundations.



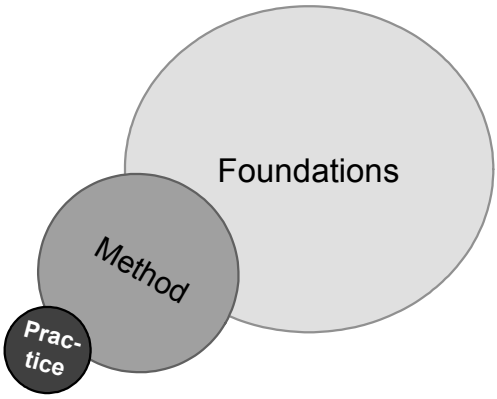
Methods and foundations arise slowly over time by being fed continually by practice

5.4.8 The situated actor

If we now shift our focus from an actor's development over time to one actor situated in time and place, then we have the situation depicted in the figure below. Notice how this figure in fact signifies a radical inversion from the picture above. Above, the great many practical experiences hone methods, and the shared foundations of a much smaller number of methods slowly but surely form the deepest core of an actor's foundations.

In the figure below, things are precisely the opposite. We jump from process to situation, from development to identity. At a particular point in time, and in a particular situation, foundations and methods guide and largely determine the way in which an actor behaves in practice. The 'present' of an actor is that part of the perspectivist identity that is active, and it situates the actor. The foundations and methods are now firm and robust, and they give the actor an enduring and recognizable identity on the basis of which we can formulate expectations. Although they remain hypotheses,[219] they give us a certain grip on a societal situation.

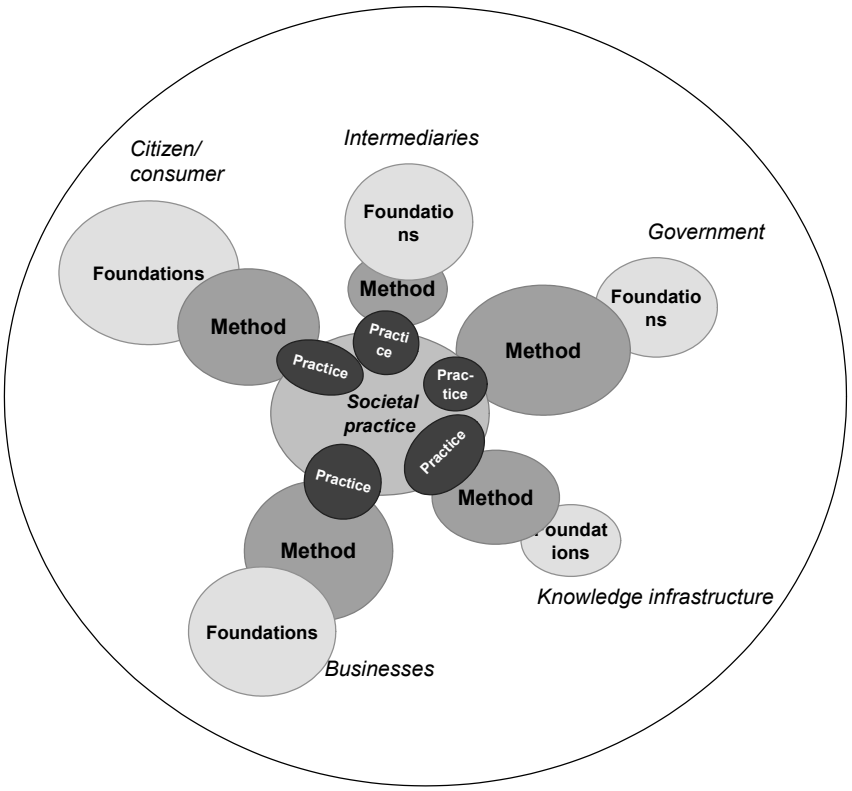
[219] As Karl Popper put it so clearly in his *Logik der Forschung* (published in English as *The Logic of Scientifiic Discovery*). They are easily falsified.



Foundations, method, practice

5.4.9 Multi-actor practices

The following figure shows the generalized case of a multi-actor practice. In this multi-actor situation, we can distinguish a broad societal practice in which citizen/consumers, government agencies, business, intermediaries, and the knowledge infrastructure (let's say the consultancy world, colleges, and universities) are participating. This figure was previously presented in Diepenmaat and te Riele (2001), and Harry and I – for obvious reasons, take a good look – call it 'the little guy'. Of course, this diagram can be expanded to any level of abstraction and number of actors.



'The little guy': foundations and methods strongly determine the way in which individual actors in a given time and space participate in particular multi-actor practices. 'The little guy' represents a 'penta helix' (see Part III).

In a societal practice like the one depicted with 'the little guy' above, there are many actors participating, each working from their own foundations and methods.[220] To a certain extent, they also are aware of each other's foundations and methods. The dominant practice is that these parties find each other; very little gets designed or planned, especially on the larger (broader, longer) scales. Compare making an expensive film, which involves a good amount of planning, to the hustle and bustle of a city like Amsterdam, which is much more spontaneous.

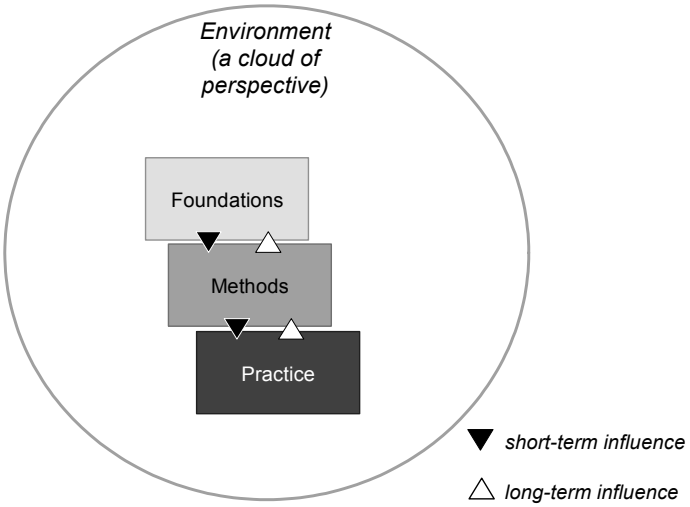
If we look at a specific societal practice at a certain point, then we can observe that all the participating actors are mostly using their favourite methods, and as an extension of their foundations, confirmed by repetition and thus legitimized over time. Getting them to change will certainly not be easy. It will require cathartic experiences (often-shocking

[220] Henk Diepenmaat and Harry te Riele (2001). 'Above the Clover Flower the Daisies: Societal Network for Innovations Directed Toward Sustainability'. Actors / VROM report.

experiences that upset their worldview) or new processes that refine existing methods on the basis of new experiences.

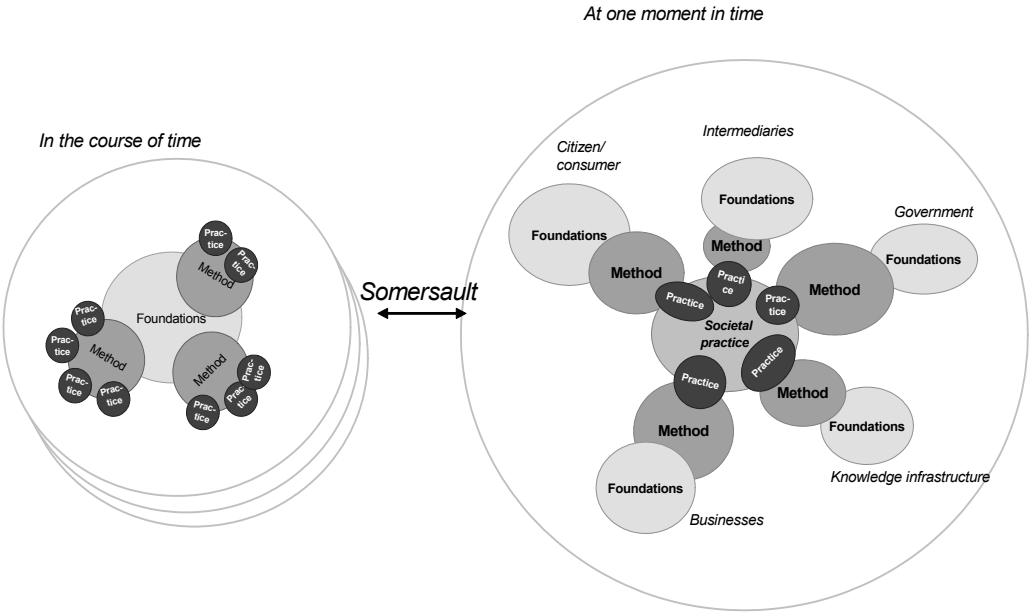
5.4.10 Developing and using identities: the identity model

The figure below summarizes the previous two mechanisms in an *identity model*'. Foundations refine methods that lead to practices (the fast influence); and conversely, practices influence methods that percolate through to foundations (the slow influence).



The identity model: short-and long-term influence in perspective

If we now conceive of the identity of an actor as the combination of his/her/its perspectivist foundations, methods, and practices, then we can see what a wonderful thing an actor's identity really is. To speak in extremes, identity is fluid in the flow of time, and fixed at a given point in time. Identity involves a marvellous perspectivist interplay of being and becoming, of development and stability, and we are all subject to it. The four processes of the balance model discussed earlier work on the basis of this mechanism.



The perspectivist identity of an actor develops slowly over time ...

... and reveals itself at a point in time in the societal multi-actor practice

There he is. The CEO of the oil company. He enjoyed the oil and gas business during his decades long career, from the source to the pump. His company looks to him. He breathes oil, thinks oil, does oil, is oil. The same goes for his company. All interests, relations, shareholders, contacts, contracts, investments, hardware, software, orgware, humanware, you name, are seeping oil and gas. We, as a global society, have experienced the benefits for decades as well.

And now we're at the brink of a new era. Imperfections in our current practices and methods have created a new foundation, brittle and vague. We look beyond the pump. Fossil fuel must be renewable, affordable, secure, and intrinsically sustainable. Climate issues, no thanks! The shift is inevitable. Difficult, too. But it is possible! With leaders who can think and act according to this new foundation. Leaders who, based on this foundation, can start new practices and dare to create new methods. Because our society asks them to do so. Can the CEO make this shift? Could you? Can we do it together?

If you look at your own development up to now, you'll recognize this process. Since birth, you've been subject to practical experiences that have made you who you are in your own environment. Your family situation where you lived as a child partly determined who you are now, as did your education, professional work experience, and current work situation, as well as your relationships and social networks. It actually starts much earlier: in a sense, your forebears partly determine who you are; we call this genetic influence. Evolution as a whole actually plays along. Nature and nurture? Mind and matter? From the perspectivist viewpoint, there's no conflict. Actors are highly changeable, fluid in time, but stilled and robust at any given moment.

> There he is, the medical top specialist. Arrived at this top position after a 40 year long medical career. An icon of medical expertise. Master of his universe. Used to honours, attention, status, as the world shapes itself around him, his medical routines and methods, for years. All the patients looking for a cure do so as well. Over the past few decades, healthcare has developed into an enormous and imposing modern societal practice, which has improved us all. But it's becoming more and more expensive, insurance premiums are rising through the roof, and more and more patients and dependants wonder where exactly they stand in that enormous process. Was it not initially intended for them?
>
> Is the specialist or the insurer able, or willing, to move along with the inevitable shift to the citizen/consumer, away from his own foundations, methods, and practices? If yes, how? If not, what would it take? These are pressing questions, which this book seeks to answer.

It is important to be aware of these kinds of phenomena if you walk up to an actor and ask for something. If you're asking for a practice that the actor already does, then there's no problem. If you're asking for another practice that fits in with an existing method, there's a reasonable chance you'll succeed. But if you're asking for a practice that doesn't fit in with an existing method, and conflicts with its foundations? Prepare for a difficult process. So know what you're asking, and know your actors!

You can swim against the current, of course. Think of all the salmon who swim hundreds of kilometres upstream to spawn. It just takes more effort, practice, and stamina. It's certainly possible, but requires a lot of work. You can choose to do this as long as the reward is worth the effort. It's up to you if you want to take the leap, and it's not certain that you'll make it. This is precisely why societal experiments with societally complete arrangements at the scale of the penta helix (see 'the little guy' a few pages back, and chapter 9) are so important. Experiments allow you to swim in a protected environment sheltered from the current, and after it succeeds, you can scale up.

5.4.11 Societal improvement

Structurally improving society requires a large amount of exploration and design work, and especially at the beginning, it will require swimming against the current. That's the way it is. Societal actors and societal practices have often had decades, centuries, or even millennia to develop into their current forms. Methods have grown and been fine-tuned, and foundations established and perpetuated time and again. Legal systems, courses of study, and entire physical infrastructures (such as motorways and urban design) have arisen this way. In most cultures, you mustn't even *think* that certain things – which can be very different in some other cultures or subcultures – could be different.

And now it's time to change methods and foundations, since they are less and less appropriate to the needs and wants of our age. For example, the classical roles of government and business and citizen/consumers are no longer enough. Neither are our modern financial, healthcare, or educational systems, or the food supply chain. The way in which we make and dispose of products has created the plastic soup in our oceans, and more and more pollution in our living environment on microscales as well. If change and improvement are necessary, the great extent to which our societal practices are anchored in methods and foundations will turn them against us, in a sense. The very things that support and define us, and even characterize us, are terribly difficult to change.

A crisis is not a method!

Can foundations only emerge from methods, and methods from practices? Is the only available route to the structural change of our societal practices the long one? No, it isn't. It can be expedited by two things: structurally working on and experimenting with societal perspectives, from societal sensitivity, and a crisis.

Yes, a crisis structurally changes things. That is how we established the League of Nations after World War I, and the United Nations after World War II. Closing the stable door after the horse has bolted, would be the proper expression for this.

But does that mean a crisis is a method? Occasionally, I host vision workshops, in which participants invariably indicate that they think that it takes an external crisis to really change systems or organizations. Of course, when a crisis is heading your way, you have no choice but to deal with it, and you might as well make the best of it. But I think that the inverse, where you have to wait for a crisis to bring about large scale changes, is an absolute affront. An enormous motion of incapacity. Every leader or director is free to believe this, of course. But then give yourself a salary that matches this level of ambition, or reduce the size of your staff that watches over the store. Or find another job.

Why wait for a crisis? The point is to anticipate, prevent, avoid, and at the very least mitigate crises as much as possible, by constanty exploring new avenues. Or, in more pro-active terms, it's about keeping your eyes wide open and picking a course together towards better, more promising futures. The route that is suggested in this book is following the path of humanity. More concretely, it's about employing societal intentional logics, by developing the societal multi-actor perspective.

If the identity model tells us one thing, it's that even the largest societal practices can be created. After all, we can place them in societal improvement perspective. It's certainly not a simple task, but it's a path we can take!

The identity model (the foundations-methods-practice model) gives us an understanding of the huge perspectivist composition (the huge perspectivist *mass*) of societal practices, and the resistance to change (perspectivist *inertia*) that accompanies it. If we intend to tackle methods, or even foundations, then we'll need to think in the increasingly longer term. This explains why working in multi-actor situations can be frustrating. Behaviour can come forth from elaborate and highly ingrained methods, which in turn are based on enormous foundations. Entrepreneurship and administration have traditions going back centuries if not millennia. We'd better know what we're getting into!

However, the identity model also offers an extremely positive message, one that invites us to conduct societally complete penta helix experiments and large-scale innovation. This message has two parts. The identity model shows us first of all how even the most complex current societal practices simply have grown, arisen, and become what they are. Although partly planned, they have mostly evolved rather than always having been there, so we can certainly develop new and better societal practices on even the largest scales. Nothing lasts forever or is untouchable, societally speaking (or in any other way too, actually). This late-modern finding would have been completely unthinkable less than 150 years ago. After all, it wasn't until 1859 that Charles Darwin published his *On the Origin of Species* and made a

plea for the idea that life could evolve.[221] Before him, at least in what we call the Western world that God created in six days, things just 'were there'. A man at my local fish stall still thinks so. Once when I remarked how well the flounder had adapted to living on the sea bottom by evolving so that both its eyes are on top facing up, he looked at me somewhat puzzled and disturbed, and said, 'But they've always been like that'.

Secondly, we can accelerate improvement on larger societal scales by turning our focus to improvement, and using the intentional logics of future players, rather than emphasizing the current interests and methods of existing players. Every actor will know how to estimate the value of a genuine improvement perspective that fits that actor's foundations. The crucial question is whether we will manage to give a place to not only our own foundations, but those of the other players as well, in pluriform coherence.

Once we can do so, we can get going. We must experiment with a much broader cross-section of society, develop new societal perspectives alongside the old ones, allow the relevant actors to arise and give them active support, enter into new coalitions, and let the old ones be absorbed into the new systems (or let them die off). In theory, this is all very feasible, or at least there are no fundamental reasons why we cannot do it. It may take a long time and require a lot of effort, and we will make mistakes along the way, but we can do it. We can certainly place society in perspective, even though it's rattling somewhat and missing a few pieces. It's all a question of societal perspective. This book and this series are adding to the methodological repertoire we'll need to carry it out.

5.5 A value-seeking balance

'A consciousness, which can be an individual's consciousness or a team consciousness or a societal consciousness, seeks value, and to this end will seek and possess just the right perspectives that add the most value or require the least amount of effort.
It continually places these perspectives in recursive networks.'

The concept of 'value' plays a crucial part in the development of networks of perspective. Recursive perspectivism offers an unusual look at what becomes experience and how it works. Consciousness seeks value: it tries to generate new value, maintain existing value, and prevent destruction of value. The search for value makes a consciousness intentional.

To be conscious is to experience perspective, with an eye to value. A consciousness therefore experiences value in terms of perspective. But what is the relationship between

[221] Charles Darwin (1859), *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*

value and perspective? How does awareness of value drive the distinguishing of perspectives? There aren't so many flavours to choose from here. A consciousness can assign more value to certain perspectives and less to another. Then some perspectives become more important and others less important (traffic in a large city versus what glossy magazines are at the hairdresser's). This is also how people relate to knowledge: some knowledge is more important than other knowledge. With things, too, one is more important than the other.

Why should this be so complicated? Why should a consciousness be organized around highly different perspectives? Recursive perspectivism has the beauty of simplicity: every perspective may be different in its content, but in other ways, every perspective is actually similar to every other perspective. Its place in the recursive web of perspective makes it different from other perspectives. Structure arises from content, but content also arises from structure.

For the time being, accept the idea that every perspective is statistically speaking as valuable as every other one. Then the picture becomes very simple. Willem of Ockham, a fourteenth-century Franciscan monk, would have appreciated this premise. He formulated the principle '*Entia non sunt praeter necessitatem multiplicanda*': 'Entities are not to be multiplied without necessity'. According to this principle, the best way to understand something is the simplest way, thus the way with the fewest assumptions and building blocks. If there are several likely explanations, take the simplest. This advice became known as Ockham's razor: snip away all superfluous loose ends, and add no superfluous things. Of course, you need to use a razor carefully, since you can go too far. Albert Einstein formulated a theoretical lower limit in an utterly pragmatic way: 'A theory should be as simple as possible. But not simpler.'

Recursive perspectivism honours both Ockham and Einstein, with the perspectivist value hypothesis:

> *Every perspective represents a certain amount of value, and requires a certain amount of effort.*

This does not mean that every perspective represents *exactly* the same amount of value and effort. It does mean that there is a meaningful average value that represents a perspective, and a meaningful average effort required to actualize a perspective. There are some sharp deviations, but they are few and far between, to paraphrase Gauss. If a consciousness does not experience any perspective, then the consciousness is absent, and in fact unconscious.

Different consciousnesses can see completely different things as valuable. Even within one consciousness, completely different things can be thought of as important or not. For example, it's important to eat and drink enough, not to get into a car accident, and to pay attention to those you love. However, these value-representing priorities get the perspectivist attention they deserve at very different times. A good meal is less important to me right after I've finished eating, for example. Value is also situated, for example in time and space (which is local, since it involves perspective).

At a certain point, a consciousness perceives that there is more or less value at stake in relation to the number of perspectives experienced. In a dangerous situation, say, where value is at stake, you might say that the endangered value per action perspective is too great, so you are off balance. The consciousness then responds by bringing in more perspective, and points you towards a particular perspective. You focus and concentrate, we say.

5.5.1 Cleopatra's nose

Cleopatra was a beauty, and she fluttered – not entirely without some calculation, we suspect – through life. If Cleopatra's nose had been shorter, things would have gone much differently for the world. At least, that's what Blaise Pascal wrote in his *Pensées* ('thoughts'), in the seventeenth century.[222] Given today's obsession with appearances, you as a child of our time might imagine that since a tiny-nosed Cleopatra would have been considered ugly, Julius Caesar would not have fallen for her. Pascal probably didn't mean it like that; in line with the ideas from physiognomic studies that prevailed in the seventeenth century, which linked facial traits to character traits, he felt that a long nose was a sign of a dominant, strong character.

This gives food for thought about how our ideas about beauty and science are very much part of their age. We can guess why Caesar and Cleopatra fell for each other, but we'll never really know. The broader vision in Pascal's observation, that small details can change the entire history of the world, holds true. Small causes can have huge effects! We are now entering the territory of causality.

The late Edward Lorenz, an American meteorologist who died in 2008, presented an idea to the world related to Cleopatra's nose, namely that small physical events can have large physical consequences. It had a catchy and visual name: *the butterfly effect*. Supposedly, a butterfly flapping its wings in Brazil can cause a tornado in Texas.[223] This contradicted the conventional wisdom of meteorologists before him, who thought that using increasingly powerful computers to make mathematical models would produce increasingly accurate and longer-term weather predictions. Chaos theory studies this kind of deterministic chaos: non-linearities in the meteorological models (that consist of systems of differential equations) can cause microscopic differences in the baseline condition to result in wholly different macroscopic effects. Lorenz actually discovered this effect by chance. He wanted to recalculate something quickly, and he re-entered the initial values in his calculation program by hand, skipping a couple of digits after the decimal point. That gave him completely different results than a previous calculation that used virtually the same data but had just a few more digits. The input was almost identical, but what a huge effect it had on the forecasts! It was truly a meteorological Cleopatra's nose.

[222] Blaise Pascal, *Pensées* (1669)

[223] Both Lorenz and a journalist have been credited with the image of the butterfly/tornado.

Lorenz's butterfly is often used to illustrate the intrinsic unpredictability of complex processes in our world. However, at the heart of the matter, his butterfly says nothing about that. The fact that Lorenz indicates how apparently chaotic and surprising the outcomes of calculations can be is nothing remarkable; it's a property of his particular model. The butterfly effect says everything about the nature of current meteorological models, which consist of systems of differential equations, but *nothing* at all about the intrinsic unpredictability of the weather. *Meteorological models are simply not weather.*[224] How well we can predict the weather depends mostly on how well the models imitate the development of weather (including the measurability of the input parameters).[225] At this point, we have models that are very good at predicting the weather two minutes from now (by looking around you; it will stay the same for that long) and ones that do a reasonable job for at most a couple of weeks (by calculating systems of differential equations). There's every chance, however, that in another century we'll have wholly different meteorological models, based on wholly different patterns and/or with different or more accurate input parameters, that can predict the weather a year ahead of time. If you think that's inconceivable, just look back 500 years and you'll see just how much can change in a time frame like that. Imagine trying to convince those people that you can fly around the world in a few hours. (Do explain that the world is round first. And stay away from people piling up firewood around a stake.)

Models are fine when used to estimate things. You can even see how well your model resembles your referent using a model validation (a series of direct comparisons between model and referent).[226] By contrast, it is a crucial error to assume a model is completely correct, and to confuse it with its referent. After all, you use a model because you think that it *resembles* a referent in certain ways, and because working with a model offers *advantages* over working with the referent directly.[227] Using a mannequin when you're sewing clothing and simulating the use of nuclear weapons are two examples of using models. However, you're making a mistake if you unquestioningly conclude, on the assumption that your *model* resembles your *referent* in certain ways, that your *referent* also has to resemble your *model* in totally *different* ways (note the reversed order here). At best, this kind of thinking will give you a crude and approximate path of inquiry (a heuristic search) for further modelling, but even this is dubious and must always be thoroughly tested. Perhaps the ultimate example of this kind of confusion is the many researchers who confuse brain

[224] For fans of model theory, *Een filosofie van de maatschappelijke praktijk* has a critical look at conventional model theory, and an alternative in recursive perspective that turns conventional wisdom about models as reflections of a referent on its head. See *Een filosofie van de maatschappelijke praktijk* pp. 135-145, and p. 274: 'Neurologisch connectionisme'.

[225] This involves the degree of isomorphy between model and referent.

[226] Referent: the thing being modelled, what the model involves. For a perspectivist interpretation of modeltheory, see *Een filosofie van de maatschappelijke praktijk* pp. 135-145.

[227] See my dissertation section 2.6 for an overview of functions of models.

activity with thinking.[228] Later on, I shall explain how our notion of a shared material world is also nothing more than a model. It's an experience in recursive perspective of something else that we ultimately cannot experience (this non-experienceability is a very Kantian idea: *das Ding an sich*) and thus our notion of the world must also continually make room for reinterpretation. The ongoing and ever-changing process of forming theories in the sciences also shows precisely this continuous process of adapting our interpretation (our model) of part of 'reality (societal or otherwise)' (the referent). It's happening in plain sight, but we don't see it because we're in the middle of it, and we are even a part of it! We miss it because we live our lives on a much smaller scale (an echo of why we don't see *the path of humanity*).

And then there's Cleopatra's nose. Is history really so chaotic and dependent on chance events? What if Adolf Hitler had been a gifted and celebrated painter in the 1920s? What if the bullets in Sarajevo that started the First World War had missed the Austrian archduke and heir to the throne Franz Ferdinand and his wife? Would the twentieth century not have had any world wars? I cannot know with any more certainty than you can, but I strongly suspect that given the enormous cultural and societal tensions and the international military pacts in those days, some *other* event would have occurred that led the world into violent conflict. It's still guesswork, but I'd put my money on Cleopatra's nose not being so unique after all.

5.5.2 Don't be led by the nose

Both Cleopatra's nose and Lorenz's butterfly are small and therefore unpredictable causes with large consequences, if you look at them superficially. But do small causes really have large consequences that often, either societal ones (Cleopatra's nose) or physical ones (Lorenz's butterfly)? I don't think they do at all. Of course, it happens now and then, and when it does, we hear about it, because it is a deviation from the norm and people are hugely curious about those. What's usual and desirable is that small causes have small effects and large causes have large effects. *Scales find each other*. The exception, and what we don't like, is that small causes have large consequences or that large causes have small consequences (and peter out). When that happens, we call it coincidence, unexpected, good luck, or just bad luck. See the table below.

[228] See also the book *We Are Our Brains* by Dick Swaab, in which the functions of our material brain are equated with thinking. There is a general form of isomorphy between brain and thinking, but uncritically equating model and referent is the most egregious form of confusion that can occur in modelling. See also *Een filosofie van de maatschappelijke praktijk* on model theory (pp. 135-145). Swaab's book is nevertheless also worth reading.

Cause	*Effect*	*Occurrence*
small	small	Often (the rule)
large	large	Often (the rule)
small	large	Rare (the exception)
large	small	Rare (the exception)

Scales find each other

Both Cleopatra's nose and Lorenz's butterfly are in the *small cause*, *large effect* category (at least they are from a rough analysis, which I'll come back to shortly) and thus seem to be salient exceptions to the rule, which is why they get so much attention. However, why do I think that the distribution of occurrence of causality is the way it is in the table above? It has everything to do with the original (pre-ontological[229] and pre-epistemological[230]) nature and the ability of the experiencing consciousness, in general, to learn and adapt, and of recursive perspectivism in particular. What I'm trying to do is illustrate a principle as general as it is fundamental, that helps us as pragmatic people to improve our society even more, using the paint roller instead of the fine brush.

The principle I'm getting at states that an actor is always striving for a perspectivist balance. The number of component perspectives of the initial situation of a perspective, and the number of component perspectives of the final situation of a perspective are kept more or less the same. This balance is not there beforehand, and actors keep getting off balance, but a consciousness tries to restore this balance as soon as it sees the chance.

This section is called 'Don't be led by the nose' because Cleopatra's nose and Lorenz's butterfly seem to support the idea that perspectivist balance actually does not exist, and that our societal reality is in fact chaotic and out of balance. It may indeed seem that way now and then, but as people, we are armed with the formidable weapon of perspectivist structure and perspectivist balance. Recursive perspectivism helps us to survive and so far has given us victory over the chaos, thanks to a continuous pursuit of and working on perspectivist balance.

[229] Pre-ontological: previous to ontology. Ontology is the study of things, and of being. It tries to describe which things are real and objective. An empirical science must presuppose an ontology (a system of beings, of things, like the early classification system of Linnaeus or the periodic table of the elements), since this science tries to understand the deeper nature of and interaction between these things through experiments and theory formation. Recursive perspectivism is pre-ontological since things arise (emerge) in recursive perspective, i.e. they are not already there beforehand.

[230] Pre-epistemological: previous to epistemology. Epistemology is the study of knowledge. It focuses on the nature of knowledge and knowing. Recursive perspectivism is pre-epistemological, since knowledge arises (emerges) in recursive perspective, i.e. it is not already there beforehand. (It is also pre-ontological.)

The moment we experience something we have to classify as *small cause, large effect*, it grabs our attention (see above). We do so with good reason, but it's because we don't know how to deal with it. The cause is understood in terms of *little* perspective, and the effect in terms of *much* perspective, and it overwhelms us, literally putting us off balance. Because we're off balance, it takes extra attention and energy to stay grounded in the chaos.

We therefore like to avoid the cases in which small causes have large *negative* consequences. If small causes have large *positive* consequences, on the other hand, we're happy if they come along more often. John Stuart Mill put these two drives together succinctly as 'We avoid pain and seek pleasure'.[231] In both variants, it's high time to look in more detail at what exactly happened to be able to benefit from it in the future. A similar consideration applies to *big cause, small effect*. If you've worked very hard for something and the result is not up to expectations, then you'll want to avoid doing that again in the future. Or if something either menacing or wonderful seems to be happening, but then doesn't, like a nuclear warhead that accidentally falls out of an airplane and fortunately doesn't detonate, or a wonderful coincidence (serendipity) you hope to repeat – then you want to be able to predict that next time around.

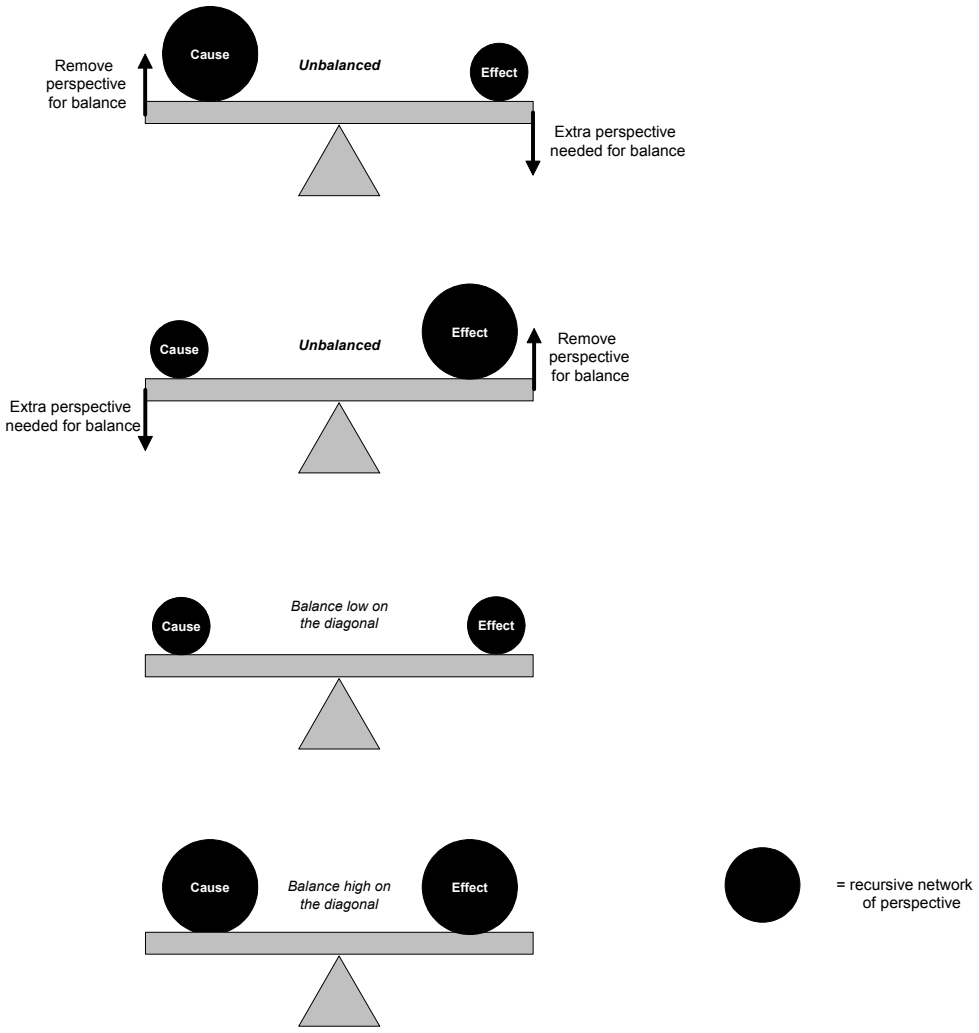
If we have an extremely exceptional experience, we 'save' it in our memories it as such. However, we'd rather have a better picture of what's going on, and by 'better' I mean that we *put cause and effect better in balance*. We can weigh, or at least estimate, this balance in terms of perspective (the number of perspectives). There are several ways we can restore the perspectivist balance between cause and effect. The 'small part' can be bigger, or the 'large part' can be smaller, or a combination of the two. We always enjoy seeing a meaningful average value and effort when we distinguish perspectives. We look more deeply into things we don't understand well, get rid of parts that don't seem as relevant, place the matter more broadly in context if necessary, and so on, bringing cause and effect better into balance with each other.

I'm reminded of the painstaking investigation into the cause of the explosion of the Challenger space shuttle in 1986, a disaster that tragically cost seven people their lives. I still remember that, like many others, I watched the images in silent astonishment. The technological superiority of the United States was suddenly in doubt, and this large-scale consequence justified a commensurately large-scale investigation into the causes. The cause of the disaster turned out to be complex and multi-faceted and was therefore extremely difficult to have anticipated, according to the commission. This brought cause and effect neatly back into balance. But would an outcome like 'oops, just wasn't looking for a second, sorry about that….' really have been an acceptable finding?

Note that 'weighing in perspective' has little to do with normal measures like kilograms, square metres, or light-years. Every discourse and every set of experiences (internal and

[231] John Stuart Mill, *On Liberty*.

external) has, or better yet, consists of its own particular recursive web of perspective. For a quantum physicist, a wine merchant, and an astronomer, there are all kinds of scales (time, space, mass, etc.) of completely different orders. Yet all three subjectively experience their own (subjective) recursive networks of perspective (this even creates their notions of 'I'). I even have a strong suspicion that the perspectivist networks of a leading quantum physicist, a leading wine merchant, a leading hunter of the Hadza people, and a leading astronomer would not differ that much in terms of complexity, in terms of perspectivist structure (they weigh similarly on the perspectivist scale), as different as they are in content, and as different as they are in kilograms.



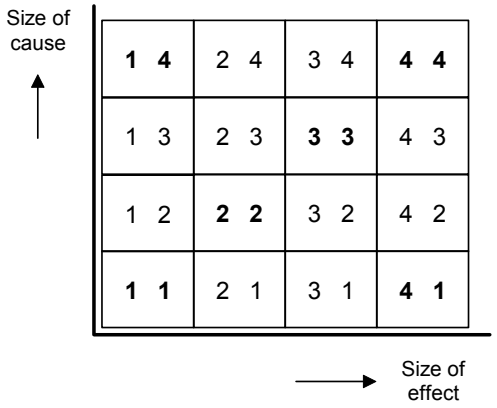
Perspectivist cause-and-effect balance (for the diagonal, see further on)

When my oldest son was 15, we were on holiday on a farm in Costa Rica. He sat on a chair but it wasn't very comfortable, so he pushed the chair away and took another. Noticing something under the chair he'd pushed away, he removed the cushion and saw an enormous scorpion. One end of the scale dropped at once all the way to the ground, an unexpected imbalance. However, life dictates that you get the balance back as quickly as you can, and that's what happened. The staff at the farm raced out with a spray can and very quickly dealt with the scorpion (it turns out they're not so rare after all), and the short-term balance was restored. We had already been wary of all manner of vermin, but as you'll understand, from that point on we were extra careful. The cause quickly became much larger in our perspective. We asked local people where scorpions (and other creatures) were usually found. We checked our bedrooms before we went to sleep, and our clothing (hang it up – don't leave it on a chair or on the floor) and shoes after getting up. We also asked about what to do if we got stung, to minimize the consequences (they turn out to not always be fatal but will always be fairly significant). We placed the presence of scorpions (and pit vipers and tarantulas and…) in our Dutch recursive perspective, and slowly calmed down. In brief, we tried to find a better balance between cause and effect, and the sudden imbalance was restored, as well as it could be. Although we didn't see any more scorpions, we were considerably better prepared for the next one. No scorpions for us in the Netherlands, thank you. We'd rather live five metres below sea level. We can deal with that because we have advanced governances technologies to make that possible (and we find balance here too).

5.5.3 A return to balance

'By the eternal laws of proportion
a child's loss of a doll and a king's loss of a crown
are events of the same size'
Mark Twain

The illustration below shows all possible relationships between the sizes (the 'perspectivist weight') of cause and effect plotted in a plane. On the diagonal, the size of cause and size of effect are in balance with each other, as we prefer. The greater the distance from the diagonal, the smaller the probability of occurrence. Large cause, small effect and small cause, large effect are therefore less likely. If cause and effect are systematically out of balance, then we do everything we can to restore it. There is an attraction towards the diagonal, and a quest for balance. In a well-ordered world, we *are* reasonably well in balance, and in a chaotic world, we *search* for balance again and again.



The balance between cause and effect is on the diagonal.

It's mainly the two limiting cases that are so interesting. Effects whose causes are near zero, thus effects without causes, can only be undergone as (or as if it were) an unanticipated confrontation (since we cannot anticipate them). They are at their most confrontational if these effects-without-cause, in turn, can cause large effects themselves (since effect and cause, in other words, the ending situation and starting situation, tumble over in a flow or chain of perspective). In this way, things appear at the fringes of a consciousness. Causes whose effects approach zero, or in practical terms causes without effects, are literally inconsequential; they automatically drop out of the focus of our consciousness and we turn to other matters. This shows how the two locations of extreme imbalance form the locus for the appearance and disappearance of experiences from a consciousness. By contrast, the diagonal is where we are firmly placed in a world we know, and the anticipation is the greatest. This applies to causality (a form of temporality), as well as spatiality. After all, we know that the kitchen is at the end of the living room, and precisely because we do, we can spatially anticipate it. Experiences appear and disappear in these places in the total flux of experiences, where the relationship between cause and effect is extremely out of balance. Emergence is, speaking from a perspectivist perspective (!), just a question of seeking and finding balance.

If you look a bit deeper, then it turns out that the attraction, the gravitational force of the diagonal also holds true for the nose and the butterfly. Let's start with the butterfly. Of course, it's not the flapping of a wing of the butterfly in Brazil that causes the tornado in Texas. That tornado is the culmination of an enormous number of very diverse small-scale events in a variety of places in the world (an infinite number of butterflies if you will). Together they suddenly make a big cause with a big effect – a big cause that we cannot grasp at this point in time, although I expect that in a century the meteorological models will be much more advanced, whatever kinds of theories and instruments and input data they may operate (as long as we haven't fallen back a few steps on *the path of humanity*). We're seeking balance, after all.

And then there's Cleopatra's nose. It may be that events with Roman rulers and the Roman Empire unfolded right in front of (and because of) her nose, but wasn't it more likely the combination of that particular phase of the Roman Empire, the culture of and around its male and female leaders, the structure of the royal household, and a hundred more things that promoted these events? Here as well, if you just think about it, the balance restores itself automatically, changing this example as well from an exception to a rule.

We are far from being constantly in balance. As humans, we live in a rugged social and material environment that is constantly throwing surprises our way, both positive and negative, which is what makes life so special. Nassim Nicholas Taleb's recent books have hugely helped increase our consciousness that we have the systematic tendency in this day and age to underestimate the occurrence of unexpected or disruptive events, and that we would do well to prepare for them structurally.[232] In terms of the figure above, we are fixated on and are lulled to sleep by the diagonal, and we tend to ignore the major deviations from it, or at least to underestimate the likelihood of their occurrence. The figure therefore shows the diagonal, as well as the extreme deviations that can occur now and then. The more 'experiences' we process, including those from hundreds, thousands, millions, and billions of years ago, the more it gets through to us that extreme situations can occur, even though many predate human memory. We can extend the axes so that near the plane (very large, 1) our entire society, all of humanity is destroyed by a cause as small as it is unlikely, such as a giant comet or a bizarre mutation in a particular virus. Or we could collectively pass through the eye of the needle.

Life is a colourful mix of anticipation (the result of causality in the broad sense) and confrontation (the lack of causality in the broad sense). The way we cope with this is by continually seeking perspectivist balance, because that gives us the best odds of being able to turn events to our favour in the future. I sometimes compare it to the way a goalkeeper facing a penalty kick doesn't move to the left or right but stays at *his* balancing point of *his* goal. This puts things best in perspective. If goalkeepers moved faster to the right than to the left, or the other players systematically and inevitably kicked more often to the left than to the right, then the balance would shift itself, but the keeper will always determine the balancing point, where he can best anticipate.

Actors are seekers of balance. If we really can no longer find the balance, then we realize that we've lost our ability to anticipate and that our only option is surrender, since we've exhausted all other options. Advanced civilizations, such as the Mayans, have been brought to an end by a changing climate that created such a drought that there was no way to combat it. In other places, such as in ancient Mesopotamia, people have been able to respond to drought by creating complex irrigation systems and thus restoring balance.

[232] See Nassim Nicholas Taleb's books *The Black Swan* and *Antifragile*.

We restore balance, in other words, we seek the diagonal, by placing processes of cause and effect in perspective differently in the *objective* sense, with more or perhaps less detail. However, we can also work *subjectively*, and actually adapt our appreciation. We humans have an enormous psychological and social arsenal of ways to adjust the way we view our circumstances. A structural, systemic change then automatically becomes the 'new normal'. These adjustment mechanisms are often seen as somewhat shaky psychological deviations from a desirable 'real' but more objective appreciation. Remember Festinger's theory of cognitive dissonance, which roughly speaking states that when people's circumstances do not match their preference, they try to minimize the 'cognitive dissonance' that has arisen, and if the circumstances won't budge, they modify their preferences.[233] The unwanted dissonance is thus eliminated. If you can't change the facts, then just change your attitude to them. If an individual looks differently at something than society on the whole, then of course you can see this as psychologically deviant. However, I think that these consonance mechanisms are not deviations, but to a large extent determine our society's practices and standards at larger scales as well. Our craving for balance calibrates our ideas of normal and abnormal. If the balance is always off, whether for an individual, an actor or a society, then this individual, actor, or society will recalibrate the balance, whether by material consonance processes (an eye for other objective facts, bringing the environment into harmony with the valuation), or through cognitive consonance processes (changing the attitudes to bring them into harmony with the environment), and usually through a complex blend of the two. The plane is moved, and thus the diagonal as well. We are surprisingly flexible and adaptive in our continuous quest for balance.

Compare how something as drastic as child mortality is experienced in abjectly poor places where children die every day, with the experience in highly developed countries where child deaths are becoming increasingly rare. There is no challenging the objective figures, and the parents' grief is always sincere, but the diagonal is clearly in a different place in developed countries than it is in developing ones. Or look at our attitudes to the availability of food. Someone living in a rich country is unpleasantly surprised if a supermarket shelf is empty and will inform the staff with some irritation. Members of the San, a tribe of hunter-gatherers in the Kalahari, know that a dire situation, possibly starvation, awaits if their hunters don't bring back anything. Precisely for this reason, they have an enormous reservoir of recursive perspective to make the hunt successful. The behaviour of the Westerner in the supermarket pales by comparison, since they assume that food is simply always available (again, balance).

What is our conclusion as a whole? As humans, we are constantly seeking perspectivist balance. Therefore, I think, small causes usually have small effects, average causes have average effects, and large causes have large effects. Any deviation is experienced by the actors involved as off balance, and they then try to restore the perspectivist balance. Of course, it doesn't always work, but it enables us to anticipate the future the best. With

[233] See the discussion of subject–object tensions in the 'Methodological Foundation' section of this book.

imbalance, the size of the cause grows (if it can) to the size of the effect or vice versa, or cause and effect grow towards each other. However it happens, we like to see that cause and effect are more in balance. For us, that's the best way to go into the future, and to make our lives, this lively mix of anticipation and confrontation, as pleasurable as we can. With as little pain and as much pleasure as possible, to paraphrase John Stuart Mill again.

We distinguish networks of perspective, whether they are physical, mental, temporal, spatial, shared, personal, or whatever, because they offer stability in our experience, and they help us to maximize value and minimize effort (in whatever form these take). Where a lot of value is at stake, we use a lot of perspective. We work on perspective this way, with a world of perspective as a result. We don't always find the value balance, and if we do it's not always right away, but we try. The continuous pursuit of perspectivist balance forms the recursive perspectivist networks that we experience, causing us to progress on *the path of humanity*.

6

Part II: The Perspectivist Landscape

6.1 We're locking each other up

'In the early 19th century there were about 60 different attempts to build telegraphs – using "bubbling chemicals, sparks, or the twitching of pith balls to detect tiny electric shocks sent along wires," among other schemes. … Ironically, once they got the telegraph working, it created instantaneous global communication. It led to phones, faxes, and eventually today's Internet.'
'Genius is more common than you think', a blog by Clive Thompson, 2015

This part II, ***The perspectivist landscape***, attempts to deepen our understanding of the whole of our development as societies and of the plurimodern transformation we will need to make. It is fascinating to look at the historical outlines of our societal development (see Part I), since it tells us something about where we come from, who we are now, and who we as humanity may be able to become. However, the ambition of this book is not only to describe the history and quality of *the path of humanity*, but also to plumb it more deeply in quantitative terms, for us to be able to follow *the path* better together. This new understanding will help us to support our plurimodern transformation, and to take the next steps towards the improved society we can bring about as Team World.

To this end, I will place *the path of humanity* as a whole in a quantitative perspectivist landscape at the end of this section. I will explain why I think that on macroscales we tend towards societal balance, even if on the microscales of our individual lives we are unaware, or barely aware, of it. Understanding this properly requires a thorough understanding of recursive perspectivism. Therefore, this section will begin with a brief summary of its central aspects, as a foundation-in-a-nutshell for radically understanding *the path* that we are walking as a route we have taken unconsciously through a perspectivist space.

6.1.1 A philosophical rethinking

So far, the development of our societies has given us huge advantages. Compared to their earlier counterparts, the modern ways we provide ourselves with healthcare, energy, housing, educational systems, transportation, communication, food, etc. have huge added value. We don't want to give them up; neither should we nor can we give them up. However, these modern systems are wearing down, and increasingly they are grating against each other. More and more, we see the negative effects of our growing misunderstanding of society, and our growing powerlessness to act on the societal level, all around us on smaller and larger scales than before. The pollution, exhaustion of our resources, and changes taking place in the environment we all live in (such as the greenhouse effect) are extremely worrying. The effects of economic and armed conflicts are increasing. Segments of the population without much education are systematically being

excluded from opportunities for work, development, and training. Classical development aid, although well-intentioned, has some perverse consequences. Sick people and others needing care are increasingly being subjected to bureaucratic care systems, while these systems should be helping them to make their lives optimal. Companies and consumers are creating the most unsustainable chains of production and consumption in their preoccupation with satisfying every individual's desires. Our financial systems have become entities that few understand, and it's unclear who will benefit from the government's recent interventions. Politicians and administrators are doing their best, but they are powerless on all fronts, as loudly as many sitting politicians and administrators deny it.

We're locking each other up *en masse* like this. The government only manages to intervene once matters get completely out of hand, when the problems have become either so prominent in the media or directly tangible for citizens that it has no other choice but to take action, and when the political will is great enough to do so. Problem-driven crisis management prevails over opportunity-seeking improvement management, and that is an enormous missed opportunity.

There is an increasing neglect of everything that lacks economic potential, such as rare diseases and social cohesion. Our modernist educational systems have the tendency to stifle our children, the best and greatest capital we have, by making them all uniform. None of it stops governments from making policy with even more technocracy, cutbacks, and efficiency-oriented up-scaling, often for financial reasons. More frequently, individuals and groups are wondering what it all means. Wasn't society also supposed to serve them? Why aren't we sitting around the campfire together any longer?

This is all typical of our late-modern era. The process continues while we watch it happen. Increasingly, the scales of our ever-more-complex multi-actor practices are outgrowing the scales of our fragmented experiential worlds. This is breaking us up more and more. Increasingly, the negative effects are beginning to overshadow the positive ones (see also Part I). Therefore, with the positive themes of this book in mind, we must learn how we can actively develop our societal practices at increasingly larger scales of coherence and enhance their quality. We must continually keep an eye on the many bad experiences with large-scale societal planning and the 'makeability' mentality (such as Hayek's warning about the totalitarian hybrid forms of fascism and communism that he says it engenders,[234] or the miserable conditions in nursing homes striving to cut costs). Plurimodernity is focused exactly on these things.

To find solutions within this paradoxical set of preconditions, in which the growing need for societal sensitivity and reciprocity seem to run in parallel to an increasing inability to use them, we will need a *philosophical rethinking of society*. In this rethinking, I agree with

[234] Hayek, The Road to Serfdom, 1944

many contemporary thinkers that people today are fleeing these cold, rational modern bastions and withdrawing back into their own shells. There are unmistakeably postmodern cracks showing in modernity. We're seeing tendencies towards fragmentation in society, among them a new appreciation of religion and of small-scale values that are neither rational nor economic. I also subscribe to another broadly supported idea, namely that we are evolving and transitioning more and more to a *global network society*. These days, we like to see this development as the result of the enormous development of Information and Communication Technology (ICT)[235]. However, a similar development was put forward much earlier and in other words by sociologists in the late nineteenth and early twentieth centuries, among them Simmel and Weber, who were already observing the rise of new forms of organization and more complex social-economic relationships. Even eighteenth-century economists like Adam Smith and, somewhat later, David Ricardo saw commercial and economic alliances quickly growing into worldwide networks. They put forth a theoretical explanation for it: absolute and comparative advantages for countries led to division, specialization, and large-scale chains. This book is based on all these ideas and many more related to them, and when appropriate, it puts them into the entire framework of a journey along *the path of humanity*.

In a nutshell, this philosophical rethinking entails the following change. Our society is following *the path of humanity* and turning from a dualist individual-and-world society into an experiential-worlds society. As we began our journey on *the path of humanity*, people lived in relatively small bands in a large shared environment, a lifestyle which a simple individual-and-world duality fits like a glove. The vast majority of people still maintain this dualist view of individual and world, with us as thinking inhabitants on a material planet spinning in the universe.[236] This conventional individual–world view distinguishes and supposes thinking ('mind') people and a shared material world in which they live ('matter'). After all, our material earth is populated by people with minds. This worldview supposes an enormous shared world, a reality that just *is*, that we all experience in *the same way*, observe, but within which we can find, believe, and pursue *other* things.

Who would dare to dispute this distinction between the individual and the world? It's just common sense, isn't it? I just live here in the little town of Zeist at the edge of the woods with my wife and children, right? This view has deep roots. We see it in the distinctions between the 'hard' and 'soft' sciences, in an absolute belief in the fundamental difference

[235] At the end of the 20th century, the development towards the network society took on an increasingly technological hue, since the advent of information and communication technology in the last few decades has enabled the rise of social media (see Castells, *The Rise of the Network Society*, 1996). *The path of humanity* sheds light on another side of the story, namely that our societies are undergoing an ascending path of multi-actor scale enlargement, albeit with a few jerks, leaps, and setbacks. This increases the need for communication, so we develop the means to do so, in whatever way we can. Technology is an enabler, but at the same time it is enabled itself by the need for it. Cause and effect play an unusual game with each other here.

[236] This world view is also called the mind–matter or mind–body world view.

between facts and opinions (and the belief that these two categories are all we need), and in our legal system, that weighs actions (in the shared world) and thoughts (the private world) very differently. It's really unbelievably practical; even I will jump out of the way of a lorry heading for me, in the belief that it will kill me if I don't move.

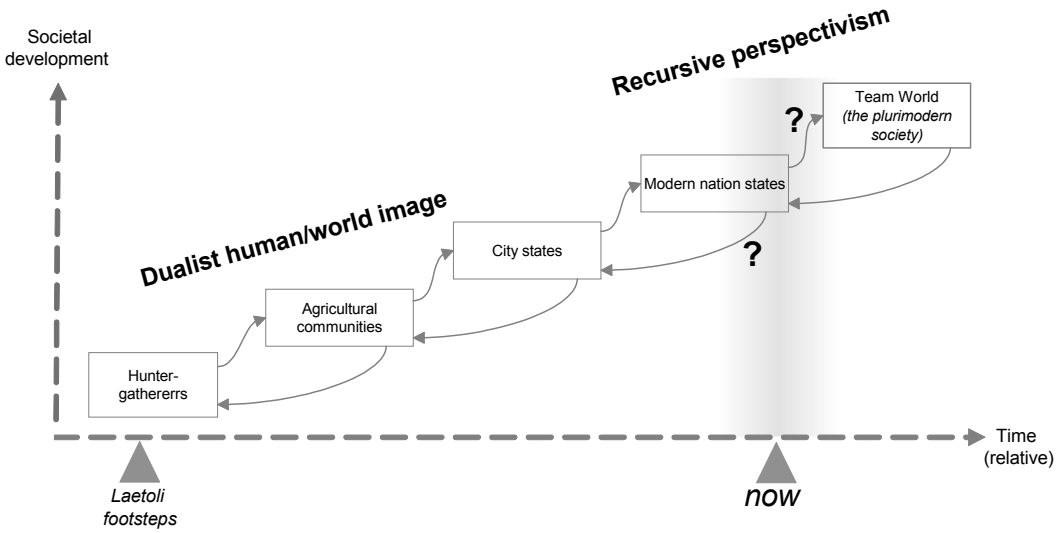
Being a deeply rooted belief, however, doesn't make dualism *a priori true* yet. The world has more than once seen the ideas of a loner or an isolated group (like Galileo, Planck, or Einstein and his peers), considered to be opinions, become high-level natural science (and sometimes return to being opinions again). Our earth was the centre of our universe until the sun took its place, and later on, even the sun had to give up its centrality to the innovations of relativism. Often what is fact and what is opinion only becomes clear centuries later, and the boundaries between them often blur as well.

This individual–world mentality is less and less appropriate in a society of experiential worlds, which encompasses more and more actors, all in their own environments and having their own points of view. There is therefore a need for a different philosophical-societal worldview that does justice to the dynamic multi-actor signature of more complex societies, and helps us to relate to and deal with them.

This *Society in Perspective* series meets this need with recursive perspectivism[237] and the concept of society as a multi-actor practice based on it. This takes care of the '*why*': it is necessary for meeting the demands of our increasingly complex society. Recursive perspectivism will be used in this section to better understand *the path of humanity* (the '*what*'). Following *The path* more closely (the '*how*') will be the theme of Part III.

The illustration below shows preferences of the dual individual–world (mind-matter) mentality and of recursive perspectivism as we progress along *the path of humanity*.

[237] The first fragments of recursive perspectivism arose in my mind the late 1980s and early 1990s. It was introduced in my dissertation (1997), and is discussed in philosophical and practical terms in volumes 1 and 4 of this series.



Philosophical rethinking of society: recursive perspectivism allows us to better grasp complex multiscale multi-actor societies than a dual individual–world mentality does.

Recursive perspectivism derives many elements from philosophy, science, and from everyday and professional practice. It is, however, important to realize that it is above all an extremely pragmatic way to grasp, relate to, and improve our societal practices. Although it provides surprising and valuable insights, it is more a value-seeking interpretation (a pragmatic skill) than a faithful model (a science) of our society. Its aim is to improve our competences in understanding, allowing development of, and collectively self-steering our societal practices. It attempts to make us less vulnerable and more powerful as actors and societal practices by tackling our collective Achilles heel: our lack of understanding of and for each other, and the resulting lack of consciousness of our society's interconnections, coherences, and possibilities for improvement. Recursive perspectivism aims for us to deal with all of this more consciously and more competently (the plurimodern transformation), without straying onto the paths of imperative planning and steering. This transformation can help us make the rest of our journey along *the path of humanity*.

The dualist individual–world view worked outstandingly well for hunter-gatherers living in small bands in a large environment shared fully by the group members. A significant amount of their mental world was probably also magical and religious, and thus not as rational or technological as it is for us today.[238] Max Weber highlighted the enormous influence of modernization with his idea of the *Entzauberung der Welt* (the disenchantment

[238] Making hand axes was also a technological process, of course.

of the world).[239] Religion and magic (faith and hope) yielding increasingly to a more rationalist (knowing) and technological (ability) mindset is characteristic of modernity. However, the great shared environment was virtually indisputable and genuine. If a big bear was in front of your cave, it was clearly observable for everyone, and if it was blocking the entrance, the most practical solution was to bash its brains in. Where people live together intensively on a small scale, say a family, small company, or similar small community, dualism is still extremely practical. It's also useful for crossing the street. But this dualist individual–world view starts to chafe more and more the further we progress along *the path of humanity*, to the point where it's now failing to serve our late-modern societies.

This is because today's societies are filled to bursting with actors. In a complex society, many different actors each experience *their own experiential worlds*. What is experienced over and over again becomes a reality for the group it touches. These experiences differ greatly between groups. In this way, each actor creates his (or her or even its) *own* realities in his/her/its *own* way in his/her/its *own* context.[240] The shared environment, thus the shared world around us becomes quite thin. What do Wall Street bankers have in common with the pensioners whose savings they play roulette with? What do car drivers have in common with the inhabitants of the Maldives?[241] And how real are their separate experiences and realities actually *to each other*? They are nevertheless connected, by even wider societal relationships that too few people notice, and on behalf of which even fewer of them consciously act.

From a dualistic point of view, we have trouble with the vague societal boundary area between mental and material that becomes more dominant and large-scale in connecting the shared environment around all of us with our own individual experiences the further along *the path* we go. [242] This area is created by the presence of others who do not belong to our group, and who have largely different experiential worlds than ours. What is concrete, true, meaningful, and real for one is vague, untrue, meaningless, and illusion for another.

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[239] Max Weber, Vortrag, Wissenschaft als Beruf, section on Rationalisierung, *Fortschritt und Entzauberung der Welt*, 1922.

[240] Recursive perspectivism clearly has constructivist roots, as it turns out.

[241] Rising sea levels caused by greenhouse-gas emissions from cars are submerging the Maldives, a group of islands near India. No individual driver is deliberately trying to sink the Maldives, but it's happening nevertheless, since the experiential worlds of drivers and Maldive Islanders have virtually nothing in common. This relationship becomes visible in an experiential world seeking coherence.

[242] Perspective precedes all kinds of dual distinctions, e.g. matter and mind, fact and opinion, or time and space. It turns around what is a priori and what is a posteriori with regard to dual and absolute philosophical positions: first comes perspective, and only then comes all the dualist interpretation. Perspectivism recognizes the practical value of these kinds of dualities, but sees them as limiting cases on a spectrum, and as interchangeable with each other. Our societal lives play out in the entire enormous spectrum between the extremes. Recursive perspectivism's philosophical position in the middle between a sterile, oppressive, and crippling positivism and a noncommittal and unfocused relativism make it suited at least in principle to support humans cooperating and thus societies developing further as well.

Something that is most precious for one person is a horror for another. The differences can be vast, as the wave of fundamentalist terrorism in today's world illustrates. One parent does their best to help their daughter negotiate her way as she takes her first steps into sexuality and relationships, while another parent will have her killed to save the family's honour. Some of these differences are timeless, but right now with an increasingly complex multi-actor practice, there are more and more 'others' and the differences are becoming more extreme. This is why it's time that we bring our philosophical principles better in line with the societal requirements dictated by our position on *the path of humanity*.[243] These requirements are easily summarized as having to interact with more and more experiential worlds that differ more and more strongly with each other, and doing so in coherence, that is, making a unified whole. Recursive perspectivism provides a framework for us to do this.

6.1.2 Recursive perspectivism revisited

'I'll be discreet: in my opinion, the world is not continuous.'

Perspectives are three-part experiences of change.[244] They turn a beginning situation into a resulting situation. A flat bike tyre gets patched, resulting in a bike that works again. You are walking happily in the sun, something reminds you of your late mother, and then you feel melancholy. You find out that that cute girl often eats lunch in a certain place, so now you make sure you go there at lunchtime. This is how we experience perspective, again and again: the triple combination of beginning situation, process of change, and resulting situation.

Therefore, according to recursive perspectivism we – any actor on any scale – experience our society as a fabric or network of perspectives. Actors' experiential worlds are conceived of as dynamic networks of perspective, containing their own facts and opinions that come forth from individual experiences.

It is difficult to understand a society without using perspective. Why should you go to work, raise a child, wait for the bus, or look before you cross the street? How could you do all of this without partly reciprocal ideas about 'change', 'better', and 'worse' that connect with each other? Recursive perspective makes targeted change operational. Perspectives offer a set of tools for improvement, completely based on experiences from (and about) the past and present, as well as expectations for the future.[245]

Every perspective, whether a thought or a material thing, spatial or temporal, private or shared by a group, atomic (in the sense of being the smallest unit possible) or composed of other perspectives, forms a three-part building block of subjective or objective experience,

[243] Philosophy is, I think ultimately pragmatic, since I see people as improvers.
[244] 'Experience' here is everything you are aware of, thus both material and mental experiences.
[245] Of course past experiences are not *guarantees* for the future, a belief defended early on by dyed-in-the-wool sceptic David Hume against all odds. But they're the best we've got, and there's no alternative.

and of life. Perspectives are often just as concrete, or I should say practical, as material things, like a chair in your kitchen. Who doubts that a vase will break if it falls from the table (Vase on table, *Falls*, Vase in pieces on the floor), or that a family member getting sick makes you sad (Healthy family member, *Gets sick,* Sadness)? The advantage of perspectives is that with one concept, they can cover a much larger share of our experiential worlds than just the material or mental aspects, since they do not restrict our notions of experience to what we *all can sensorily* (see, feel, hear, smell, taste) or *mentally* perceive (thoughts, feelings, etc.). Personal experiences, group experiences, mental experiences, material experiences – it's all perspective. Everything that we consciously experience can be expressed in perspective. It only makes a distinction between beginning situations, changes, and ending situations, and does so in coherence. It can cover so many different experiences precisely because it is so hugely abstract.[246]

Perspectives can link to form more extensive perspectives. The result of one perspective is then the starting situation of the next perspective, and together they can form an even larger perspective, in the way smaller Lego pieces can be put together to form a larger one (on a different scale). In this way, it can cast entire experiential worlds in a practical mould. Think of all the smaller activities that go into patching a flat bike tyre (turn bike upside down; get bucket; fill with water; remove tyre, etc.) or the phases of solving a puzzle. This is where the recursive character appears: perspective is the building block of experience on any scale, and it can be unravelled into smaller perspectives or assembled into larger ones when convenient or appropriate. Recursivity is a form of repetition that manifests itself on different scales.

The perspectives that can signify either an improvement or a worsening are especially interesting. We try to pursue perspectives for improvement and avoid those with potential adversity. It's why we patch the bike tyre, avoid riding over broken glass, and lock the bike when it's parked. It's why you jump in the car to see your family when you miss them. It's why we strive for a plurimodern society.

None of us deliberately turns the thermostat up a degree or takes the car to visit our mother-in-law to submerge the Maldives under the rising sea. Yet that is what our countless thermostats and mothers-in-law have brought about today, and the Maldive Islanders are extremely worried about an increase in the greenhouse effect. At the same time, the Maldive Islanders depend on tourism for their livelihoods, and most tourists come by aeroplane, the undisputed champion of CO_2 emissions.

Recursive perspective gives form and content to our most human quality: that of improvers, of value seekers (and of avoiders and preventers of regression). It does this on

[246] It will emerge further on that this is the most abstract description of a perspectivist consciousness. In any case it will be difficult to abstract farther than situations connected by changes. It introduces a temporal order that covers spatiality as well. Spatiality means nothing more than that you can repeatedly experience the same perspectives together with others.

every scale and from within all experiential worlds because of its recursive structure. Recursive perspective clarifies the relationship and the tensions, and the cooperation and the competition among all these improvements, even in the most complex multiscale multi-actor practices. Additionally, and crucially for this book, it reveals paths to improvement.

The dual individual-and-world view is much too restricted to capture and connect all of today's experiential worlds. It can condemn us to a sterile objective positivism in which we keep seeking objectivity, the shared and universal truth in the world, and we get stranded in inconceivable complexity.[247] It can also lead to a crippling subjectivity, an utterly noncommittal 'anything goes' mindset in which we cannot take one step forwards in agreement, since every opinion is equally valid. Recursive perspectivism rejects both positivism and subjectivism as adequate images for society, putting them at the outer limits of a societal spectrum.



The societal spectrum

Recursive perspectivism continually looks for ways in which *different experiential worlds in coherence* can create societal value. Then you don't have to know all the perspectivist details, which in fact is an impossible task for a human being.[248] You don't have to completely agree with others – we shouldn't have to give up our pluriformity, since that's actually a strength. However, neither can you disagree with everyone else on all fronts, since then there is no common ground either in cooperation or competition. Instead, you work together to find value, a better mutual balance, whatever that means for the various actors, avoiding the objective and subjective pitfalls. Then societal coherence and cooperation emerge from recursive perspective, like Rembrandt's portrait of Jan Six, in which the subject emerges out of a dark cloud of coarse brush strokes.[249]

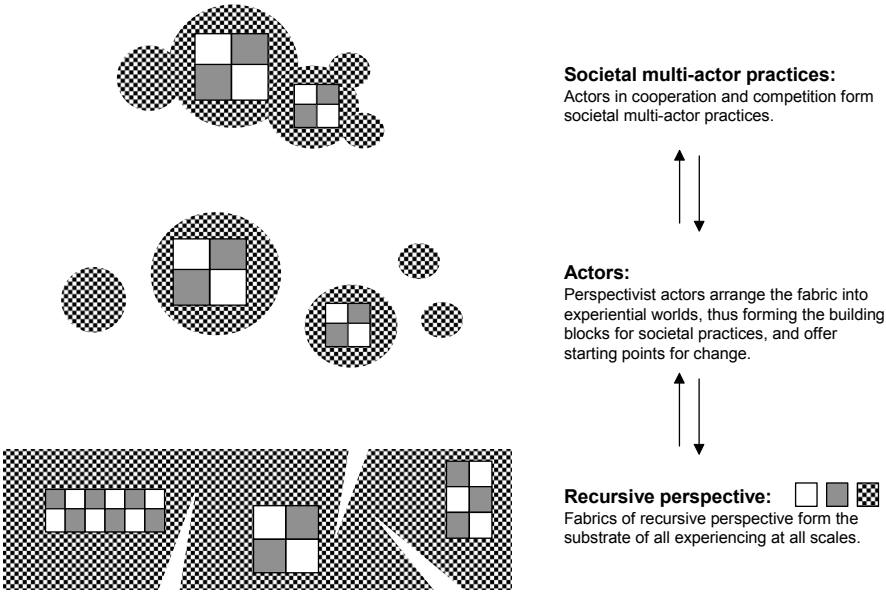
6.1.3 Perspective, actors, societal practices

The recursive perspectivist view of society is closely linked to our dynamic late-modern multi-actor society. It supports our next move to Team World, in which coherence and cooperation between conscious actors will have to increase even more, and take place on larger scales to generate even more value. It radically conceives of our society as interacting

[247] We get stranded by necessity. If 1 person can experience x number of perspectives in coherence, then 7 billion people can experience 7 billion times x perspectives. We thus can only broaden our scope over others by giving up our own resoluteness. Positivism shoots itself in the foot on larger scales in this way.
[248] Practically speaking, there is a perspectivist threshold, a maximum number of perspectives that a human being can experience. In my dissertation I called this the cognitive threshold, since at the time I still conceived of perspective as a relatively mental notion, although it was expanding rapidly.
[249] A painting by Rembrandt from 1654, famous for its broad, rough brushstrokes.

actors who consist of recursive perspective (see figure below). If actors and societal practices change, then they do so in terms of recursive perspective.

The course of our societal development is a jagged line, but on average it heads towards more perspective, more actors, and more coherence and cooperation. In the same way Rembrandt created the most magnificent works of art using only paint, we can now experience, understand, sketch, model, discuss, combine, think through, organize, test, etc. actors and multi-actor practices, purely on the basis of recursive perspective. Since perspective is a basic unit of conscious improvement, we can use it to foster the development of better societies, based on more conscious and explicit use of multi-actor improvement perspective.



Recursive perspectivism results in a three-layered view of society in which actors constitute the connecting principle (figure repeated).

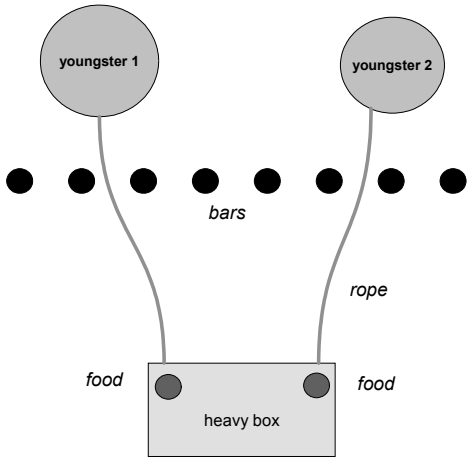
The more we emphasize our own experiential worlds, the more we lock each other up. It denies us the access to the enormous richness that perspectives in coherence and cooperation can offer. What this means has been illustrated in the images comparing entropy in mixing gases, throwing a dice, and meshing perspective (see Part I).

Recursive perspectivism offers a dynamic alternative to the rigid dual individual–world view that is geared to the questions of our age. This is because it conceives of our society as dynamic perspectivist multi-actor practices. It supports our consciously and coherently working with experiential worlds. That's a fitting method for our position on *the path of humanity*.

6.2 Two can do more than one

The perspectivist space through which *the path* leads us is based on coherence and cooperation. In this section, therefore, I'll go deeper into cooperation and competition and how they are related to each other, using three points of view: one from anthropology and two from game theory.

6.2.1 Anthropology and apes



Although I'm neither an anthropologist nor a comparative psychologist, I have to tell you about a couple of remarkable experiments from these disciplines. In a classic experiment filmed in the 1930s, brought to my attention in a lecture by Frans de Waal[250], two youngsters look at a heavy chest with food at either end, which is a few meters away and behind bars so that they can't reach it (see illustration at right). There are two ropes attached to the chest just within their reach. If only one of them pulls one rope, the chest won't move, but if they both pull together it's snack time! If one of them had already eaten, he was considerably less enthusiastic about pulling the rope, but with a little encouragement by the other, he ultimately cooperated.

Did I mention that these youngsters were chimpanzees? Chimps understand this basic level of cooperation perfectly. Another telling experiment from the same lecture was conducted by De Waal himself. Two capuchin monkeys are side by side in a cage. If they give back a pebble that was given to them by a researcher, they get a piece of cucumber as a reward. For

[250] During a 2011 talk at the TEDxPeachtree conference in Atlanta, primatologist Frans de Waal discussed the moral sense possessed by monkeys, apes, and elephants.

a while, they take turns returning pebbles and getting bits of cucumber. At one point, the researcher gives one monkey a grape as a reward instead of a piece of cucumber (and they like grapes much more) in full view of the other. Then she gives a pebble to the other monkey, who then gives it back. When this monkey gets the piece of cucumber, it angrily throws it out of the cage (and the second time its neighbour gets a grape, this monkey tests the pebble to see if it is somehow different).

There's only one logical explanation for this. The second monkey feels that it deserves the same reward for the same task. If *one* monkey gets a grape for doing the same task as the other, then *the other* should get a grape too, and not a lousy piece of cucumber. It's not *fair*. Frans de Waal's dry and fitting comment is 'This is basically the Wall Street protest that you see here.' In a few isolated cases, some chimpanzees (a different species) have such a concept of fairness that they refuse the grape until their neighbour gets one too.

Researchers on cooperation are still inspired by the 1930s film with the heavy chest. Developmental psychologist Michael Tomasello referred to several related experiments in a video connected with his article *Origins of Human Cooperation and Morality*[251] (with Amrisha Vaish). He shows several variants of this experiment with chimps and human children. Children even only a couple of years old seem to really excel in cooperation and sharing fairly. In one variation on the rope experiment, two children use the ropes *together* to bring in four gummi bears. What happens next? In over 80% of the cases, they divide the bears fairly between the two of them. Many primates are not capable of sharing; often the first one to grab the food gobbles it up right away. As you might expect, the other one then gives up. So much for the future. End of cooperation, end of path.

If you give one child, especially a young child, four gummi bears and *then* ask it to share them, it will not always do so. Children are still like the other apes. Earlier scientists concluded from this study that children are selfish by nature. However, a variation of it brought some nuance into the picture. Two children pulled on two ropes to acquire four gummi bears, but the equipment was rigged so that three bears fell to one side and only one to the other side (and thus to the other child). *In the vast majority of cases, the children shared the gummi bears fairly, since they had 'earned' them together.* If each child had pulled its own separate rope to get its own gummi bears, i.e. one got three and the other got one, then they didn't share, since there was no cooperative effort.

Apparently, people at a very young age are already capable of not only feeling that cooperation deserves a shared reward, but of sharing the reward fairly as well. In terms of this book, they are using a certain perspectivist value–effort balance. De Waal's studies even suggest that important elements of moral behaviour, such as empathy and consolation, social and prosocial behaviour, reciprocity, and fairness, are innate in primates. Evolutionary processes that promote collaboration are what underlies these

[251] Annual Review of Psychology, Vol. 64: 231-255 (January 2013)

elements. From this evolutionary basis – if and because the environment gives us a reason to cooperate or even collaborate – we learn when we're very young that working together pays off, and we develop appropriate standards for it. At least we do on the small scale where the entire game can be seen, and if the collaborative relationship endures for a while with the same people (such as playmates).

This principle does not work on larger scales, in groups of people whose members *no longer know each other personally*. All sorts of other social mechanisms become necessary, such as social standards (of dress or behaviour), religions, laws, and institutions, that make it clear who belongs to the group, what is required of them as members, and what they can be criticized for. Competition *between* groups is still fine, but *within* the group, people cooperate following the established rules. If you don't obey the rules, then in extreme cases you won't be able to enjoy the advantages of cooperation within the group.

6.2.2 The evolution of cooperation

For our second point of view, Robert Axelrod studied the rules of cooperation in a completely different domain, that of game theory and computer simulation (see his book *The Evolution of Cooperation*).[252] Axelrod says his research began with a simple question:

> When should a person cooperate, and when should a person be selfish, in an ongoing interaction with another person?

The question may be simple, but at first glance, the answer looks anything but simple. If you replace the word *person* in the above sentence with *actor*, it covers an enormous variety of situations in society that require a decision: getting along with the neighbours, business-like behaviour, and the Cold War, to name a few. What's unusual, however, is that situations like these can be modelled more simply as a *series of Prisoner's dilemmas* (see box for an explanation of the Prisoner's dilemma), and this is exactly what inspired Axelrod to conduct a unique experiment.

> The **Prisoner's dilemma**[253] is a famous dilemma that shows why cooperation between two actors can go wrong even when it's obvious that cooperating has great benefits. The situation is as follows. Two gang members, who we'll call Pete and Jimmy, are suspected of a serious crime, and are being held in separate cells (they *cannot* communicate with each other). The police have too little evidence to convict them both, so they decide to indict them for a less serious crime carrying a penalty of one year in prison. If they cooperate with each other and keep their mouths shut,

[252] Robert Axelrod(1984), The Evolution of Cooperation.

[253] The prisoner's dilemma was originally thought of by Merrill Flood and Melvin Dresher of the RAND Corporation in 1950. Albert Tucker worked it out with prison sentences.

then they each get one year. If one betrays the other by telling the police that the other committed the crime, the other will get five years while the betrayer will go free (zero years). If *both* betray the other one, they each get three years. The table shows the choices more neatly, with four possible outcomes. Pete's axis is horizontal, Jimmy's is vertical:

Pete **Jimmy**	Cooperate	Betray
Cooperate	1 year each	Jimmy 5 years, Pete 0 years
Betray	Pete 5 years, Jimmy 0 years	3 years each

The table of outcomes in a prisoner's dilemma

Now put yourself in the place of one of the criminals. Let's say you're Pete. You think that Jimmy will keep quiet (cooperate with you). Then it would be smart to betray him, since you'll go free. If you think that Jimmy will accuse you, then it makes sense for you to accuse him, and then both of you will only get three years (if you don't say anything, you'll get five years while Jimmy goes free). Whatever Jimmy does, it's *always* advantageous for Pete to accuse Jimmy. But Jimmy has the same dilemma, of course. If he accuses you, you both get three years.

They needn't have done so: if they had cooperated and both kept their mouths shut, then they'd both be free in one year. The mafia understands this quite well, by the way, as shown by their code of *omertà* (an oath to keep silent on pain of death). The Prisoner's dilemma makes it clear that a strictly selfish rational approach automatically results in a suboptimal outcome for both parties.

Axelrod stresses that the Prisoner's dilemma is nothing more than an example of a broad category of situations in which completely rational, selfish action results in a suboptimal outcome. He defines the essence of the Prisoner's Dilemma in two properties.[254] The first is that there are four possible outcomes, ordered in the following way (from good to bad):

1. The temptation (T): Egoist wins over Cooperator (0 years)
2. The reward (R): Cooperation by both actors (1 year)
3. The punishment (P): Egoism by both actors (3 years)
4. The sucker's payoff (S): Cooperator loses to Egoist (5 years)

The second, according to Axelrod, is that the averages of outcomes 1 and 4 may not be lower than outcome 2. Otherwise, the criminals could change places and

[254] Robert Axelrod(1984), *The Evolution of Cooperation*, Chapter 1: The problem of cooperation.

> exchanging 1 and 4 would be better than both cooperating (outcome 2). (For a one-off Prisoner's dilemma this second quality of Axelrod's is not needed.) Briefly if somewhat incomprehensibly summarized: T < R < P < S and (T+S)/2 > R. (In the event of reward, we can say T > R > P > S and (T+S)/2 < R.)

Axelrod challenged scientists to submit computer programs for a 'Computer Prisoner's Dilemma Tournament'. It was like a chess tournament for computer programs except that instead of chess, a long series of Prisoner's dilemmas was played between *each* possible pair of the programs sent in.[255] Everyone was playing against everyone else. As shown in the box, each of the two programs playing can cooperate or betray. Together they result in one of the four rewards: T, R, P, or S. Any program submitted always has the history of the decisions made up until then, and it can use this history to make the next smart move.

His first request yielded 14 computer programs, sent in by game theorists from economics, psychology, sociology, political science, and mathematics, from various universities and institutes. These programs included cooperative, selfish, 'honest', and 'sly' types. The tournament was held, and what happened? The winner, the program that kept the most points after a series of 200 moves against each participant, was the simplest entry by far, called Tit For Tat. Tit For Tat is a strategy that always starts by cooperating, and then consistently doing whatever the opponent did in its previous move. Axelrod's simple question turned out to have a simple answer after all! Tit For Tat does not use any profound analyses of the game history, and it makes no attempts to outwit or corner the opponent (as some other entries did). None of that. No competition, no assumptions. Just a positive beginning and then either a positive or negative response, depending on what the opponent did the last time.

The results were made public and an additional round was held with new computer programs. The makers of the new programs knew that Tit For Tat had won, and they knew the strategies of all the first-round programs. They had in-depth 'insider information', and adapted their programs accordingly, with new tweaks. Tit For Tat was also entered in this round, and nothing changed: again, Tit For Tat won.

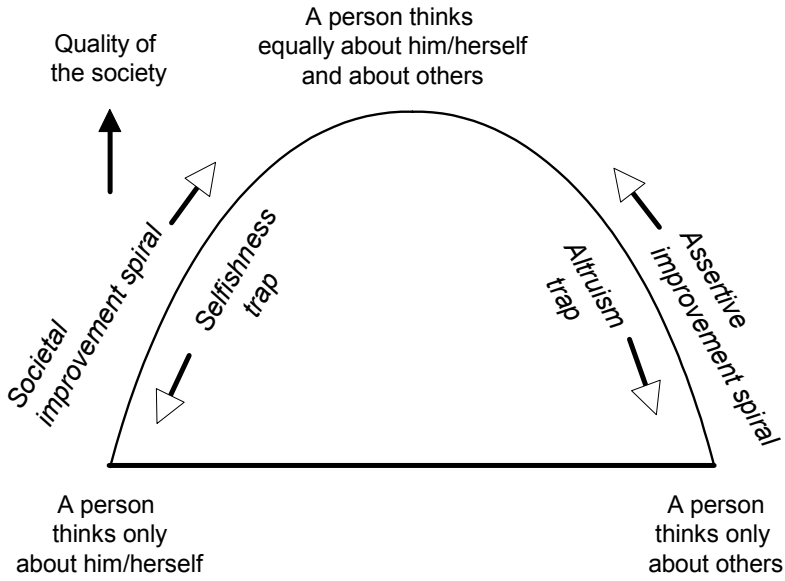
Axelrod's book provides several analyses of the interactions between the various programs, and they're entertaining to read. He sums up the reasons for Tit For Tat's resounding success compactly thus:

> What accounts for Tit For Tat's robust success is its combination of being nice, retaliatory, forgiving and clear. Its niceness prevents it from getting into unnecessary trouble. Its retaliation discourages the other side from persisting whenever defection is tried. Its forgiveness helps restore mutual cooperation. And

[255] This is called the iterated Prisoner's dilemma.

> its clarity makes it intelligible to the other player, thereby eliciting long-term cooperation.[256]

I have remarkably little to add here, except perhaps this. Do you remember the Societal Balance Model (shown again below) from Part I? Tit For Tat navigates this model masterfully. The program knows how to avoid the destructive pitfalls of both selfish and altruistic behaviour, by never *only* thinking of itself, and never *only* neglecting itself. It uses the upward social and assertive improvement spirals skilfully by being cooperative, forgiving, and clear whenever it can. This makes Tit For Tat almost a precept for reaching the entropic peak of societal quality under normal circumstances. It is astonishing in its simplicity, and grand in its power. Always be open to others, and always growl back once if you need to. If we all play Tit for Tat, then we'll all be racing towards the peak together.



The balance model of societal quality (again, see 4.2.5).
Tit for Tat plays this model masterfully.

6.2.3 Long live competition?

Then we have the third point of view, again from game theory. In the 1980s and 1990s, I was surprised at the huge amount of attention *competition* was getting within the field of strategy. Today, poor managers still emphasize its importance. One of the most striking titles on the subject by Dixit and Nalebuff (1991) was *Thinking Strategically: The Competitive*

[256] Robert Axelrod (1984), *The Evolution of Cooperation*, Chapter 2, last paragraph.

Edge in Business, Politics, and Everyday Life.[257] At the time, if you weren't in favour of ruthless competition, then you were doing something terribly wrong. Although there certainly is room for competition, it seemed obvious to me that cooperation usually wins out over competition, certainly in the long term. The evidence is all around us.

Frans de Waal also recognized this excessive focus on competition in those years in his research on primates (see the lecture referred to earlier). *The Clash of Civilizations* by Huntington, a reaction to Fukuyama's *The End of History*, was nothing more than competition at the large-scale cultural level. And using the term 'sucker's payoff' to denote a victim of their own cooperative attitude in the Prisoner's dilemma is not exactly sympathetic to the cooperator. Evidently, the sympathy for competition in the 1980s and 1990s extended well beyond the business world.

Innovation, the deliberate process of seeking improvements (such as the famous pairing of process efficiency and product innovation), among other reasons to take on the competition, immediately results in the creation of the new and destruction of the old. Joseph Schumpeter, a famous early-twentieth-century economist, devised the term 'creative destruction': old companies are being continually destroyed by new ones that have better technology, thanks to innovation, in a competitive evolutionary process. According to Schumpeter, improvement simply requires competition and causes destruction; that's the way it is.

Richard Dawkins, author of *The Selfish Gene*, used Tennyson's evocative expression 'red in tooth and claw' to make it clear how merciless the effects of relentless *evolutionary* competition are. In an interview with the US educational network PBS on the relationship between evolution and free will, he said:

> I am very comfortable with the idea that we can override biology with free will. Indeed, I encourage people all the time to do it. Much of the message of my first book, *The Selfish Gene*, was that we must understand what it means to be a gene machine, what it means to be programmed by genes, so that we are better equipped to escape, so that we are better equipped to use our big brains, use our conscience intelligence, to depart from the dictates of the selfish genes and to build for ourselves a new kind of life, which as far as I am concerned the more un-Darwinian it is, the better, because the Darwinian world in which our ancestors were selected is a very unpleasant world. Nature really is red in tooth and claw. And when we sit down together to argue out and discuss and decide upon how we want to run our societies, I think we should hold up Darwinism as an awful warning for how we should not organize our societies.[258]

[257] Avinash K. Dixit, Barry J. Nalebuff (1991), *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life*.[EAH since most of this is already in the text the footnote only needs the full names of the authors.]

[258] www.pbs.org Interview with Richard Dawkins about evolution, determinism and free will.

These are wise words. The first two of the above points of view, from anthropology and computer simulation, show us precisely the beginnings of a wholly different route to improvement from the competitive survival strategy. Societal value is also mainly generated by cooperation by a range of actors. It emerges from shared creation, the use and realization of the many opportunities at higher levels of quality, in ever-wider and more pluriform coherence. It all revolves around coherence and cooperation. *The path of humanity* is the example of this observation *par excellence*. Today, the importance of cooperation is being recognized more and more, even by the former competition gurus Dixit and Nalebuff, as evidenced in 2008 by the foreword to their thorough revision of *Thinking Strategically*, called *The Art Of Strategy:*

> When we wrote *Thinking Strategically* [the predecessor to *The Art of Strategy* from 1993, HD], we were younger, and the Zeitgeist was one of self-centred competition. We have since come to the full realization of the important part that cooperation plays in strategic situations, and how good strategy must appropriately mix competition and cooperation. [259]

That's progress, I'd say. The position that cooperation and competition are both important is an obvious improvement over the emphasis on competition. (This competitive variant of *the path of humanity* could be called the stagnating *path of the crocodile*: the animal will survive, but I doubt if crocodiles' lives will improve more and more in the long run.) This more nuanced position balancing cooperation and competition is becoming more common. It turns up in negotiation theory, where the maxim 'hard in business, soft on the person' has been the rage since the end of the twentieth century.

Nevertheless, I think that this equitable, or call it more a balanced approach (even though that sounds much too positive) to competition and cooperation misses the crucial point completely. Cooperation is absolutely the *real* champion instrument for improvement and for creating societal value and quality. I'll emphasize it again: I'm saying this not as a naïve utopian, but as someone looking critically at human development. Cooperation simply deserves our preference as a basic attitude. Although competition is certainly useful, its place is not at the forefront. In other words, competition should be 'fair play', with an eye to the position of the losers and the consequences for them. At best, competition is second best, to be used only when there is no other choice (see Tit For Tat). Within the broad frameworks of cooperation, competition can be an outstandingly positive force as a driver of improvement. Forms of healthy competition, framed in a cooperative atmosphere, can be just the thing to produce impressive results. Brian Eno's concept of 'scenius' makes this clear in an appealing way.[260] Scenius is the collective form of genius: within a group (the *scene*) it results in a dazzling ecology of ideas and actions that embrace an inspiring form of competition. Think of a group of musicians jamming together. Of course one wants to

[259] Avinash K. Dixit, Barry J. Nalebuff (2008), The Art of Strategy: A Game Theorist's Guide to Success in Business and Life.

[260] I'd like to thank Jan Willem van de Groep, who brought the concept of *scenius* to my attention.

outshine the other; maybe one gets frustrated if their improvisation derails (and someone else's is brilliant). But the prevailing mood is one of appreciation of each other's prowess, with everyone helping each other, learning from each other, and inspiring each other to new heights.

In times of extreme scarcity, we may have no choice as a society but to break down to the point where we destroy our adversaries, playing a brutal zero-sum game just to survive. As a general rule, though, 'everyone for himself' is not a rule to live by. There is also no reason why innovation and improvement need to go along with the large-scale, crude creative destruction that results in Pyrrhic victories (also see the six innovative value orientations in Part III). The most added value for society is actually created in a mix that continually and explicitly safeguards social innovation. Genius, scenius, societius: the optimal *path of humanity* expressed somewhat differently.

6.2.4 On coherence and cooperation

What can we take away from anthropology and game theory here? Purely competitive entrepreneurs, purely vote-driven politicians, and purely price-oriented consumers are like chimpanzees who fight for the biggest portion of fruit even knowing that they didn't gather that fruit themselves. They inhibit further societal development. You do want to make sure you tie your own fate to someone like yourself. If someone attacks you, as a nation or an individual, of course you have to defend yourself. But 'attack mode' mustn't be our *first* nature (see also Tit For Tat). There's no need to harm others just to better your situation – it's excessive, undesired, and unnecessary. There is one important reason why there is barely any 'path of the crocodile', and why the path of the chimpanzees is so much shorter than *the path of humanity*: they have much lower levels of coherence and cooperation. There is little that crocodiles or chimpanzees can do about that themselves.[261] We humans are at a much higher level of competence in connecting, cohering, and cooperating with each other, even though sometimes it seems that we're nearing our limits, and we risk stagnation and regression as a result. The big difference with us is that we can do something about it. We can observe and identify it, and then choose to go further along *the path of humanity*: a path of coherence and cooperation that has space for healthy competition. It requires us to consciously flesh out the details of plurimodern transformation. What I mean by healthy competition within frameworks of cooperation is the deliberate development of better and better alternatives, on any societal scale at all, oriented toward maximizing the quality of society. That sounds almost like evolution, but there is one major difference. The intentional and whole *individual*[262] is then at the wheel, as it were, instead of nature and

[261] See also Piet Vroon, *Tranen van de krokodil* (Crocodile tears, 1989), about the rapid evolution of our brains, for a remarkable and underappreciated perspective on evolution, biology, and psychology.
[262] The individual can follow *the path of humanity* much better than a blind watchmaker can make a watch. (See *The Blind Watchmaker* by Richard Dawkins).

chance throwing the dice.[263] That easily has my preference, even if the natural forces around us reveal our insignificance as humans now and then.

> Can two do more than one? That's the title of this chapter, but in the form of a question, and the answer is crystal clear. Yes, if they cooperate. They can even do more than twice as many as one, as it creates extra value, in any form, and that is precisely the motivation for cooperation. When two people work alongside each other and do exactly the same thing, than two can do exactly twice as much as one. If you cooperate and structurally fall under this level, the cooperation will quickly end. When two work against each other, they can do even less than twice as much as one. Unless you take something away from the other, but then you win and the other loses. That is exactly why you should strive to improve cooperation, and refrain from working against each other, unless there is no other way. The math is crystal clear for anyone who cares to look. I will mathematically support this statement in a moment, when I address the three perspectivist balances.

The stonesmith of the Vézère

Years ago, I visited the Vézère Valley in the Perigord region of France. We know from the many archaeological finds there that for tens of thousands of years it was inhabited by the Cro-Magnon, an early form of *Homo sapiens* who appeared 40,000 years ago in what is today France. They lived in '*abris*', indentations in the southwest-facing slopes of the limestone rocks there, given additional protection by palisades hung with animal skins.

These archaeological finds include many flint tools. The inhabitants of the Vézère Valley lived by hunting large animals such as mammoths, aurochs, woolly rhinoceros, and reindeer. The march of technology was many orders of magnitude slower than it is today; although there was some development, some kinds of flint tools were used for literally tens of thousands of years without changing significantly. Nevertheless, the Cro-Magnon raised working with flint to a real art. All kinds of tools and weapons have been found in the area, constituting an impressive repertoire that was truly 'cutting edge' for a very long time.

I met someone there whom I mentally nicknamed 'the stonesmith'. He was hugely skilful at making flint tools, and he gave demonstrations. By looking closely at the products and the

[263] A famous pronouncement by Albert Einstein, reacting to the rise of quantum mechanics, was 'God does not throw dice'. I don't know if there is a god that throws dice. I do think that there is quite a lot of randomness in nature, and that we can set our human intentionality (our consciousness and goal orientation) against it. Human intentionality on a substrate of recursive perspective can be a weapon against natural entropy.

fragments lying around, he had reconstructed the tool-making techniques of the Cro-Magnon. (At least the scraps and finished products were the same. We can only guess whether or not his method was absolutely identical.) I could only imagine that even tens of thousands of years ago, in these small groups living in their *abris*, there must have been people who specialized in making flint tools.

It may be that all the men both hunted and made weapons. But why not assign those tasks to different people in your group if some are better at making weapons and others are better at hunting? Then you have a distinction between weapon makers and hunters. The presence of 'workplaces' heaped with stone fragments indeed points to an early form of professional specialization, one that fits in excellently with the group's task of living at the highest standard possible in terms of welfare and wellbeing. If you have more time to perfect your skill at hunting, or gathering roots and berries, or making tools, then you'll improve much more. Reconstructions of how people lived back then suggest that the women and children gathered fruit and roots and that the men did the hunting. That's rather obvious, since rearing and watching over children doesn't go well with hunting woolly rhinos, and even back then men were usually physically stronger than women. The seeds of further social and professional specialization are here in this early form of society. They knew even then that cooperation results in value, and that two can accomplish more than one.

The Hadza, the Datooga, and the Masai

There are a total of around 1000 Hadza living near Lake Eyasi and the Ngorongoro Reserve in Tanzania. About half of them still have an extremely basic and traditional hunter-gatherer lifestyle, living in groups of ten to thirty people. Genetically, they are not at all similar to other tribes in Tanzania. Among other things, they are characterized by their unusual clicking language which also has little similarity with other languages. I thought that visiting them would help my two sons open their eyes to the diversity of forms of society on this earth, and to how luxurious the Western lifestyle is by comparison to most. A visit to the Hadza is like stepping thousands of years back in time. Although I've had contact with many remarkable tribes (including the Emberra in Panama, restaurant workers in tourist cities, and African tribes), I must confess that the aboriginality of the Hadza really touched me. You can't get any closer to how hunter-gatherers must have lived.

The Hadza are hypernomadic. This became apparent as we began our visit: we needed a few hours just to find them, even though we had a member of the neighbouring Datooga tribe as our guide. They have an encyclopedic knowledge of plants and animals, and they are master hunters, primarily using bows and arrows to kill all sizes of game. What astonished us most as Westerners was the utterly basic way they live. What they call a hut is more like a shrub; the prehistoric dwellings of the Cro-Magnon in the Vézère Valley are luxurious by comparison. They can literally fit all their possessions in their two hands, or carry them on their backs (which they do frequently when they look for new hunting grounds). According to the Datooga guide, if the Hadza shoot a very large animal, then everybody moves to where the animal is, since that's much easier than the other way round.

The Datooga guide told us that his own people were primarily hunters and agriculturalists, with a few metalsmiths. We visited a forge run by a member of his family. In essence, it was a ring of thorny branches about 10 metres in diameter to keep the predators out, a fire, a simple bellows, a large stone for an anvil, several smaller stones for moulds, and a few self-made hammer-like tools that seemed to have started out as car parts. This was where he made jewellery from brass bullet casings (evidently found in abundance there), which their women wore with pride and sold to visitors as well. They also made a wide variety of iron arrowheads and smaller objects. It was a fascinating mix of old technology and new ingredients.

Although the Hadza do not possess the technology to forge metals, they certainly can appreciate metal arrowheads, so they trade with the Datooga, exchanging meat, skins, and other bush products for arrowheads. The Vézère Valley arrowheads were made of flint, and the Cro-Magnon were completely self-sufficient or 'autarkic'. In the Hadza we see a tribe, one of the closest to the start of *the path of humanity*, improving their position by entering into cooperation with other more modern tribes.

Some tribes attach honour to hunting lions with minimal weapons. Later in my trip, I had the opportunity to speak in more depth with an elder of the Masai, a proud tribe of livestock herders and warriors. He explained that to become men, boys had to kill a lion with only a long knife and a spear, and he told me how they did it. It turned out to be quite a sophisticated process. The details were difficult to follow, but they included slicing specific tendons in the lion's powerful forepaws to render them useless. It goes without saying that elder hunters trained the boys intensively before exposing them to such a dangerous trial. The elder had killed two lions himself, armed only with a spear and a long knife, and much of his status was due to these feats. The memory of his eyes twinkling as he watched mine open in astonishment will stay with me for a long time. But to be very honest, I had imagined the process to be crude and primitive, and I was completely impressed by the knowledge and skills that went into it.

The path of humanity rewards cooperation

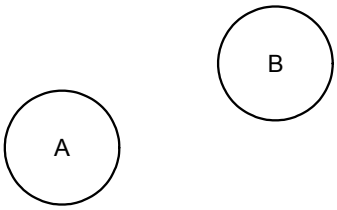
What do we see in the stories about the Cro-Magnon, Hadza, Datooga, and Masai? Essentially, they are tales of the first steps on *the path of humanity*. The Cro-Magnon in the Vézère Valley were already specialized, even within their small semi-nomadic groups of a few dozen people. The Masai and the Hadza had intensive, small-scale 'apprenticeship' programs that could teach today's trade schools a thing or two. The Hadza and Datooga traded to acquire things they could not otherwise make or acquire themselves. The more complex and intensive these kinds of relationships become, the better off people are.

This is essentially true for every productive step along *the path of humanity*. The path generally rewards coherence and cooperation. The value of perspectives in coherence and cooperation is higher than those of perspectives in isolation. Thus, two can do more than one, as long as they cohere to form a whole and cooperate, and as long as scarcity can be prevented.

According to the radical actor thesis, a societal practice (and our entire human society) consists of actors in coherence. Suppose we recognize n number of actors. As soon as you observe these n coherent, cooperating actors (a skill we need to master much more than we have so far), you introduce an n+1 experiential world, and thus an n+1 actor (a collective actor). Broadly, the coherence between actors can be expressed by one of three basic relationships, starting from this n+1 actor:[264]

- there is *no relationship* among actors,
- there is a *cooperative* relationship among actors (that can go so far that they constitute a new actor), or
- there is a *competitive relationship among* actors (that can go so far that the actors break up and destroy each other).

The crux of *no relationship* is that actors neither rely on nor need *anything* from each other. I don't mean a situation where two or more actors do not happen to know each other. This coincidental variant is the most common, since there are currently about 7 billion individuals aggregated in all kinds of group actors, and most of them have very few conscious relationships with each other. Nor do I mean two or more actors avoiding each other so as not to be bothered by each other: that is a different relationship, the *competitive relationship*. The core of *no relationship* is that there is absolutely no advantage, prevented disadvantage, or any value at all associated with the relationship, and that it *therefore* does not exist. Like two comets with different paths, the actors A and B in question are in two different places and never meet.



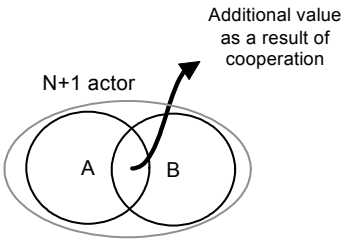
No relationship between actors A and B.

By contrast, the crux of a *cooperative relationship* is that it does create, generate, and add value that the participants cannot deliver separately. This value is added value. It arises in and emerges from cooperation, and it goes beyond allowing both actors to experience an advantage.[265] The value they create together exists by the grace of their also being an entity

[264] See Volume 4 of this series, *Multi-actor procesmanagement in theorie en praktijk*, chapter 14, 'Relationele verhoudingen tussen actoren' for more.

[265] I sometimes put it like this: cooperation between *two* actors is win-win-win (a *triple* win). That looks like a mistake, but it is manifestly not: there are three actors now, the third being the coalition. Calling the relationship win-win is sloppy and oversimplistic.

together, that they experience and value each other, and that they have a common identity, as fleeting as it may be. If n actors are cooperating, an n+1 identity arises. You'll experience this if, for example, you organize a treasure hunt in a forest with a bunch of young children. It requires everyone to be on the lookout. What a team spirit that creates! Every participant is relying on the eyes of the others as well as their own, as if the eyes are all being shared by the group.



A cooperative relationship. The value in the overlap zone is additional, the result of the cooperation. The N+1 actor arises.

The cooperation can go so far that the shared experiential world of the original actors appears as a single new composite experiential world at a higher scale. Two people can form a *couple*, a group of adults and children form a *family* or a *clan*, eleven or more players form a *soccer team*, a number of workers form a *company*, a number of officials form a *department* or *ministry*, a number of kindred spirits form a *political party* or a *church*, or a number of countries form a *union*. The original experiential worlds on the smaller scale remain, while the part they share operates as a new actor on a higher-level playing field.

The crux of a *competitive relationship* is precisely that the actors are pursuing value (possibly anticipated value).[266] In *competition* and even its superlative, destruction, there is a scarcity: something of value is scarce and is contested from within different experiential worlds. This value can be material like market share or a territory on the border, mental like status or prestige, or a blend, such as a potential partner or a company involved in a takeover, or a religious war. A bit of competition is healthy: it requires investment and attention, but it sharpens wits, unleashes energy, and creates space for the better ideas and practices, since more than one can be tested. The losing ideas or practices have to go. The winning party can continue, unhindered by the other (remember Joseph Schumpeter's 'creative destruction': poorly performing companies must die off to create the room for the better ones, which promotes opportunities for further growth – in essence, an evolutionary idea). Competition gets rid of dead-end streets and favours promising new avenues.

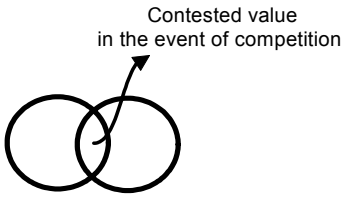
[266] I definitely see competition as something other than exploring options in frameworks together in order to find the best ones. Of course, in this form you may want to win against others, but the difference is that at a high level of aggregation, you are back together as an actor.

However, in times of extreme scarcity, the competition can become so fierce that a mutually *destructive relationship* arises: the actors involved break down into much smaller pieces (as they literally do in wars and mass extermination). During the Cuban Missile Crisis of 1962, when I was a baby, the world was literally on the brink of a mass nuclear war, the world-scale example of this scenario. The scarcity here was one of ideological space: both capitalism and communism were demanding hegemony. The great Mayan cities also collapsed due to scarcity from an external cause, namely drought. Water became scarce, so food became scarce, so competition increased, dragging an astonishing civilization back to a much more primitive phase of sedentary agriculture, and people ultimately left in search of food (essentially a move to a nomadic existence).

Competition at best only shares value (as opposed to creating it), but can even destroy it. Constant competition (a competitive spiral) by nature wastes energy, shares value at best, and ultimately destroys value. If the scarcity really is due to something external, such as a change in climatic conditions not caused by human activity, then there is little that can be done about it. However, people have so much power; after all, we can work together closely in coherence.

Why then would you choose competition, in God's name? The crystal-clear answer to this is if you want the scarce, contested value for yourself. A condition for competition is scarcity of value in whatever form it takes (status, food, water, territory, esteem, a partner, etc.).

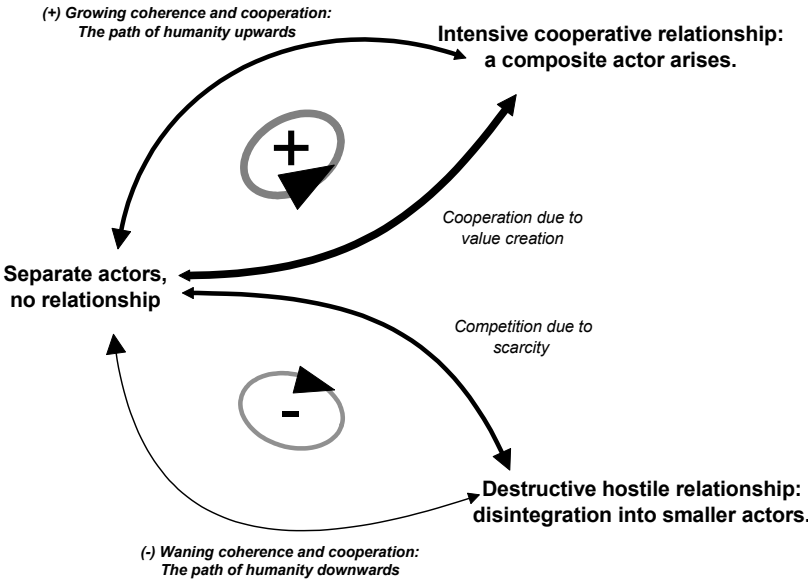
If one actor tends toward sharing (the dove), and the other towards aggressive competition (the hawk), then the sharing-inclined actor can do little else but take the route of aggressive competition as well (see Axelrod's Tit For Tat strategy a few pages pack, for an answer on how to deal with this). Peace doves simply don't stand a chance against aggressive hawks. The result is what we recognize as a spiral of competition that can even become violent. Every competitive move leads to a stronger response: the escalation can only be stopped if there are clear minds and good will on both sides, as Khrushchev and Kennedy proved in the Cuban Missile Crisis. In a rapidly escalating spiral of violence, even the conflict-seeking hawks don't end up better off (remember the 'Pyrrhic victory' from Greek mythology).



A competitive relationship.

In a competitive relationship, there is a threat of escalation, and the contested value (the overlap in the diagram) increases. The identity of the competitive actors is then more pronounced (each side waves its flag, flexes its muscles, and scorns and dehumanizes the other side), with the differences on both sides becoming exaggerated. The best possible outcome is 'winner takes all', since the loser disappears from the picture. The worst possible outcome is mutual destruction, when *both* actors disappear from the stage.

The figure below shows the connections between the cooperation spiral and competition spiral. Actors who show structural cooperation acquire a strong group identity, forming a composite (N+1) actor at a higher scale. This higher-level actor emerges at the upper right corner of the figure, and through the *positive societal improvement spiral,* it can join the *No relationship* to explore new forms of coherence, whether cooperative or competitive, on this higher-level playing field. This actor can also unravel into its original constituent actors, as in an amicable divorce, a bankruptcy with little damage, or a peaceful dissolution of the European Union. It's not desirable unless there are obvious reasons to do so.



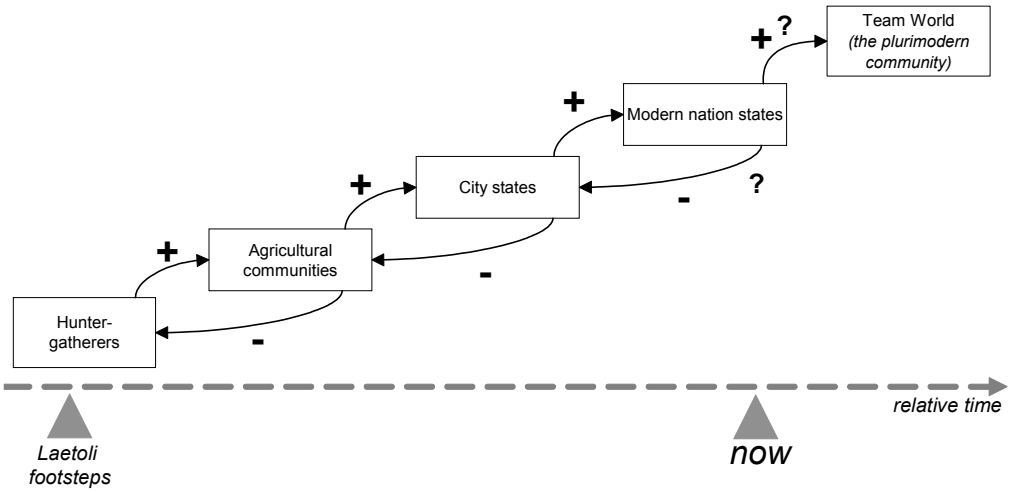
The cooperation spiral creates value and coherence (+);
the competition spiral destroys value and coherence (-).

Growing coherence and cooperation go hand in hand with shrinking fragmentation and competition, and vice versa. They need each other and alternate with each other (competition restores lock-in and accelerates improvement processes among the competitors), but in the long term, the positive spiral is dominant, since it creates value.

Actors who systematically exhibit competitive behaviour are no longer able to generate value. They run a huge risk of ending up in a destructive competitive spiral, such as a spiral

of violence, in which composite actors increasingly break down into their constituent parts. In the balance model (Part I) we saw the description of this breakdown in the selfishness trap, as well as the Pyrrhic victory in ancient Greece.

The path of humanity reveals itself in this figure as an ongoing interaction between actors, and an ongoing movement following the spirals. It's sometimes extremely slow, sometimes gradual, and sometimes by leaps and bounds, both up and down. These are clumping and un-clumping processes of perspective, since the journey occurs by smaller perspectivist steps and leaps. A look at *the path of humanity* over time proves that the advantages of ever-stronger cooperation transcend those of perpetual competition: if positive and negative movements always cancelled each other out, then the path would be a wavy line with occasional extreme peaks and troughs, governed by random chance but ultimately remaining at a horizontal zero. It is precisely the relatively favourable nature of the value-creating cooperation spiral (the (+) spiral) and the relatively unfavourable nature of the value-destroying, even wholly destructive competition spiral (the (-) spiral) that cause and explain the origin of *the path of humanity*.



The path of humanity begins when the value-creating cooperation spiral (+) occurs more often than the value-destroying competition spiral (-). The net result is that coherence and cooperation increase.

In brief, then, our human abilities to connect, which are geared to creating societal value, win out over the cold randomness of nature in the long term. Cooperation and competition are both human societal abilities. The fact that our societal development generates more and more value (i.e. that *the path of humanity* becomes visible) is because we cooperate more often (the positive spiral) than we compete (the negative spiral). Thus it is primarily through increasing coherence and cooperation that we are acquiring value.

Other empirical studies on the development of individual countries have also come to the conclusion that cooperation is the key to development. One example is the impressive book *Why Nations Fail* by Daron Acemoglu and James Robinson. This book is – in my free interpretation – one long substantiation of the thesis that the key to the prosperity of nations is in jointly developing and maintaining *inclusive institutions*: broad cooperative agreements that involve and safeguard the needs and desires of as many societal actors as possible. This starts with national political institutions – central authorities that foster pluriformity. Economic institutions follow within these political frameworks. The way to a failed state, the authors say, is with *extractive* institutions, operated by a minority at the expense of the majority. Extractive institutions block our way on *the path of humanity*.

Admittedly, our progress so far on *the path of humanity* often looks more like we have stumbled forwards by accident than taken deliberate and purposeful steps together. However, even if stumbling along has been the dominant societal practice so far, it doesn't change the fact that the societal steps along the path have shown leaps of value as well as stability.[267] At this point, there is no reason why we should continue to stumble along unawares.

The path of humanity shows the road to our future. In the first place, this requires multiscale cooperation, coherence, and reciprocity. Only in the second place within this context of cooperation does it require competition, a sporting kind of exploratory competition which also looks out for the losers. Although cynics may find this idea naïve and unrealistic, they should ponder the fact that *the path of humanity* shows that this is what we've been doing for hundreds of thousands of years, with a bit of trial and error.

In this highly competitive late-modern age, in which major problems are heading straight for us and in which our habit is increasingly to shut the gates, blame the losers, and sweep them under the rug, this conclusion should give us serious food for thought as humanity. *The path of humanity* shows a completely different way to even more growth, and provides a downright inspiring point of view.

Human development revolves around cooperation over competition, inclusion over exclusion, contributing over freeloading, and exploring over standing still. We can see this looking at *the path of humanity*.

[267] The comparison with levels of support for stock markets rears its head here.

6.3 Team spirit

Once more and more people start to work together, we call them a team. A team has a certain enduring character. It's about both the qualities of the individual players but especially about the cooperation among these individuals, in an entity. That sounds like something that we all understand, but nevertheless, let's take a closer look.

6.3.1 The second worst definition of a team

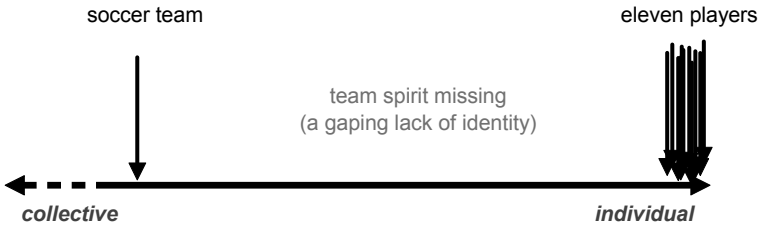
As logical as the above description sounds, 'individuals who cooperate' is the second worst definition there is of a team. The absolute worst is simply to define a team as 'a collection of individuals'. However, 'individuals who cooperate' is not much better. If you look at a team from the recursive perspectivist point of view, you'll see something going beyond individuals who cooperate. To illustrate my point, I'll use a soccer (football for the Europeans) team and explain things in more detail. For the sake of convenience, I'll assume that the team has eleven players (which unfortunately does little justice to the many other team members on and off the field, but it's the idea that counts here).

I'm watching the Dutch team play a soccer match, along with my family. The two teams come onto the pitch, with the junior league at their sides, which is always fun to see. National anthems are sung. Time for the kickoff, a midfielder starts the play and sends the ball to the right back. He plays to the midfield, and there's an attack from the right side. The right forward plays to one of the strikers, the defender shows his stuff, the striker kicks it to another striker who scores with an amazing kick, a world-class goal! The fans are ecstatic, both in the stands and at home. Wow, what a match. My team plays like gods.

'Individual players cooperating' is a grotesque understatement of what a finely-tuned team can actually accomplish. Of course, any good team starts with talented players, and they kick the ball back and forth. But beyond that, every structural interaction between two or more players creates its own 'third identity', a new actor with its own motivations, potentials, and interests. A team has several recognizable duos and trios whose members are highly attuned to one another and who to a large extent can take over each other's tasks. At a higher level, these duos and trios themselves are also attuned to each other. There are other even more complex group identities, such as the forwards, the midfield, right and left wings, and down the centre. Coaches and trainers also play a role here. There is a separate training for the goalkeeper. The largest collective is the team identity. A good team result is pursued and celebrated together. Speaking of celebrating, I need to add something: the largest identity is, of course, the club as a whole, including all the ad hoc fans; the audience in the stadium and at home participate as well. Before an important match, virtually the entire population of the Netherlands puts on orange clothing and wigs, which is difficult to imagine for some out-of-towners. We can really enjoy a masterful goal, and it allows the

striker to make a star of him- (or recently her-)self. There can even be some heavy rivalry between the strikers, but the one who scores the goal thanks the other striker gallantly for the assist, and even the goalie on the other side shares the joy completely.

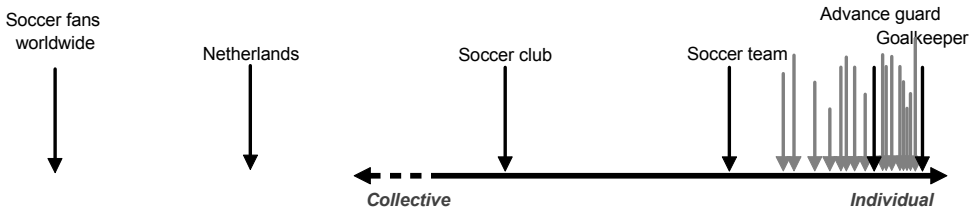
Thus, a team in which eleven individuals kick a ball around together is, in essence, quite a shabby team. There is no team spirit, the team is literally hollow. It has no depth, only a screaming lack of layered identity.



An inadequate team spirit

A brilliant football team, on the other hand, covers many different identities. Its focus really races back and forth, and every identity on every scale has the right to exist. These identities come to the fore at different points in different combinations and with different accents. This is exactly what makes the game so exciting. People who don't understand this won't be interested in the sport (is this why Americans don't understand soccer?). The team as a whole is the focus while the anthem is being sung, and after a goal. The defence goes into action when there's an attack, and at a certain point, the striker shines as an individual. Many identities come into their own this way. At various levels of 'together' interests are acted out and they strive for improvements. A splendid football team is simply sizzling with identities, at several levels of scale, and that is the essence of team spirit: it makes or breaks the quality of a team. The diagram below places a few of the identities mentioned so far on the spectrum from collective to individual.[268]

[268] Recursive perspectivism also allows actors to be recognized at much lower levels, such as different playing styles of one player, down to the level of the smallest intentional activities. For practical reasons I stop at the level of individuals.



A team spirit that is already richer

6.3.2 Team configurations in three dimensions

'Quis est homo qui non fleret, Matrem Christi si videret in tanto supplicio?
Quis non posset contristari, Piam matrem contemplari dolentem cum filio?'
From 'Stabat Mater'[269], thirteenth century, Franciscan (?)

Now there's unity –in principle everyone is doing what I ask them to. It's not like typical Dutch people, who as soon as you take a breath say 'yeah, but…'
Johan Cruijff

Et ne fut jamais au monde deux opinions pareilles, non plus que deux poils ou deux grains. Leur plus universelle qualité, c'est la diversité.
Michel Eyquem de Montaigne, *Essais II, 37*

When a team really sparkles and plays high-level soccer, we see one identity after the other coming into view on various scales, in a cohesion that is unpredictable for the viewer at the microlevel. That sparkling is the changing and linking of identities. They find each other, then drift apart. Of course, it's not completely unpredictable for the fans, since they're familiar with the identity of their team. They know these micro- and macropatterns, or at least partly, and they expect them. They feast on a mix of the micro and the macro.

You can take this imagery quite far: a diamond sparkles because it shows the light reflecting off of its various facets in quick succession, often nearly simultaneously. A sparkling team shows its various identities in a similar, coherent way.

Identities, according to perspectivism, consist of recursively coherent, self-reconfiguring perspectives. A perspective is a three-part combination of a starting situation and a resulting situation with a process of change (an action or an autonomous activity or a mix of the two) in between them. In previous chapters, the identity of an actor was described as a web of recursive perspective that the actor defines and composes. When two actors – two identities – interact in a structural way, a third identity is created. It's precisely this game that is played among a soccer team. It offers the opportunity to take apart the various partial identities and the team spirit (or put them together, depending on whether you start

[269] Listen to the setting of this text to music by Pergolesi sometime.

with the individual or the team) in terms of perspective. In doing so, I work purely with the structure of this perspective, not with the significance of its contents. I want to know how much perspective there is, and how it all coheres (I'm interested in the structure), but for the moment I don't go into exactly what perspective it involves. This way I assure that the argumentation to be developed for any random team, from a volleyball team to a team of negotiators, continues to hold water.

The situation gets highly simplified: a team consists of eleven players (for the time being, I'm ignoring the rest of the staff and everything else around them). The identity of each player consists of a recursive web of perspective that consists of equally many separately distinguishable perspectives, which I call the complexity **c**. The total perspectivist complexity used in a team is then 11 times **c** (each player consists on average of **c** perspectives). I call this total number of perspectives **n**, thus: 11 x **c** = **n**.

I'll now immediately go back to the three societal foundations I mentioned earlier: the same, different, and one whole, and I'll use them on our team.

We know that at least a substantial part of these **n** perspectives are highly similar (the same) for each player. They all wear team clothing, football shoes, they can all play the ball using many diverse basic techniques, and they all understand the main rules of play. In other words, they are partly identical in perspectivist terms – equal to each other. Let's call this identical part **a**.

At the same time, they each have their own unique identity (they are different). One plays outstanding defensive left back. Another is a genius with free kicks. A third can drive any opposing player mad with the way they stall. The fourth has a patent on a fantastic way to score goals. In other words, they differ in perspective from each other. Let's call this unique part **d** (for 'difference'). Now, thus, **c** = **a** + **d**.

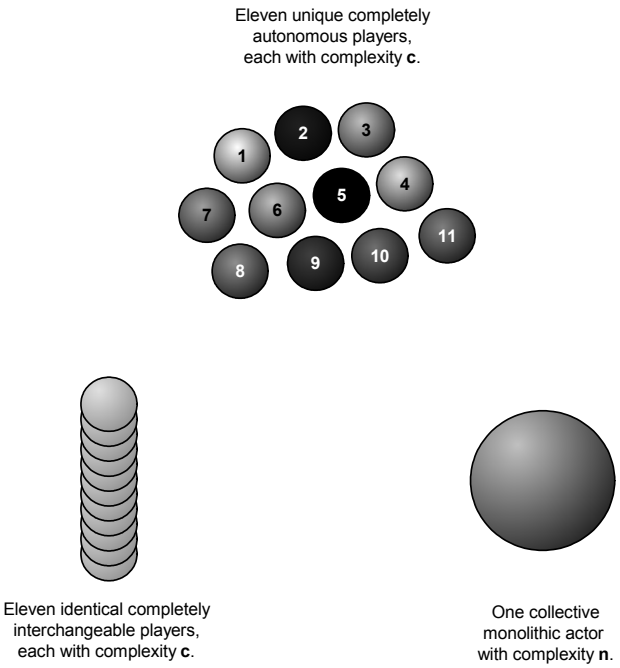
What do we know about this team, purely involving its perspectivist structure? They are eleven identical players, each with the same identity **a**. They are eleven unique individuals, each with a unique identity **d**. It's one team, one collective, with a total identity 11 x (**a** + **d**) = 11 x **c** = **n**.

We can now easily determine the three extremes by shifting the boundaries:

> If we see the team as **one monolithic whole** without a deeper internal structure of smaller actors (the players having dissolved as it were), then we have a single team actor with a total perspectivist complexity of **n**. (This is the point of view when we're talking about 'chemicals' as a sector, or 'the ministry of transport', 'the world community', or 'Ajax'.)
>
> If all **11 players are completely identical** to each other, then **d** approaches zero and thus **a** approaches **c**. We then have 11 players that are all the same. (I always think of a team of robots that play mechanically as a team.)

> If the **11 players are completely different**, and thus have completely different insights, opportunities, and talents, then **a** approaches zero, and thus **d** approaches **c**. We have 11 completely unique players. (This always reminds me of the term *idiotès* of ancient Greece, which meant *individual*.)

The figure on the next page shows these three extreme positions.



Three extreme (team) configurations

The three extreme (team) configurations each use the same total amount of perspective in a completely different way. Formally, the notion of a team disappears in these extreme configurations; in practical terms, we are never at the outer edges, although we do come very close.

Each of these three extreme positions has its advantages and disadvantages. The advantage of the variant at the bottom left, eleven identical individuals, is that the players are completely interchangeable. Also, since they all do the same thing, they are completely familiar to an observer and thus very easy to control and predict. The disadvantage is that this predictability makes them worthless as a team. Taken to this extreme, the world consists of identical robots. We feel the association with some extreme communist regimes coming up, or with mind-numbing work. 'The voter', says 'the politician' (and I hear 'the herd'). The factory employee working at the assembly line or in the sweatshop, and the student in modern educational systems. Overdoing it isn't good. However, redundancy has

its uses. Don't you agree that all the redundant safety systems in a nuclear reactor are a good thing?

The advantage of the variant at bottom right, one monolithic giant, is of course that there is only one actor to deal with, to which only collective perspectives can be attributed. The team is large, strong, internally opaque, and unified. There is no value placed on players having individual qualities, and players must conform to the collective. The disadvantage is that there will never be any brilliant solo action from an individual player. Politically, this monolithism is related to fascism, in which the most important element is 'the people'. However, unity is also good, especially on larger playing fields. It ensures that recognizability is maintained even at larger scales, and that other members can take over another member's tasks if necessary to benefit the almighty collective. (The dismayed pacifist observes people streaming to the front lines of battle.)

Lastly, the variant at the top centre, of eleven completely different individuals, has the advantage that it provides maximum variety and versatility. No two perspectives are alike. As a team, you pay a price for it: zero mutual ties, coherence, or connection. Macho strutting on the field, while each member is only trying to score for themselves, leads to anarchy on the pitch. But that brilliant kick that carries the team to victory is a thing of beauty!

These three extremes are caricatures, of course, and show the three fundamental dimensions of teams as perspective in coherence. They show the three societal foundations discussed earlier. Each dimension has its own strengths, and if a one-sided choice is made, the team loses out to the strengths of the other two dimensions. The table below makes this clearer. The left column shows the three very bad (i.e. totally inadequate and incomplete) definitions of a team (I mentioned one of them at the beginning of this chapter).

A team as:	*Strength*	*Weakness*
One whole	Strength, power, unity, wholeness, view of the overall picture,	Individuality smothered, members alienated.
All different individuals	Pluriformity, variety, versatility, individuality.	View of overall picture lost, fragmentation, lack of mutual understanding.
All similar persons	Interchangeability, homogeneity, kinship, recognizability, empathy.	Push for similarity (uniformity) limits power, potential, and opportunities.

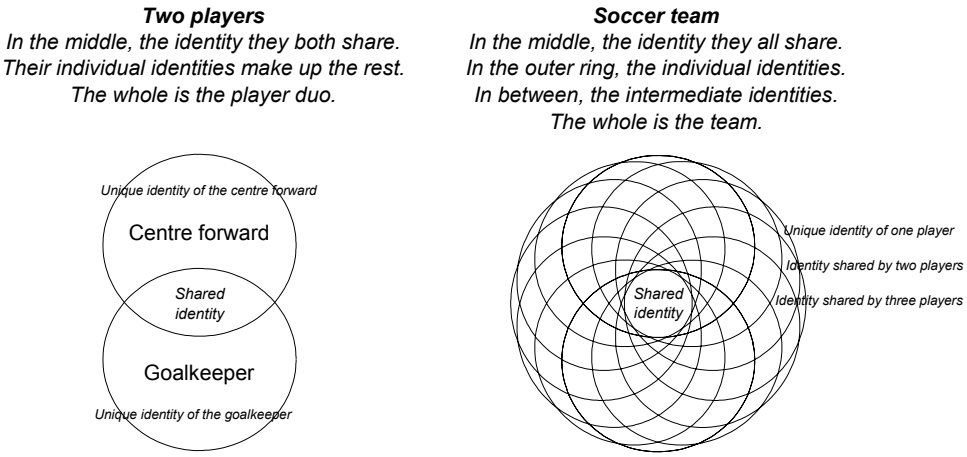
Extreme configurations (dimensions) of a team, and their strengths and weaknesses.

If you opt for two of the three dimensions from the table, then you may excel slightly less with them than if you choose only one, but then you only surrender to the strengths of the third. Choosing all three dimensions is unmistakably the most difficult route, but your team will be capable of showing the strengths of all three dimensions and avoiding their weaknesses. You'll be able to operate as a powerful team, since you'll understand each other, support each other, and be so attuned to each other that individual and specialized talents can be used to the benefit of each other and the whole.

If you don't choose one, but go for a little bit of all three dimensions, won't it just be a bit grey? Doesn't the truth – for the umpteenth time – lie somewhere in the middle, sluggish and slow and dull? On the contrary; nothing could be further from the truth. Think of a good goalkeeper, who naturally stays in the middle of the goal during a penalty kick. There's nothing dull about it: the goalie has inside knowledge and reacts quickly to signals before his (or her) brain can completely understand them, diving like lightning to the corner. The goalie could just stand on the left, but then will he catch half the kicks? Of course not – the kicker will simply take advantage of that position and kick right, and the goalie won't be able to stop any of the balls.

A good team also works from the centre outwards. It is capable of bringing to the fore the right identity or mix of identities that best fits the situation. If you're *truly* good in all three areas, then you can change the relationship between the three at lightning speed if circumstances require it. It's pluriformity in a changing coherence. An experienced observer also can see this happening, anticipates it (although only partly aware of doing so), and is also often surprised by what happens. These changes are what makes a team sparkle like a diamond and play like gods, and it gives the best expected results. The truth is somewhere in the middle, and the game sparkles in all the variations around it.

What does that team from the centre look like? It will have to be a hybrid form of the three extremes: it is partly one whole, partly 'every player the same', and partly 'every player unique'. The figure below outlines this. On the left, you see how a goalkeeper and a centre-forward each have a completely individual identity, and together they share a third identity. On the right, you can see how that works for a larger team. All sorts of intermediate identities of two, three, or more players also have a place. Some are somewhat more pronounced than others (such as rearguard, midfielders, and forwards, and the left and right wingers). Intermediate identities are what make it possible for a left back to take on some of the centre-back's role when he comes forward, and others in the vicinity can also shift (i.e. be situated differently in perspectivist terms). If a crucial match is threatened with loss, by the end of the match, even the goalie joins in the attack. The fully shared identity is what makes this possible.



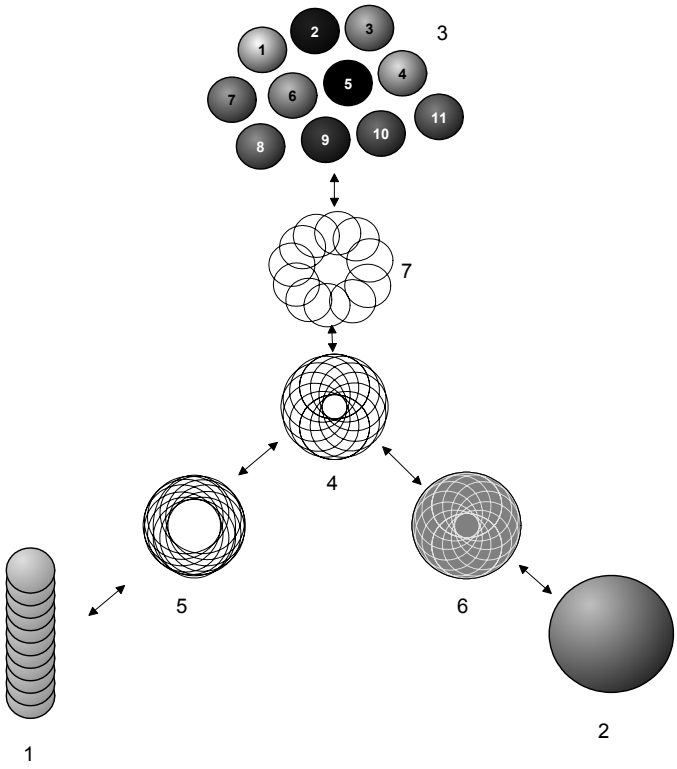
Individual and shared identities

Seeing the right-hand figure, we can understand better what a thrilling and dazzling phenomenon team spirit is. Speaking from recursive perspective, an identity is a little network of recursive perspective. An identity corresponds to a consciousness. Team spirit is a sparkling consciousness of the available perspective, which sometimes spreads itself over the eleven players, but always changes focus during a match. At the start, all the players are standing in a row, as a shared identity. The camera pans along the row of players, and each individual gets a few seconds of fame. The formation is only now definitive, so now we know who is playing rearguard, forward, and midfield. And that's only the point of view of the people watching. The players themselves also experience shared identities on all kinds of scales. When things are going badly, there is a pep talk: we have to fight back. Some players are much better attuned to the others: their shared identity is much stronger. They develop attack identities and defensive identities. The team spirit spreads out over the players, and focuses itself again, in an eddying play of third and even more identities. The striker scores, the goalie blocks, and the team celebrates.

A team consciousness concentrates itself and spreads itself back into the fabric of perspective, like a dance of swirling pirouettes. A strong team knows how to play this game from individual consciousness to a team-of-eleven consciousness, with all the consciousnesses in between, much better than a weak team. It stretches farther and switches among the three dimensions faster.

At the same time, teams can have a completely different perspectivist structure. The figure below illustrates this. Like the above figure, you see at the bottom left identical players (team configuration 1), at the bottom right a closely-knit collective (team configuration 2), and at the top centre separate individuals (team configuration 3). Remember that these extremes are thoroughly poor teams (and actually they don't even deserve the name

'teams'). A balanced team, one using all three dimensions in balance, is in the centre (team configuration 4). However, there are now some intermediate forms: team configurations 5, 6, and 7.



Alternative team configurations given an equal total amount of perspective.

In team configuration 5 the players resemble each other more than in 4, but they are not completely identical to each other as they are in 1. As well as a team consciousness can whirl through this fabric of perspective between 1 and 4, great unique individuals will not appear, and unity will also remain out of reach. If it's not in there in the first place, it won't come out.

In team configuration 6, the internal actor structure is already disappearing; the team is showing itself more and more to be a monolith, increasingly prepared to storm onto the larger pitch as one collective actor (although its internal structures are still vaguely visible for the keen-eyed observer in this middle variant). Between 2 and 4, similarity and pluriformity will remain substandard.

Lastly, team configuration 7 is interesting because the *chain structure* emerges. A chain structure results from the fact that players still do share a bit of perspective with their next-

door neighbours, but little or none with the neighbours next to those positions (one link further). Between 3 and 4, similarity will necessarily be low, as well as unity.

6.4 On families and politics

'The world has enough for everyone's need, but not enough for everyone's greed.'
Mahatma Gandhi

'It is no exaggeration to say that if we had had to rely on conscious central planning for the growth of our industrial system, it would never have reached the degree of differentiation, complexity, and flexibility it has attained. Compared with this method of solving the economic problem by means of decentralization plus automatic co-ordination, the more obvious method of central direction is incredibly clumsy, primitive, and limited in scope. That the division of labor has reached the extent which makes modern civilization possible we owe to the fact that it did not have to be consciously created but that man tumbled on a method by which the division of labor could be extended far beyond the limits within which it could have been planned. Any further growth of its complexity, therefore, far from making central direction more necessary, makes it more important than ever that we should use a technique which does not depend on conscious control.'
F. A. Hayek, *The Road to Serfdom*

6.4.1 Lack of political understanding

Politics is a remarkable activity, and I'll confess right away that now and then I hardly understand it. This is not just obligatory grumbling; it's because I often do not understand how the methods used in politics are compatible with the findings from *the path of humanity* and recursive perspectivism. Occasionally I step into the political discourse. See the inset below, which was a handout accompanying one of my short lectures on achieving a sustainable economy. What you'll read is an unadulterated call to work on the plurimodern transformation. Although it had some response, it didn't take root. There is a prevailing lack of political understanding. I am not completely sure where most of it resides, whether in me, in politicians, or on both sides (put this way, it must be the third option), but by now I am convinced that politics is too important to leave to professional politicians alone. That's another form of modernist strain.

For much of my childhood, I thought that politics was about how to create a liveable, just society in which everyone is happy, and that the politicians' job was to work on bringing that about. In this interpretation, we continually strive together for improvement, even though we may disagree strongly about exactly how the future should look. Of course as a toddler I didn't yet know that this was called politics, or just what politicians were, but I had no doubt that this important area had the attention of the most competent of people, people with broad views and generous hearts, people who really made a difference, so

everything would be all right. I got this perhaps somewhat naïve idea because I grew up in a harmonious household. I'll come back to this soon. But in fact, I don't think that it is naïve. Of course, you may growl back if someone growls at you (remember Tit For Tat). However, competition and fighting are worthless as our basic attitude. The proof of is this is all around us.

The pursuit of improvement I spoke of above is certainly part of politics. Yet it also seems as if politics all too often is about class struggles, power, and influence: various actors (from individuals to political and economic blocs) are trying to get as big as possible a slice of the pie, and are looking around suspiciously to make sure someone else hasn't grabbed it. That pie has all sorts of different flavours, by the way, and it's often unclear where it comes from.[270]

These class struggles and issues of distribution occur because ardently desired things are scarce. (That ardently desired things are scarce is, of course, a tautology). Scarcity causes conflicts of interest to flare up between actors, and politics seeks ways of dealing with them. The initial solutions are nonviolent (without wars, insurrections, or revolutions), but they do not always work, not by far – just look at the newspapers and at history. The Prussian general Von Clausewitz clarified the reasons in his masterpiece of military strategy *On War* (published in 1832, a year after his death) with the famous line 'War is the continuation of politics by other means'.

This may be true for all forms of violence. Once the pie has become too small to share, because we still want to cash in all our accumulated claims – sometimes out of necessity but much more often from greed or selfishness, as the quote from Gandhi above says so well – tensions, violence, and oppression are our share. We trim our notion of 'with each other' to keep a more solid piece of the pie for the new, leaner 'ourselves'. That requires battle with the others, the marginalized people remaining who are also making claims for some pie. This can go quite far and just what 'the pie' is can take on many different forms. I've just seen on the news that ISIS burned a Jordanian pilot alive in a cage, and the Jordanian people are calling for revenge. It is a grim symptom of one distribution issue or another, based on scarcity, whether presumed or real.

[270] The pie emerges much more often than we bake it, and no one is really responsible for it, since we're all stumbling upwards along *the path of humanity*. Hayek has written compellingly on the industrial system, and thus production-consumption processes in his book *The Road to Serfdom* (see the quote at the beginning of this chapter). However, planning and emergence are the monomaniac extremes of a dualism. There is a whole spectrum of hybrids in between, of course, which for our purposes is much more preferable.

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Duurzaam Overleg Politieke Partijen (Sustainability Conference Political Parties), Academiegebouw, Utrecht, June 14, 2012

The process towards a sustainable economy

1: The sociology and political science of the transition
Which steps should or should we not take to shape the transition?

1: Crisis and well-being

Many crises of the past century were not natural, nor even economic, but societal in nature. They share the same root cause: actors fulfil their *own* interests at the cost of others. Look at the banking crisis, the debt crisis, the energy crisis, the healthcare crisis, the education crisis, the salary crisis, the ecological crisis, Enron, and so on.

Many great *successes* of the past century can be illustrated in exactly inverse terms: actors can excellently fulfil their own *and each other's* interests. Look at strong economic clusters. Therefore

> ***Position 1: Societal crises and societal successes are rooted in the degree of coherence and cooperation between actors.*** The society is a multi-actor practice first and foremost.

Consequence for sustainability: Focus primarily on actors and their coherence. (Not, for example, on tax legislation regarding work commutes.)

2: Which actors play a role?

Albert Einstein regarding crises: 'It is characteristic for a society in crisis for individuals to act indifferent or even hostile towards the smaller or larger group they belong to.' Actors then look out for their own self-interests. Everything starts to fragment. This has been increasingly apparent over the past few decades (sustainability is the counter movement). Look at the construction industry, the government, Europe, the relation between banks, governments, and corporations, between healthcare managers and healthcare dependants, between food producers and consumers, you name it. I'm now assuming three primary actors: citizen-consumer, corporate life, and the government.

> ***Position 2: You can only improve sustainability as a government, if corporate life and citizen-consumers want it too*** (see also position 1). In this position, you can switch the three main actors around however you like.

Consequence for sustainability: You formulate and realize it together, or not at all. What's required is more **openness,** more **coherence**, more **mutual sensitivity**, those are the keys, and that will lead to societal well-being. Politics and the government should take the lead in this. (We *are* doing that here tonight, but generally much *too little*).

6.4.2 Together

Now, in my fifties, having had many great experiences as well as a few good-sized scars on my soul, I am contemplating all of the above. Although I may be older, I have to say I'm not any wiser about politics. Political jargon is charged with competition; for example, Dutch politicians don't talk to each other, they enter 'into debate'. Now there's nothing wrong with debate, since it helps clarify differences and initial standpoints. However, it's only one of the many possible forms of communication, with the notable characteristic that the disputes are what get the most attention. Debate as a preferred form of conversation quickly degenerates into a dogmatic and competitive event. Between left, right, neoliberal, socially minded, compromises, the battle for votes, class struggles, and issues of distribution, I have trouble seeing how this highly competitive game actively makes our society better, precisely because it is so clear that coherence and cooperation in societal balance are what produce the most prosperity and well-being.

If I look around and focus on the best and most powerful societal processes, I don't see at all that competition and debate are dominant. People find each other, can give something to each other, and together they make the best things happen. Human beings at their strongest seek new power together, and accomplish the greatest things in new connections of coherence and cooperation. The key is not competition, neither is it hacking a piece out of someone else. It's not even about sharing. It's *creating together* that offers the most value. Politics seems to delay this process more often than necessary, instead of promoting it. The advantage is that, as we stumble forth, we try to embed the best principles and practices in legislation (or are we mainly trying to eliminate the worst abuses?). How is it possible that the political process, intended to strengthen humanity, [271] so often thwarts humanity's powers?

I grew up in a happy and harmonious family, and that is a privilege that enormously colours your views. If you grow up like this, you think it's normal to try to make the best of things, and preferably try to make them even better, *together*. Certainly, I had fights with my brother and sisters, and there were also issues that flared up between the generations. But I was privileged, and the core of this lovely and harmonious family was in my experience that we experienced all the valuable things together, each to our own ability and according to our needs, both as individuals and as a family.[272] You may argue with each other, but you're all in the same boat. That's how I've always experienced it, and now as a father myself, that's how I experience it again. And call me naïve, but I think that that should be a guiding principle on every scale within society – a family, a business, a country, politics, and in

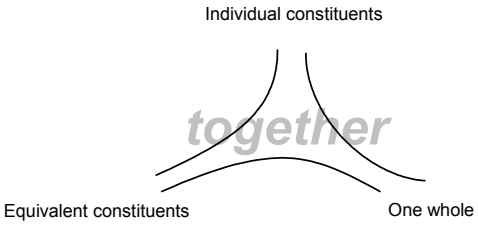
[271] At least in democracies, that is.

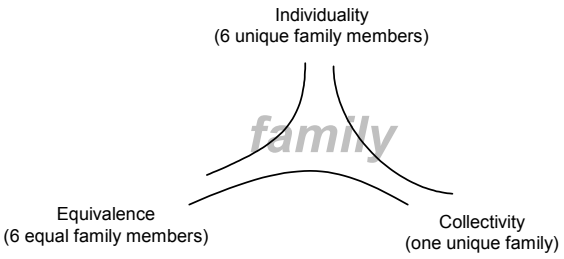
[272] *Harmonious* has nothing to do with being equal or peaceful, a definition you see in most dictionaries. The ancient Greek term *harmonia* refers to the way an octave is created by holding a vibrating string in 1, 2, 3, or more divisions. Harmony results when a sound resonates with the harmonic series. It's no coincidence that this very harmonic series is also central in pattern-distribution laws and networks of recursive perspective.

society as one whole. Team World is nothing more than this idea taken to its fullest expression.

As participants in and elements of any scale of societal practice, we have different backgrounds, contexts, opinions, and views. However, they're not instrumental in sharing one existing pie or another. They're not even instrumental in enlarging the pie, to share it later (the famous 'enlarging the pie' from negotiation theory). Not at all. Concepts like pie, enlarging the pie, and sharing the pie completely miss the point, societally speaking. Enlarging the pie so that it can be shared sets the essential core of societability out of the picture. What is central is both generating and enjoying value together, and the essence of that is first of all this very concept of 'together' as well.

'Together' is the central concept in a societal practice. 'Together' is an intriguing concept. In its simplest form, it is seen as dual: the elements (one dimension) together form a whole (the other dimension). (By now you know what I think of absolute dualities.) 'Together' implies individuality *and* similarity *and* collectivity (the three societal foundations). It connects similar elements that are nevertheless all different into one whole. Yet 'together' allows all three identities to have their own values at the same time, or at least so that they can be called upon at any time, and in all kinds of proportions as well.





Togetherness, both abstract and in a family.

This is easy to see in the case of a family. You're all family members, you're each a unique individual, and you're one family. But that's not all. I came from a family of six, three men/boys, and three women/girls. My father and mother were 'the parents', my brother and I together were 'the boys', and my sisters were 'the girls'. 'The boys' and 'the girls' were 'the children'. There were the older and the younger children, the middle children (my brother and I, who did a lot together), and later on, the ones who lived at home as students and those who went off to school. It may be superfluous to say that we also had completely different characters, which looked different at different times. We were simultaneously six highly similar family members, six unique family members, and one family, and at all the different scales in between. I thought that this was normal. My brother and sisters and parents thought so, and as a family, we thought so too.

You experience 'togetherness' in a harmonious family most strongly when it is undermined by deaths or fights, or when new bonds are created, by things like births, friendships or new love relationships. Thus, 'togetherness' can change. It grows and shrinks, and it shifts its nature.[273] If 'togetherness' just is there, unchangeable, it's easy to pay too little attention to it. If 'togetherness' grows, it feels like progress or gain. If it shrinks, it feels painful, like a loss. At least it does in a harmonious family. It's a different story if 'together' becomes bigger but the feeling of well-being decreases, such as when two people with children from their previous marriages try unsuccessfully to become a new family. If 'togetherness' doesn't offer added value, or leads to out-and-out misery, you'll want to be rid of each other quickly. Then 'togetherness' *seems* to shrink, but if you take a good look, it is still growing, with the remaining perspective cohering more intimately.

The path of humanity is also essentially a path of a developing 'togetherness', going up more often than down, but certainly with its share of down. The path goes onwards and upwards if the larger togetherness in a particular configuration produces more prosperity and well-being. It goes downwards when less togetherness produces more prosperity and well-being, since it will be concentrated among fewer actors. In general, *the path of humanity* is clear: greater togetherness is preferable to less, since it usually generates prosperity and well-being. Of course we experience societal togetherness differently than family togetherness. But why should something that is true on the scale of a harmonious family be different on the scale of a harmonious society? After all, it's all a matter of perspective.

6.4.3 Actor-specific logic

You don't have to agree with another actor's improvement perspectives to cooperate. Usually, you don't even see these perspectives, since you don't share certain experiences. Exactly how much do you know about your baker's bakery? This partial ignorance is the essence of and even the driver behind functional and social differentiation. Perspectives work like a kind of societal stealth technology. You may even think the other actor's

[273] For a poignant description of my personal experience of this as a father and spouse, see *Een filosofie van de maatschappelijke praktijk*, pp. 149 ff.: *Een verhaal van een gezin*.

improvement perspectives are incomprehensible or reprehensible. An astrologer and an astronomer, for example, will not easily agree about the stars. The differences can take on extreme forms. In some families, cautious explorations by their adolescents are met with good advice, while in others, daughters who make the same explorations are murdered by their own families in so-called honour killings.

However, an improvement perspective doesn't have to claim to be universal at all. It is not rational in the classical sense. Classically, we understand 'rational' thinking as focusing our thoughts and actions on maximizing objective value, based on facts and using objective universal understanding of cause and effect. Recursive perspectivism, by contrast, works based on an actor-based rationality. If *an actor* (an individual or a group, with the maximum possible size being all of humanity) thinks an improvement perspective is suitable as a basis for *his/her/its* actions, then that makes it adequate *for that* actor. An actor's intentionality is based on their own experiences, improvement perspectives, and experience of value, as ramshackle, untrue, or incorrect another may find these perspectives.

In about 1950, Herbert Simon came up with the concept of 'bounded rationality' to indicate that in practice often there is not the time, means or particular conditions to investigate the classical rational universal merits of all alternatives before taking action. Once a 'satisficing' (from a combination of 'satisfy' and 'suffice') solution comes into view, according to Simon, it is acceptable; the decision-making process stops, and people go into action. Simon was a leading theorist for good reason – this behaviour is certainly what one sees in practice. However, in my opinion, the core of bounded rationality is not about weakening the ideally desired classical form of rationality on pragmatic grounds. Classical rationality on the scale(s) of society is impossible and extremely undesirable as well, as I will explain.

The classical rational method, which tries to arrive at universal truths – or at least to get closer and closer to the truth – using facts, argumentation, and objective observation, fits seamlessly into the classical scientific method. It is still appropriate within academic disciplines. It is intriguing and paradoxical that in the first few phases of the scientific revolution (the age of Copernicus, Galileo, Bacon, and Newton, during which the combination of empiricism and rationality started to gather momentum) the knowledge we now consider the most *universal* was developed by *loners* or very small groups. In the Netherlands, Newton's masterwork *Principia*, in which his three famous laws of gravity are presented, was ordered by a single bookseller, who ordered only a dozen copies – and sold about half of them. This linking of knowledge with individuals, and an unmistakable tendency towards fragmentation, is still a singular quality of science, given its customs regarding publication and citation (the custom of publishing articles in academic journals intended for a specific and small readership, written by one or a few people who are making their discovery known to their colleagues).

Big Science is a relatively recent development in which international research laboratories conduct large-scale scientific research. This scale has mostly been generated by the hugely expensive research facilities that are necessary for this research (like CERN, the enormous underground particle accelerators in Switzerland, which employs thousands of people to use and manage the facilities). A single researcher, research institute, or even a country cannot afford this. Big Science looks to many governments and corporations for its funding, which partly allows them to determine the tenor of the research. Scientific articles now have dozens of authors, like the credits at the end of a film. It seems to me a logical consequence of our current position on *the path of humanity*.

Pure fundamental science is badly equipped to meet society's needs for knowledge and to deal with its problems, because its knowledge-oriented objectives are drawn up by scientists themselves in an internal and fairly inward-looking disciplinary process. It simply cannot tackle societal issues, and isn't designed to do so. Today we are regularly confronted with questions and problems that require advanced knowledge to tackle. The pressure on science (as well as the need for socially committed scientists to help solve these problems) has become more and more intense. In the mid-twentieth century, Michael Gibbons and others wrote about the rise of another kind of 'science'. Quite unlike conventional science, 'Mode 2 science' is actually oriented to solving social and societal problems, as well as being sensitive to context:[274] In Mode 2 science, multidisciplinary teams of scientists are given assignments from societal 'clients' to come up with knowledge that can help solve problems within a limited time frame. The classical scientific approach is called Mode 1, which inspired Mode 2 as a name for the use of the objective scientific method to benefit societal causes and needs.

On larger societal scales, however, traditional scientific working methods are impossible and undesirable, and it has nothing to do with a lack of time, money, or particular conditions. Even Mode 2 science simply does not cut to the societal chase. I say this emphatically as a strong advocate of the scientific method, by the way, and I even think that the world would be a considerably better place if more people understood the scientific method and its strengths, and above all its limitations. However, our society exists by the grace of *pluriform* actors who interact *quite loosely* with each other *each on the basis of their own improvement perspectives* in a perspectivist world *they presuppose to be shared*. Of all the perspectives that our world and our society put together, only a small portion can be tested against rigorous scientific criteria, and this portion is already well framed within agreed-upon perspective. This is exactly why the scientific method had such great momentum within the empirical natural sciences. This condition has now been met: after all, no one disputes the existence of temperature, pressure, matter, force, and particles that can be

[274] Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott and Martin Trow (1994), *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*.

observed, with or without instruments.[275] No one argues that you cannot systematically ask people for their opinions, as the identity model presented earlier shows (Foundations, Methods, Practice). That's also why there cannot be a classical scientific method if we're trying to develop a preference in religion, ethics, philosophy, and the value of personal preferences.[276] Science simply takes place within the boundaries of societal frameworks, and not the other way round.

Scientific rationality does not work on larger societal scales (not even if you make it serve society using Mode 2 science), as we can illustrate with a simple thought experiment. Imagine that you could objectively know and rationally accomplish everything, really everything (a universalist, rational dream). Then you would know everything the baker knows, what the politicians know, and what the Hadza in Tanzania know. You know what it feels like to kiss someone in all its facets (and thus why you should make an effort). Taken to its extreme, a successful classically rational approach would result in a humanity that is limited, uniform, and monomaniacal. This is because according to the physicalists among us, our societal reality would be limited to the degree of complexity that the average brain can handle, since after all, everyone has to be the same. Can you see it before you, this ultimate rational world in which everyone knows everything and thereby is exactly equal to everyone else? I don't know what you think of it, but I don't want it. The universalist's rational dream is a perfect perspectivist nightmare of the worst kind.

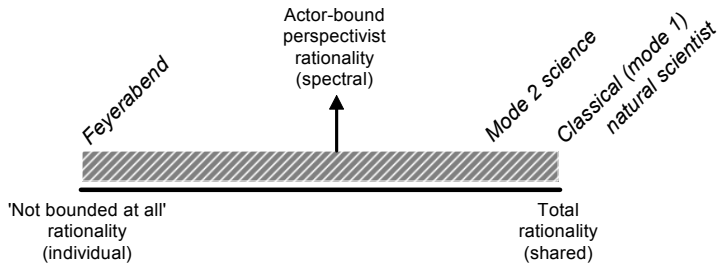
The opposite, an 'anything goes' relativism with each individual adhering to their own improvement perspectives and individual rationalities, is also worth exploring further. The philosopher of science Paul Feyerabend wrote a book, called *Against Method*,[277] which made a huge impression on me as a young man drenched in classical scientific education (and it still does today). It was one long and bracing polemic against scientific method. Among other things, Feyerabend demonstrates that even an early scientific celebrity like Galileo (the earth revolves around the sun!) mainly worked *opportunistically* in building and defending his scientific theories. There was no pure empirical and classically rational scientific method with him; he played the game for status and power (and his life) with verve. There's nothing wrong with that either, says Feyerabend. In retrospect, he thinks Galileo was completely right in doing things the way he did – otherwise his theory and perhaps he himself would not have survived – and pleads above all for the freedom to

[275] With the study of particles, things have got to the point where there is a lack of 'common sense' in its framing, giving rise to the question whether this is still science in the original Newtonian sense that we are trying to read the book of Nature.

[276] Where there are subjective opinions and objective facts, they are not subjective and objective beforehand. Certain perspectives are factual *because* they are not disputed, and other perspectives are opinions *precisely because* there are differences of opinion about them. If a difference of opinion exists within objective frameworks, science can help to further objectify these opinions. However, societability consists of a shared objective world (e.g. onions) within subjective frameworks (e.g. those of the onion grower and the greengrocer).

[277] Paul Feyerabend (1975), *Against Method*.

choose one's own ways of working, and to work with the greatest possible variety of methods. Then there will be choices, and the results will be of better quality. Feyerabend provides an almost anarchistic, recklessly evolutionary counterpoint to the classical fully empirical and rational scientific approach, and his arguments are worth reading. You could call this rationality 'not bounded at all', and it holds water as well as its counterpart, bounded rationality. However, this anarchistic variety of rationality can also be rejected by taking the idea to its extreme. Suppose that everyone goes their own way, completely. Taken to its extreme, what would happen is that the perspectives of others will be literally worthless for you, because they are unknown to you, and you cannot know them. Ultimately, as humanity, we'd fall apart, since we wouldn't know – or be able to know – each other's concepts, speak each other's languages, or empathize with and understand each other's experiences. People would be living parallel lives, like searchlights missing each other on a dark night, without any coordination or cooperation between them. Society would break down into individual souls wandering around, and souls would break down to nothing.

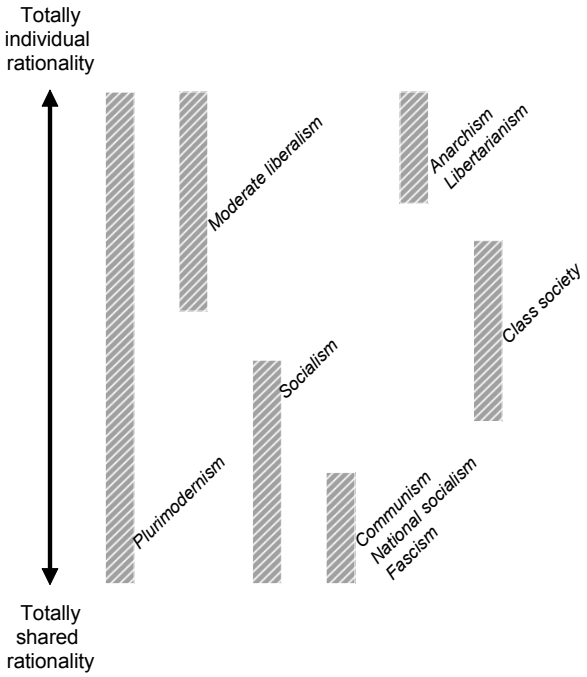


The rational spectrum. Actor-specific logics can be located anywhere along it.

What is our conclusion then? The objectivity-seeking view of the classical natural scientist and the many individual, subjective views of the anarchistic relativists both have their advantages. You can see this in something as simple as onion farmers and greengrocers: they each have their professions, their own worlds (the field and the shop, respectively), and they overlap in that they share the world of selling onions. Societability requires *both* individual *and* shared logics. Individual and shared rationality each proudly hold onto their ends of the spectrum. However, everyone understands that all sorts of individual rationalities added up without any connections or coherence make an anarchistic, low-quality mess of things. A single shared rationality in isolation also results in an oppressive society with very little sparkle, to put it mildly.

I think that we as humanity therefore have to explore the *entire* rational spectrum, and that it is precisely an actor-specific, perspectivist logic that offers outstanding opportunities for doing so. We live not *only* as pluriform individuals (at left in the previous illustration) in a shared world (right), but we *also* form all kinds of actor-based group identities in between

them, with their own perspectivist rationalities. This is the core of societability (see the discussion of the soccer team above).



The rational spectrum and the focus of political movements

Again, we are inevitably entering the world of politics. The principle of politics is that different actors (groups and individuals) at different levels have different interests, and thus they experience different improvement perspectives. Since these interests partly agree with each other and partly contradict each other, it is necessary to have some governmental and societal order if we want to have a society. The heart of the political discourse on perspectives is discussion, negotiation, and exercising power as to which perspectives we may/must share, and in which may/must be different. The figure above gives a general location of various political movements along the rational spectrum, by ideological preference. Their precise positions can be debated, but the crux is that the figure shows the political spectrum as a preconceived choice (an ideological preference) of different rationalities, differing in the degree to which they should be shared. A flexible, actor-specific, perspectivist rationality that has this *entire* spectrum, including both ends, available to carry out this discussion, is probably the best capable of evaluating societies and improving their quality. The largest actor is then the whole of humanity, and the smallest is an individual (in a particular role). There will still be plenty to argue about on political grounds, but we'll be rid of the preoccupations with ideology that result in particular political movements ignoring whole sections of the spectrum.

6.5 Team World is based on balance

'Honi soit qui mal y pense' [278]

The previous chapter described how actor-specific logics on various scales are relevant in societal practices, and connected this idea loosely to political movements.

Earlier, we took apart a soccer team and examined it in terms of perspective. The presence of identities at various scales determines the quality a soccer team can achieve. I compared this with the presence of the different facets on a diamond. Whether or not this maximum quality is achieved depends on whether the team is also capable of activating the identity that a particular situation requires. Sometimes the entire rearguard has to form a bloc, and sometimes an individual striker has to show off. This can be compared to the degree and the sequence in which the various facets of a diamond reflect light. A team works at its best when many facets are present, on different scales, and when they are all allowed to have frequent moments in the spotlight. The team as a whole sparkles; it is in a dynamic balance.

This description can be applied at any desired scale level. This section essentially transposes the soccer-team idea to other scale levels. It applies equally to smaller scales, such as a marriage and a family, and larger ones such as a neighbourhood, a municipality, an industrial sector, a country, an economic bloc, and the world community. The largest imaginable team – if we limit ourselves to humans – is at the world scale for the time being. It's high time we looked at the world's population from a team's point of view, as ambitious as that sounds. I call the intended result Team World.

Of course, every level has its idiosyncrasies, and certainly the world scale does. However, as the world's population, we already satisfy the main condition for a team: we have ambitions that we can only achieve as a team, in this case, Team World, and sometimes there are requirements so strict that we can only meet them as Team World. In some cases, like our worldwide transport and communication systems, we've already made some progress. In many other cases, though, we are at the very beginning: solving climate-change problems; feeding the world's population; combating hunger, poverty, and communicable disease; responsibly using our scarce resources; providing aid when a tsunami hits; and protecting whole peoples from afflictions like genocide and epidemics. These are only some of our problem-driven challenges (the opportunities offered by *the path of humanity* are much more interesting), and their numbers are increasing.

Team World is an intriguing vision of the future. Although Team World is obviously much more complex than a soccer team, there is a lot we can learn from a well-functioning soccer

[278] Motto of Britain's Order of the Garter (from French, literally 'shame be to him who thinks evil of it'

team. What we as humanity have a dramatic lack of is team spirit: the recursive amount of coherence and overlap between experiential worlds, and between identities at various levels. This is also true for the meso-scales such as healthcare, education, mass security, and production and consumption chains. And even soccer teams and marriages can have spectacular breakups.

It is also well worth our while to actively seek the dynamic balance of Team World, and to let humanity shine on as many levels as is useful and possible. The idea may be optimistic, but it's certainly not utopian, since we are 7 billion individuals (all different), 7 billion similar beings (we are all people), and one humanity (a single entity) – all three at the same time, as well as all the variants in between. T*he path of humanity* shows that, besides the small team relationships, we are getting better and better at working as teams on increasingly larger scales. We keep trying out teams composed of more individuals, even though they don't always work out. Until today, we've done so largely unaware. In the future, we can seek out the higher scales of *the path of humanity* consciously, and test their merits.

6.5.1 Plurimodernity comes in threes

Plurimodernity, the multiscale society of Team World that unites pluriformity and modernity, can be expressed in three perspectivist dimensions. They are very closely related to the three societal foundations mentioned earlier, but now are cast fully in perspective. These three dimensions are already present in the word 'plurimodernity'. *Pluri* refers to *Pluriformity* and emphasizes the differences in perspectives, thus also the singularity and the smaller scale. *Modernity* refers to the other two dimensions of *Unity* and *Similarity*. Within large modern structures (unity), things and people are often treated uniformly or at least very much alike (similarity). A McDonald's hamburger is the same no matter where in the world you go, and all the soldiers in an army support the unity. This also occurs in terms of perspective.

Three perspectivist dimensions

Each of the three perspectivist dimensions – pluriformity (**p**), similarity (**s**), and unity (**u**) – emphasizes a different aspect of a given amount of perspective that makes up a societal practice:

A maximum *pluriformity* (**p**) emphasizes that perspectives differ completely from each other. On the scale of actors, this means that the perspective of each actor is completely different. The perspective of a baker is largely different from that of a butcher, for example. A high pluriformity means there are many different actors.

A maximum *similarity* (**s**) emphasizes that all perspectives are completely the same. On the scale of actors, this means that the perspective of each actor is the same. The perspectives of two conventional bakers are largely the same; they are similar enough to be virtually interchangeable. A high similarity means many similar actors.

A maximum *unity* (**u**) emphasizes that the perspective of actors is conceived of and used as a single whole, as one actor on a larger scale. If a baker and a butcher work together as two of the shopkeepers on a shopping street, to prevent the city closing the street for two months for construction, then they are cooperating and trying to create value as one larger composite actor (a single multi-actor). (In this particular situation, they're actually trying to avoid *loss* of value, but the issue is still value). A high unity means many actors acting as one on a very large scale.

The three dimensions play a remarkable game with each other, which they *can* do because they are based on one common foundation of recursive perspective. This is how pluriform and uniform actors can comprise one new larger actor on a larger scale: pluriformity and similarity are incorporated in unity. This larger actor – a composite actor – can then join with other larger actors on this larger scale. The reverse can also occur: an existing composite actor breaks up, and unity is unravelled into pluriformity and/or similarity. Once we find pluriformity, similarity, and unity within one actor, we can also distinguish between smaller actors, and that actor is a composite actor, or a multi-actor.

Three components of societal quality

The three dimensions each represent a societal value, their own particular societal force that is complementary to those of the other two. Pluriformity introduces diversity in actors. Since all actors are different, one of the possibilities is for them to specialize so each can excel at one thing. They also have more flexibility in responding to different situations. Similarity, on the other hand, introduces uniformity, sameness between actors, they are all the same in some relevant respect. Thus it represents recognizability and replicability, and is also a necessary condition for empathy. Unity introduces acting and improving coherently and in concert, from well-aligned and balanced interests, as a single composite actor with might and power and force.

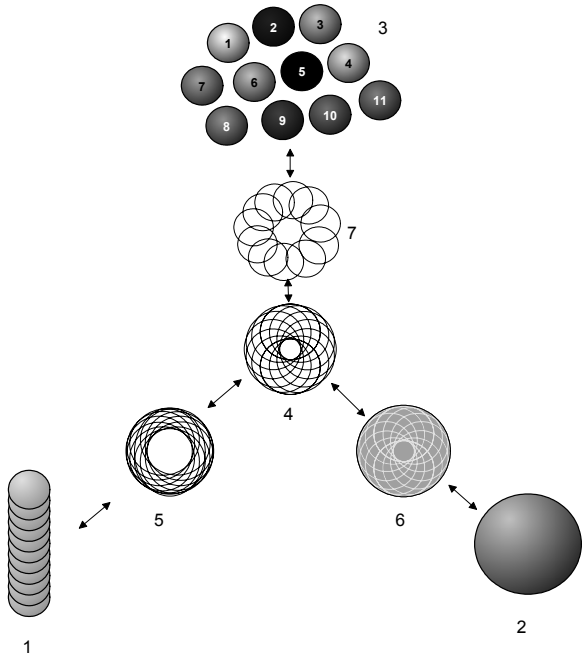
A society as:	*Dominance of*	*Strength*	*Weakness*
All unique individuals	**p** (pluriformity)	Variety, pluriformity, versatility, individuality	Loss of view of the overall picture, fragmentation, lack of mutual understanding
All similar people	**s** (similarity)	Interchangeability, homogeneity, relationship, recognizability, empathy	Striving for similarity limits power and potential
One whole	**u** (unity)	Might, power, unity, wholeness, eye for the overall picture	Individuality is suppressed, members are alienated

Components of societal quality in perspective

The three perspectivist dimensions show three fundamental components of societal quality. Each dimension has its own strengths. A society choosing only one dimension gives up the strengths of the other two. The table above shows these strengths and weaknesses.

Perspectivist dimensions (perspectivist coordinate systems), like p, s, and u, must exclude the other dimensions' limits and together form the whole. In addition, they can form larger blocks recursively, just like red and green Lego pieces can form a new block that will be partly red and partly green. Examples of perspectivist coordinate systems are p, s, and u; thinking of yourself and of others; objective and subjective; mind and matter; intended and autonomously occurring; and time and space. Examples with little value for society are heads/tails of a coin (dual) and the six values of a dice (a sextet).

It is precisely on this larger societal scale of Team World that the most balanced team has to score well on all three dimensions, and thus *on average*, it will be located at team configuration 4.



Alternative team configurations (again)

The number of possible facets at the different scale levels then increases enormously. The question is if they are really there, in other words, if they have content, concrete form. Team World might be missing some team spirit along entire sections of the identity spectrum, just like a poorly functioning soccer team or political party. It is easy to see that

team spirit is especially strong on the smaller scales, like families, small communities, and within companies. On the larger scales (like the EU or UN, or multinationals) there is often a lack of team spirit. To achieve some coherence even at these large scales, we often fall back on the chain option. However, chains have disputable advantages, as will be explained in the following section.

6.5.2 Away with the societal chains!

Chains also come in all shapes and sizes. There is a chain in the figure above between team configurations 7 and 3 (it is shown again in the illustration below). Team configuration 7 shows a closed chain, like a ring, with substantial overlaps between next-door neighbours (and here and there, two are facing each other). As soon as just one link is broken, a linear chain remains. Then the largest distance between two links suddenly becomes twice as large as in a ring. If the chain needs adjusting, this can lead to problems. Entrepreneurial and policy circles are enthusiastic about chains because of their high degree of efficiency. They push strongly *towards* team configuration 3, because this is where the use of available perspectivist resources is most efficient: there is no duplicating of perspective, and each perspective can be used separately. I stressed *towards*, because if the players operate separately from each other, the coherence is gone at once. What remains is a box full of marbles that are all different. Thus a minimal overlap is needed to retain the cohesion, otherwise the logical result will be fragmentation. Team configuration 3 operates at the edge of the abyss, where the prettiest flowers grow (as the saying goes), but also where the danger is greatest.

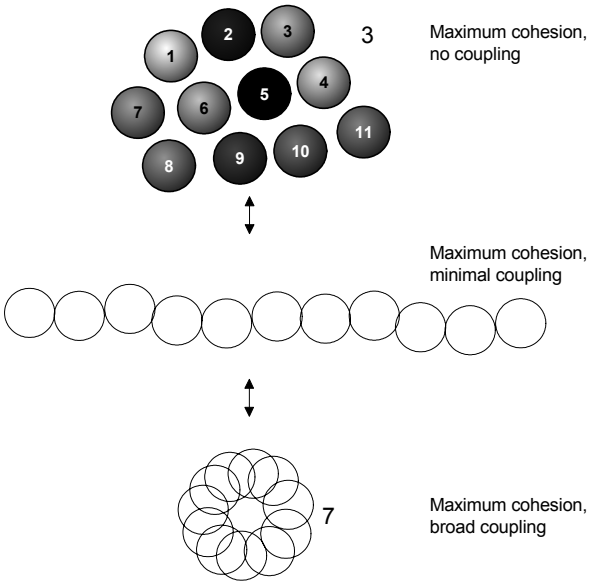
A famous principle of design that perfectly expresses the 'draw towards configuration 3' is *minimum coupling and maximum cohesion*. Separation of Concerns (better known as SoC) is the activity that helps define this more concretely.[279] The idea is that in a *good* system design, the elements each have their own set of responsibilities that fit well together, literally going their own way, and there is minimal overlap between the elements. The coupling takes place through *interfaces* that, unlike the internal structure of the elements, are instead defined in extra-fine detail. As soon as anything goes wrong, it is immediately apparent in the interfaces. Minimum coupling and maximum cohesion is by far the most *efficient* solution for working on a *large scale*. It is often resorted to in times of scarcity. All the elements are set up simply, and coordination is assigned to particular managers who follow only very specific performance criteria. This style is called 'lean and mean'.

These principles were put this clearly for the first time in the world of software engineering in the 1970s and 1980s, but they have been around for quite some time. For example, industrial Taylorism arose around 1900, and it is still unleashed wholesale on our production-consumption chains, construction chains, healthcare chains, education chains (for example, our country uses a skills test as the all-important interface between primary

[279] This principle of Separation of Concerns has of course existed as long as humankind. Edsger W. Dijkstra, a computer science pioneer, is usually credited with introducing the term SoC.

and secondary education), I could go on. All of these systems are called *chains* with good reason. Efficiency seekers like to get to the stage just next to the disintegration of team configuration 3. One step further, and the individual elements burst away from each other, and all you have is a heap of separate elements.

The reason why chains do not completely disintegrate more often is because of the particular and keen interest in interfaces. This principle can also be made flexible by using highly modular solutions. Larger modules are examples of configuration 2 (we see recursivity here again). Chains and even networks can be configured out of larger modules because their interfaces are clearly defined. The design process then takes place by configuring components with clear input–output behaviour. The illustration below shows the chain with minimum coupling and maximum cohesion, located between team configurations 7 and 3, with the annotation that real chain-efficiency adepts like to set the limit as close to configuration 3 as possible, without letting the whole thing disintegrate. Minimum coupling and maximum cohesion are taken extremely seriously.



The optimal chain configuration

The principle of chain efficiency is compatible with processes that are easy to oversee and manage, rarely or never entail unpleasant surprises (the chain or the possible configurations completely cover all the possible needs), and are highly repetitive. The solution fails, however, because of its extreme focus on only one of the three perspectivist team dimensions, at the expense of the strengths of the other two dimensions (see the previous table). Chain players completely lose sight of what is going on in other links, and at the global level. Only the people who oversee the interfaces have a view, although extremely limited, of 'the whole' (read: the interfaces), since the whole is not at all seen, not

by the players (who only see their links), and not by chain managers (who only see the interfaces between the links). On the contrary, 'the whole' is completely outside of anyone's consciousness. What is going on *within* the players is also invisible for these chain managers. The players' interchangeability, recognizability, and mutual understanding literally approach zero (because of the explicit priority of maximum cohesion and minimum coupling). A chain optimizes efficiency, and precisely for this reason, if it does so very well, it will be extremely brittle and weak (the opposite of the team as one whole) as well as cold and alienating (the opposite of the team as a group of kindred spirits).

If you choose an extreme position on only one of the team dimensions, you irrevocably give up the qualities of the other two dimensions. If you shout out 'chain' and 'efficient', you should shout 'fragile' and 'cold' in the same breath. Looking at our healthcare and education chains, the way we set up neighbourhoods and our social safety nets, and the way we budget policies in the West, doesn't it sound familiar?

I even think that a misplaced chain approach accounts for a large share of the huge costs of failure we see in various corporate sectors such as construction. If construction processes were set up more like team configuration 4, a substantial share of the suffering for those paying these costs would be a thing of the past. The cautious beginnings of a trend can be observed now, in fact: there is more communication among elements, more mutual understanding, and thus a shift 'back' towards team configuration 4 at the centre. Paradoxically enough, this is called 'chain cooperation' (a contradiction in terms, since here the links actually have to be separate from each other to form a chain, but it's a shift we badly need, since chains are simply not good for society).

Take another example: food. The world's media are continually reporting one food scandal after another, and as I write, the total lack of transparency and the abuses committed in the Dutch meat industry are once again making the front-page news. The food supply chain (the name says it all) is indeed structured very much like a chain. I'm wondering more and more if that is actually desirable. I think a few resolute steps towards team configuration 4 would be very welcome. The food supply chain is already disintegrating, while there aren't really major food-related problems everywhere, yet. If I think of real 'problems' in the food supply chain, I often see the archive photos of the 'hunger winter' in front of me, the last winter of the Second World War, which resulted primarily in severe food shortages in the Netherlands' larger cities. Many people lost their lives as a direct result of the food supply being organized as a chain. Links disappeared, and the system collapsed rapidly and completely. This was not a case of hard luck, it was just implicit in the choice of (or autonomous development of) long chains. In the countryside, where the distances were shorter, there was much less hunger. The infamous trips from the big city to the country were tragic expressions of desperate attempts by city-dwellers to have some overlap with food production. It's a bitter example of an attempt to come from team configuration 3, the world in wartime, back into team configuration 4.

We have to dare to face up to the situation. Of course, if you have to put out a fire, you make a bucket brigade. Then all the links are equal, which is a very different situation than a societal chain. But for the vast majority of forms of societal cooperation, a tight chain configuration is just not desirable. Team World in its ideal form is a team in all three dimensions, just like a brilliant soccer team, since that's where the strengths of all three team dimensions can come best to the fore. Quality standards like diversity (team dimension 3), strength (team dimension 2), and empathy (team dimension 1) show up better in coherence.

6.5.3 On people and machines

You may feel that I'm being very hard on chains. If so, you should re-read the previous section, because that is not what I am saying. If the conditions require people to work in a chain structure, then of course it's an excellent solution. Highly uniform serial production in a highly predictable, stable environment with few possibilities of risks to the other links is where the chain is right at home. Within the doors of one factory or at least under strong and unwaveringly imperative management, such as manufacturing smartphones or cars, it is fine. In cases where the qualities of the other two team dimensions are also needed, it's a no-go area.

Modern means of manufacturing go much further than blindly trying to form chains. If you combine the chain with advanced robotics, for example, then you are seeking the extremes of two of the three team dimensions: you will near the boundaries of team configurations 3 and 1. Or take the repair business, which is increasingly turning into the replacement of complete components by people with no understanding of their internal functions at all. A configurational mentality and working method are becoming more popular. Here the limit of team configuration 2 is being approached.

Human beings completely disappear from these enormous production systems that excel near all three outer edges of the three dimensions and are disturbingly empty in the middle. These systems are soulless, without identity, like a poorly functioning soccer team. I have personal memories of working during the summer holidays, in both a bread and pastry factory, and a dairy factory, where everything was determined by the speed of the belt, and the repetitive work was enforced to attain a frightening perfection. I operated like a robot (team identity approaching 1) in the chain (team identity approaching 3). If someone didn't work fast enough, he was quickly replaced so as not to slow down the entire juggernaut of production (team identity approaching 2). As far as I'm concerned, the faster the chain idea, the robotics, and the configuring mentality are implemented to their extremes here, the better. But people don't belong at these outer edges of the three dimensions. People should sparkle all over the field, with their focus in the centre.

6.5.4 The Team World configuration

Similarity, unity, and pluriformity (s, u, and p) are the basic ingredients of any societal practice. Differing proportions in the mix will result in totally different societal properties.

The three extreme team configurations 1, 2, and 3 completely ignore the other two ingredients, and therefore are simply failed teams. Team configuration 1 in isolation leads to an extreme communist-type similarity (uniformity), team configuration 2 to a relentless juggernaut with fascist traits, and team configuration 3 to the most extreme anarchistic individuality. Only once you mix them up dynamically do you get interesting, sparkling hybrid forms.

Once there are changing circumstances, and large parts of all three dimensions have to be played, and in changing coherences, then people are at their best. Then we see an exciting, sparkling interplay resembling what we see watching a good soccer team. The players can sense what the others will do, even in unforeseeable situations, correct each other's mistakes and complement each other's tasks, as well as take over another player's task if they are needed elsewhere. Exactly the same applies to society. People should be able to move over all three dimensions. A sparkling society therefore on average finds its basis in the centre, at configuration 4 as Team World, and uses the entire playing field.

6.5.5 On norms and values, and economics

You may have noticed that a soccer team is similar to a band of hunter-gatherers. Soccer, of course, is just a game, with rules that all eleven players on the pitch know. For a band of hunter-gatherers, about 20 people, their, prosperity, well-being, and in fact their lives are at stake, and the configuration develops naturally. But the rules of team configurations also apply to the Cro-Magnon, the Hadza, and the Datooga. Even for groups of hunter-gatherers an ingenious and appropriate balance among the three basic dimensions of a cooperative process offers huge advantages.

The core of every stable societal multi-actor practice, and any form of society, is that cooperation between actors offers advantages over staying fully independent. Whether you look at (a) dividing hunting and gathering tasks between men and women in a group of primitive hominids, (b) the men in a group of Cro-Magnon specializing as stonesmiths or hunters, or (c) the Hadza and the Datooga trading arrowheads for bush products, they all revolve around a certain degree of social and/or professional differentiation, and a certain coherence among actors. In example (a) the social cohesion shared by the men and women is much greater than the difference, the social specialization. Above all, they form *one* group (*one* team), and within that unit, we see social differentiation. We also call this specialization social, because it takes place within a closely-knit group (a composite actor). This is team configuration 6 (see the figure of configuration, presented again below). In example (b) there is clearly professional specialization, but the hunter will still understand what the stonesmith does and can do (and vice versa). This is team configuration 6 in the case of social specialization, and even 7 in the case of far-reaching professional specialization (if other groups of Cro-Magnon trade with the stonesmith). In example (c), the Hadza hunter has a limited idea of what the Datooga metalsmith does, and vice versa, but there is sufficient overlap for them to trade. This is an extensive team configuration 7, even leaning towards 3. This is the new world of transactional market mentality.

Dan Ariely's book *Predictably Irrational* was cited earlier. In a chapter called 'The Cost of Social Norms', Ariely explains engagingly how social norms and market norms have completely different natures. The research he cites shows again and again that market norms are cold and hard, while social norms are warm and fuzzy.[280] For example, he shows that people perform certain tasks better when asked to do so voluntarily than when they are paid badly. Paying them results in the subjects' social norms being replaced by market norms, and their involvement decreases dramatically, to a degree commensurate with their low wage. In rational economic terms, this is odd, since even a small financial reward should be better than none at all (and this is exactly where the social norms show themselves!). Introducing financial considerations into social relationships, or social relationships into market relationships, creates unnatural tensions. As an example, Ariely says if you're invited to your mother-in-law's house for a fine Christmas dinner, it would simply be unthinkable to offer to pay her for it. Even if you offer her a lot of money, no one will appreciate it! Another example is treating customers as friends. You would be expected to turn a blind eye to a customer not paying a bill on time if they're having problems. The social and market spheres do not mix well, says Ariely, and you can't have it both ways.

I think that the distinction between the social and market norms can be directly attributed to their underlying perspectivist configurations, which are entirely different. Of course they don't mix! What Ariely calls social norms fit excellently into team configuration 6, and market norms into team configuration 7. The three perspectivist team configurations make it possible for us to discern that in fact there are three sets of norms instead of two, wholly in line with the figure of the team configurations. I distinguish between:

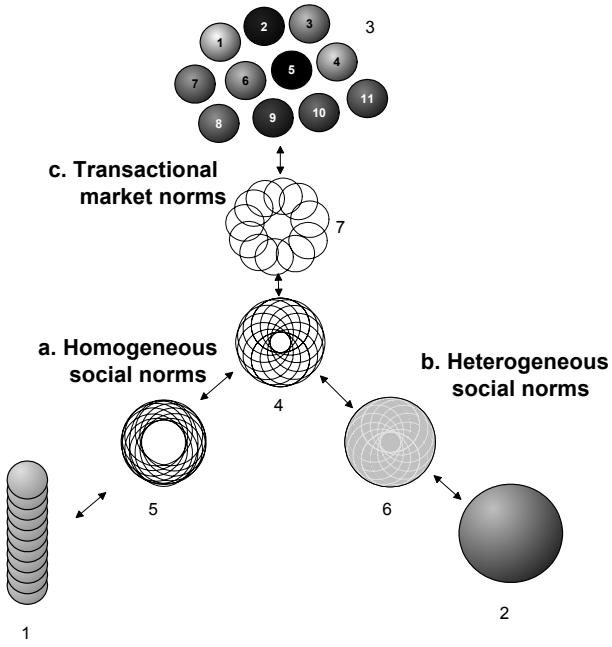
a. the homogeneous social norms,

b. the heterogeneous social norms, and

c. the transactional market norms.

They each have their own area of optimal validity, and they can be placed directly in their appropriate areas of the team configurations (see figure on the next page).

[280] See *Predictably Irrational,* Dan Ariely, chapter 4: The Cost of Social Norms



Three sets of behavioural norms, located at the team configurations.

Homogeneous social norms have a strong sense of recognizability, empathy, and reciprocity. This arises from the profound realization that in principle, we are all alike and related to each other (the position at the bottom left, team configuration 1). If someone with car trouble asks you to help them push the car off of the road, you can put yourself in their shoes right away. Someday you, too, could land in this unforeseen and unfortunate situation and if you did, you would want someone to help you out, so you are happy to help out. Isn't that how we should relate to each other? We call someone who is antisocial, who doesn't want to help an oaf or a lout. In the Netherlands, it is even a crime to deny someone essential help (although criminalizing it doesn't help at all, since it confuses homogeneous social norms with formally imposed ones). By contrast, after an acquaintance asks you to push his car twelve times in a month, you'll probably ask him to take better care of his car, whether in a friendly tone of voice or not. Then the norm that we help each other in unforeseen circumstances that are reciprocal is completely gone.

We hold doors open for other people, help an elderly lady carry a heavy bag, and we get teary when we recognize sadness in someone else.[281] It doesn't all have to revolve around you. If you have an elderly mother or father, it can motivate you to behave more considerately towards older people. After all, you can also imagine other people being nice to your own parents, and whether consciously or unconsciously, you find that a comfort.

[281] Hardened dualists will chalk this up to 'mirror neurons', but we know better!

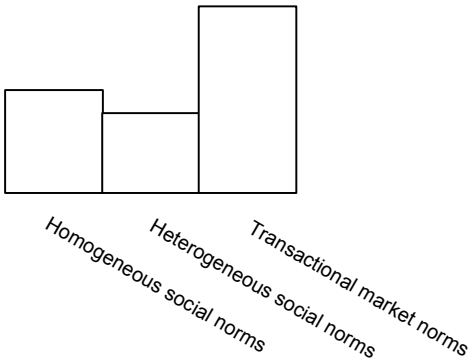
Heterogeneous social norms have a strong sense of complementarity, solidarity in diversity, and a very strong group identity. You know what role you play in the larger whole, and you are happy to play it as part of a larger system of roles, since it helps you all as a group (as a strong and close-knit team, as a composite actor, or as a superorganism). This is why the defender defends, and the striker kicks: you harvest the fruits as a team. It's why in a group of hunter-gatherers the women gather and the men hunt: it benefits the group. Because of the strong group sense, and solidarity in diversity, based on the mutual realization that we're all better off as stable actors, the norms, to use Ariely's words, are warm and fuzzy.

With *transactional market norms*, however, the main idea is that the partners in the transaction are different than you, and that they can contribute something that as an actor you do not have or cannot do, and perhaps do not even understand. The idea of 'us-and-them' is central, for example, the Datooga arrowheads that the Hadza cannot make themselves. The rules of engagement are clearly laid down, formally and often before the transaction takes place, such as in structural matters like laws and contracts, or as the outcome of a process of negotiation previous to individual transactions (or a mix of the two). If you have a money system, all you need to do is specify the quality and price; you don't need to look any further into the origin of the thing you're buying. This is the domain of the financial market transaction, as aptly indicated by Ariely. The *interface* between the actors becomes clear and sharp, as the discussion of chains in Team World made clear. If you can get something better and/or cheaper somewhere else, you will, won't you? The abuses that arise from this mentality have generated a lot of interest in socially responsible entrepreneurship, as an attempt to increase the share of social norms in the free markets.

The conventional supply-and-demand theories in price-setting assume that the retail price is the price at which both buyer and seller are satisfied. In a large, transparent market of homogeneous goods, the price ultimately moves towards an equilibrium level (the cost price including wages of the producer). But markets are seldom ideal. Things like monopolies, oligopolies, formation of cartels, commodity price cycles and bitter competition disturb a balanced market. This applies to the Hadza as well: if they can only get arrowheads from one Datooga clan, there's a monopoly.

Today we pay a huge amount of attention to the economy. The economy is like a cuckoo chick in our heads, kicking other birds out, so it gets all the attention. Our word 'economy' is derived from an ancient Greek word meaning 'household'. According to the most conventional definition, economy is the social science, or rather the knowledge and skill oriented to the production, consumption, and distribution of scarce goods and services. Trade is seen as the central business of the economy. In this definition, it drifts away a bit from keeping house in the original sense, which in fact fits team configurations 5 and 6. The natural *Hinterland* of the modern view of economy is team configuration 7. That's interesting, since it makes transactional market norms the most important and puts the homogeneous and heterogeneous social norms, fitting team configurations 5 and 6, relatively out of the picture.

This is precisely what we see today. Parties (actors) operate mostly from their own identity, expand it to this end and are mainly willing to work together with other parties on a transactional basis. The us-and-them mentality reigns in our late-modern society. There is less and less space for the social values important to a stable society: empathy (configuration 5) and unity (configuration 6), the strongly binding 5 and 6 values. There is an increasing tendency towards transactional market norms, and these norms destabilize a society. Modern-day wars are mostly about transactional market norms. If the homogeneous and heterogeneous social norms lose ground to the transactional market norms, our society loses cohesion and there is even an immediate danger of fragmentation, as the transition from team configuration 7 to 3 shows. Indeed, the fissures in our age are visible as environmental and social problems, selfishness, and exclusion of undereducated youth. Modernity, the age of great ideas and structures, is being strongly maligned by postmodernity, which although it offers much more room for individuality, comes at the cost of fragmentation.



A qualitative impression of the proportions of behavioural norms in our late-modern age. There is a strong imbalance in favour of the transactional market norms.

I'm not one of the people who think that transactional market norms are bad. That is an extremely one-sided view: global trade and extensive professional differentiation, the pillars of the transactional market, have brought great prosperity and well-being to large segments of the world's population (see also Hayek, *The Road to Serfdom,* and Adam Smith). This is deeply rooted, as the stonesmith of the Vézère Valley and the Hadza's arrowheads clearly show.

I do think that a large share of the tensions of our late-modern society is caused by this very imbalance in team configurations.

All three of the extreme team configurations can represent very positive and very negative values. The key is purely to maintain a balance among them. Egoism, poverty, hunger, short-sightedness, buck-passing, focusing on efficiency, money as a driver, mass unemployment, climate and other environmental problems, refugees, fragmentation,

suboptimization, low food security, demeaning healthcare, standardized-test-driven education [note: 'the Procrustean bed of education' may drive people to look up what that Procrustes thingy was again, so I'd like to lose it as well as the lemma Procrustes bed – none of these are necessarily a product of transactional market norms. But if the homogeneous and heterogeneous social norms are suppressed, relative to the transactional, these problems will be the logical result. We are out of balance, and it is taking on alarming forms. Therefore it is high time to roll up our sleeves and do something, otherwise, we'll be walking backwards on the path of humanity.

6.5.6 What determines human development?

The path of humanity runs from the early hunter-gatherers to today's societies in which economics and a market mentality dominate, and it will continue on into the future. To oversimplify, we have come from autarkic (self-sufficient) to modern. We consider it to be generally a path of improvement. However, there are points where one can really have one's doubts. While I was a baby, the Cuban Missile Crisis occurred, sending the world to the brink of nuclear war. In the last century, communist and fascist regimes cost hundreds of millions of people their lives. More and more people are concerned about how we are abusing our earth, and problems such as climate change, pollution of our air, soil, and water, and the plastic soup in our oceans that pollution has caused. Is this path really still leading toward improvement? Are we not facing our next big regression, and since 'what goes up must come down', won't this next one be enormous? Or are we in fact about to set off to reach new heights?

I do not mean to romanticize the life of the Hadza in any way. Hadza children suffer from lung diseases because of their miserable housing conditions, and herbal remedies are no match for acute appendicitis. There are hundreds more reasons why I prefer a more developed society to one of hunter-gatherers. However, it gradually dawned on me how inappropriate it is to call the Emberra and Hadza 'primitive' peoples. I had never before realized how incredibly complex and varied the job of hunting is, in terms of skills and knowledge of animal behaviour, tracking, driving techniques, types of poison (for the arrowheads), and weapons. The pretty decorations on the Hadza arrows turned out to have a function – they slow the arrow's progress through the body of the animal, so the hunter doesn't lose the arrow. The particular animal and the power of the bow determine what kind of decorations are put on the arrow. The bow, arrow, and arrowhead are made and chosen with care, depending on many different circumstances.

My experiences in the Perigord region, Central America, and East Africa taught me that 'primitive' societies are anything but primitive. They have extensive knowledge of and are skilled in working flint, hunting, gathering, and more. There are intensive cooperative relationships within the group. Usually, their knowledge and skills are those that we do not have (any longer), so we easily overlook them. But I don't have the idea that an experienced Hadza hunter or a top Cro-Magnon toolmaker puts much less weight on the recursive perspectivist scale than a quantum physicist, politician, or economist of today. On the scale

of small groups, the hunter-gatherers display a sophisticated balance, much higher than our balance on today's scales.

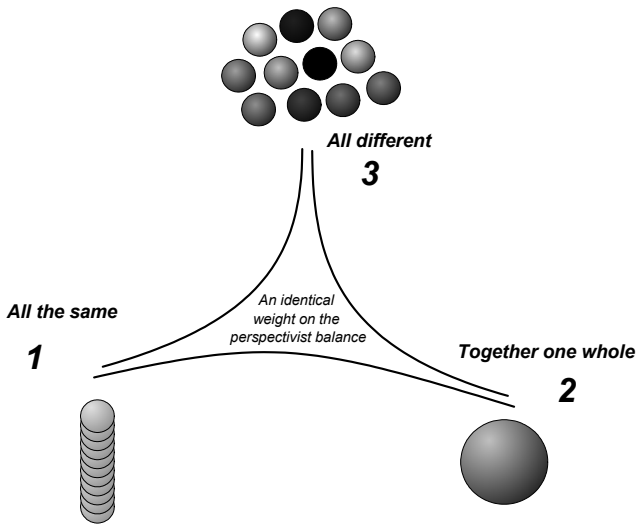
What exactly is the difference here? What characterizes the development of societies? What brings humanity to a higher plane? There is actually only one good answer, and it is illustrated by *the path of humanity*:

Coherence and cooperation are the key. People do better and better if they can create reciprocal societal coherence, on increasingly large scales and in ever-greater diversity.

Societal development in perspective

A more primitive society is not one that consists of less-intelligent or less-skilled people. Likewise, a more developed society is not one of smarter and more-skilled people. The development of our species is much more the path of a larger and larger scale, differentiation, coherence, and cooperation on the basis of ever-more effective perspectives. A more primitive society consists of fewer individuals (the scale factor) and less differentiation (the diversity factor), which gives it less cooperation and coherence. A more developed society consists of more individuals and more professional and social differentiation, and uses them in coherence and cooperation.

Thus the *degree* of coherence and cooperation is key. If there are more perspectives available as a societal practice, because there are a larger number of individuals, then this degree can increase. Recursive perspectivism offers a new way to look at this. According to recursive perspectivism, *every* societal practice consists of a given amount of perspective n. Analogous to the models of team configurations and the three dimensions, there are three extreme perspectivist configurations (I'll elaborate on them somewhat more in terms of perspective):



1: All the same. We can see all perspectives as identical, similar. They are, of course, since they're all members of the set of 'perspectives', and in any case are identical in this sense. Think of a box of M3 nuts or marbles; the differences pale beside the similarities. (At least until children start to trade marbles.) If they are ***all the same***, then we have interchangeability, homogeneity, relationship, recognizability, replicability, and empathy. But taken to extremes, the similarity is suffocating, resulting in a flock of lemmings, and soldiers marching in lock-step. All individuality is suppressed, and all exploration is nipped in the bud.

2: Together, one whole. We can also see the collection of perspectives as ***one whole***, one actor, one *unity*. We see the perspectives as belonging together, and to be distinguished from the others. The whole is then much more important than its parts. In its extreme form, it is a monolith. That gives it power, unity, wholeness, and simplicity, but it kills individuality, and its components are completely subordinate to the whole.

3: All different. We can see all the perspectives as separate, unique, individual actors. This is *pluriformity*. And they are all different, of course, since we can distinguish them all from each other, as witnessed by the fact that, at least in principle, we know how many of them there are. They are like grains of sand, distinguishable as unique individuals, and their similarities pale compared to the differences. If they are ***all different,*** we have variety, pluriformity, and diversity. But the situation can also break down into fragments, and people lose sight of the overall picture, and mutual lack of understanding and chaos looms on the horizon.

I remember a poster from my student days, drawn by Joaquin Salvador Lavado for Amnesty International, showing a huge, dismal neighbourhood made up of identical houses. The one resident who had painted his roof in bright colours was being arrested and dragged to the police van by several policemen. This is symptomatic for the world of ***all the same***. We have a strong natural urge or power to move away from pure homogeneity.[282] Sooner or later, and usually sooner, someone squeezes out of formation and paints their house in bright colours. Keeping things homogeneous, similar, requires effort. This effort, let's call it repression, is made by the 'uniformity police'.

The poster always reminded me of the second law of thermodynamics, about entropy. People who are preoccupied with order will see the second law as a continual attack on order. Briefly, entropy is the tendency of a largely orderly whole to fall apart instead of maintaining order or even enlarging. Energy is required to maintain order, and in the case above it is supplied by the police. Order stands in contrast to disorder, and if no one puts any energy into maintaining it, it will degenerate into disorder. Not even the pyramids are immune to entropy.

[282] This is why an extremely homogeneous form of communism will not last in the long run. Neither will an extremely fascistic regime or an extremely one-sided laissez-faire liberal regime.

From entropy to tritropy: perspectivist balance

Order disintegrating into disorder is actually a very slapdash and even one-sided view of entropy and it only partly matches our experiences. Just as order *degenerates* into disorder, order also *arises* from disorder. (Where is this perpetually degenerating order supposed to come from, after all? Doesn't the vitality of nature also engender order?)

The figure above suggests that there is indeed a much more differentiated and subtle relationship at work. All three extreme configurations are just that: extreme possibilities. We recognize that the three extreme configurations are rare, and that there is a tendency, or a force, towards the centre, and that it takes energy to maintain the configuration against this tendency. It is comparable to the chances of your throwing a dice and only coming up with ones with every throw, or sixes, which as the number of throws increases approaches zero. Chances of coming into one of these extreme configurations are very small, and if one does occur, the odds of it being replaced by a more balanced configuration (a configuration with equal piles of ones, twos, and on up to sixes) are especially high. That extreme order decays into more disorder is only one of the interpretations allowed by the above figure. Extreme disorder also develops into order, sooner or later, in the reverse process.

There is overarching symmetry in the figure with the three extreme configurations. As soon as you land in any one of the three extreme configurations, the other two will start to 'pull'. This 'pulling' is a statistical effect that expresses itself as an averaging force seeking a balance between the three extremes. Entropy is only one of the possibilities, and in fact, the term tritropy would cover the whole phenomenon better.

This seeking and finding balance applies to extremely uniform systems (which statistically will tend towards pluriformity and unity). Try making a classroom of children, or better yet, a whole school, stand in a neat line and stay there, or the Chinese or Russians all conform to a communist doctrine, or just getting (and keeping!) all the shoes on the shoe rack in order in a house full of teenagers, or even of grownups.

However, statistically speaking, this search for balance is also found in extremely pluriform systems (which tend towards similarity and unity). If you're all different, and you see your neighbour do something clever, wouldn't you do that yourself? In an environment where every neighbour is truly different, this is easily the case. If the apples are all too high in the tree for one person to reach, then people will quickly figure out a way to divide the tasks and cooperate, with one on another's shoulders instead of both jumping 'fruitlessly' up and down. Remember the experiments with toddlers and chimps described in section 6.2.1, in which two individuals (sometimes) cooperated using ropes to pull the treats behind bars within reach.

This is also true in systems that are extremely homogeneous (statistically they tend towards similarity and pluriformity, so their perfect unity breaks down). Sooner or later the

temptation to act not purely in the interests of the collective but to pursue advantages for yourself will be too great to resist.

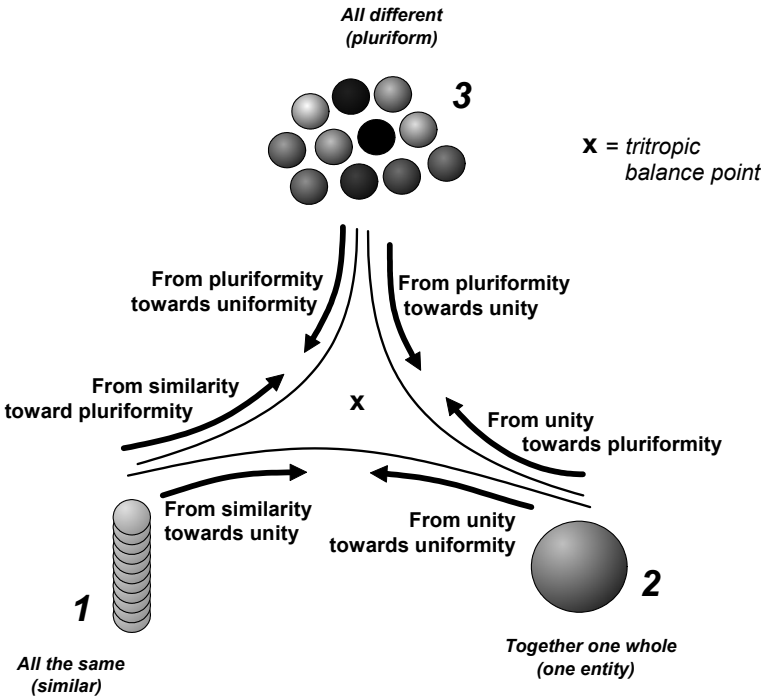
The above examples are about extremely uniform (1), extremely pluriform (2), or extremely whole (3) systems. These systems can be intentional (see most of the above examples, which are multi-actor systems), but the same applies to physical systems. I think that it applies to systems in which macroconfigurations can be assembled from a great many microconfigurations. If you go off balance (which is located in the centre, on the diagonal, with regard to the three extremes), then systems will change their nature, and the 'pull' will change direction.

In fact, therefore, I should not speak of the *systems*, as if they are objective and autonomous, and thus exist separately from a conscious observer, but of the *nature* and *effects* of the current perspectivist consciousness. As explained earlier, this encompasses relatively objective elements in the environment, relatively subjective internal elements (the observer), and everything in between.

The action of a perspectivist consciousness is what keeps creating perspectivist networks that (on average, over the long term) seek a balance between the three extremes in perspective.

The key thing is still those perspectives that represent the most value to various bearers of consciousness. This is why a professional painting restorer looking at paintings by old masters in a museum will see completely different paintings than an art historian or an interested layperson looking at them. It is why seamen in the 'tramp trade' develop a sense of a much wider spectrum of weather conditions than people on a tropical island with what Europeans would call a virtually constant climate (where a two-degree difference in temperature is annoying; I fondly remember our African guide who had a woollen cap on in temperatures we thought were pleasant). It is why the Inuit distinguish more kinds of snow than people in the tropics.[283]

[283] This is sometimes considered a myth, but nonetheless as a general principle I think that it makes a lot of sense.



A recursive perspectivist consciousness seeks perspectivist balance, on average. There is, strictly statistically, a pull towards the centre. This is experienced as tritropy: the pull towards the tritropic point of balance in the centre.

I'd like to make this phenomenon of average balance a bit more visual. Imagine that the middle of the figure above, thus the field with the curved boundaries, is a white trampoline, stretched out between three trees. A child with muddy shoes will have endless fun on it, jumping as high as she can. Afterwards, you will see that most of the mud has stayed in the middle, because that's where the jumping is good, and the farther out to the ends you go, the cleaner the trampoline is. Of course, now and then the child will try to go towards one corner (and now and then she'll fall off the edge and have to climb back on). The pattern is distributed over the entire field, but the jumping is best in the middle, and that's why most of the footprints are there – it's where the child is most likely to be, and that's where the 'sweet spot' is.

We see exactly the same pattern with a good soccer team, as well as with a well-functioning band of hunter-gatherers, a thriving agrarian society, a flourishing city-state, a booming nation state, and a brilliant Team World. The difference among all these powerful societal practices is the total amount of perspective, in other words, their perspectivist scale. Where they are the same is their hybrid perspectivist structure, in which a balance of consciousness shifts between similarity, unity, and pluriformity.

I will now discuss this concept of perspectivist balance quantitatively, in terms of three balances.

Alternative actor configurations: the first perspectivist balance

If we look at a given fixed quantity of q perspectives, the mutual relationship between these three dimensions is *inversely proportional*. This means that we can interpret the q perspectives at their extremes as a single actor (a single unit of q perspectives), as q uniform actors (q units of 1 perspective, all exactly alike), or as q pluriform actors (q different units of 1 perspective). These are the three ultimate actor configurations, in which one of the three dimensions is always laying claim to the most space. As a consequence, the two remaining dimensions are each equal to 1. Mixes of the three are also possible, and it is in these hybrid forms where social life and societies happen. The inverse proportionality of the three dimensions ensures that the growth of one results in the shrinkage of the two others (or their product). If one dimension shrinks, it means that the other two, or their product, will grow, since q does not change. This brings us to the *first perspectivist balance*: an inversely proportional relationship (there are also two proportional ones) that relates the total number of perspectives to the product of the three dimensions:

$$q = \mathbf{p}\cdot\mathbf{s}\cdot\mathbf{u} \quad (q, \mathbf{p, s, and\ u} \in N) \qquad \textit{First perspectivist balance}$$

In principle, for every specific quantity of perspectives q, there is an enumerable amount of different possible actor configurations, each with its own relationship between **p, s, and u** that satisfies the first perspectivist balance. (We can also vary q, of course, by *adding or subtracting* perspectives, whether over all three dimensions, separately or together.)

We can make this idea more graphic by using the three dimensions as the axes of a three-dimensional Cartesian coordinate system. This gives us a perspectivist space, which I call an actor space since the space organizes perspective in terms of actors. A point (p,s,u) in this space is an actor configuration, a multi-actor practice.[284] A multi-actor practice takes place starting from a shared societal consciousness (of q perspectives), from which the various pluriform (**p**) and similar (**s**) actors with complexity **u** act as a single organism (the multi-actor) to safeguard and improve the multi-actor practice. The multi-actor thus shows plurimodernity.[285]

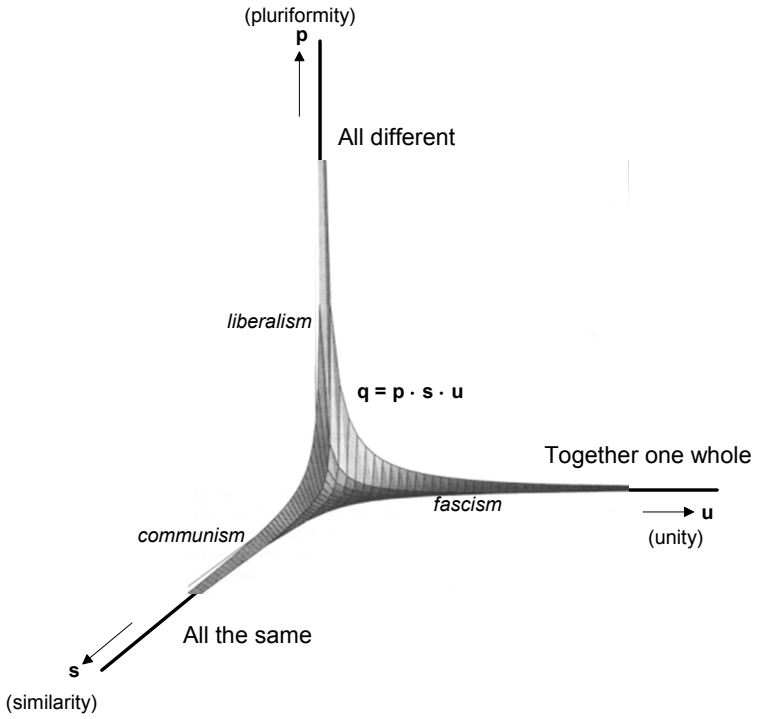
Because of this inverse proportionality, in more complex situations, the alternative actor configurations can be plotted as points on a flexible 'trampoline mat' with three 'attachment points' (see figure on the next page).[286] This mat represents the continuous

[284] At least once p and/or s > 1. Otherwise there is just one actor.

[285] It usually does so recursively and systemically, but so as to not needlessly complicate matters, I will use it with one level (one scale) here.

[286] 'Attachment points' is a nice image, but in essence it is not correct, since its dimensions never become smaller than 1. We are all people (specimens of the same species), *and* individuals, *and* parts of humanity. The points approach the axes but never touch them! The same is true for the 'mat': the actor configurations are

equation q=**p·s·u** for a fixed q. In more formal terms, I call such a surface the *isosurface*, because it connects points of a given q (a consistent total number of perspectives). In two dimensions (the third is then constant) it is an *isoline*. When the third value is 1, this shows the same inversely proportional relationship that we see in Benford's law (hidden) and Zipf's law.

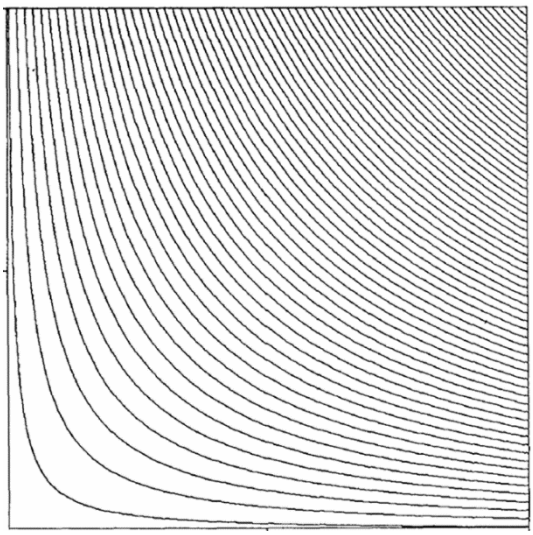


*Alternative actor configurations according to the first perspectivist balance q=**p·s·u** for a fixed q. Societal practices of perspectivist size q can only be found at particular locations on this 'mat'. Labels have been assigned for political societal variants.*

The figure below shows a two-dimensional cross-section of many different isosurfaces created by fixing each of the three variables at equal distances from one another. The result is a set of isolines that look increasingly alike as they approach the top-right corner. They become more and more alike, but are never exactly the same. This is called practical scale invariance.

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actually a collection of points that can be thought of as connected by the mat. But of course the wind can blow right through it!



A cross-section of many equidistant isosurfaces.

Because q, p, s, and u are always *whole* natural numbers, only certain relationships, and thus certain points on this continuous mat, can 'accommodate' a possible actor configuration (like the black squares in chapter 3). This phenomenon is based on *prime numbers*. For now, what is most relevant is that possible multi-actor configurations (possible societal practices) of an equal number of perspectives found at very different positions have very different characteristics. The component actors can be characterized as predominantly all different (**p** high), predominantly all the same (**s** high), and predominantly one whole (**u** high). It is not such a huge step from here to see in these imbalances similarities with political movements (see the figure above with communism, fascism, and liberalism). At the diagonal, societal practices can be characterized as a balanced mix of all different, all the same, and together one.

To sum up, points in this perspectivist space refer to multi-actor practices with certain characteristics and relationships in terms of the three dimensions. The number of perspectives sets the possible configurations, or the alternative multi-actor practices. If one characteristic grows, then the others have to shrink, and vice versa. These perspectivist characteristics are very familiar in societal terms, such as political preferences. On smaller societal scales we recognize the various forms of society: pluriform, uniform (similar), or together one whole.

Three-dimensional power: the second perspectivist balance

A high-quality practice is rarely found at the extremes of the actor configurations (near the attachments of the mat). This suggests that for a societal practice of a given size q, shifting towards the centre of the mat is not a bad idea at all.

In the late 18th century, Adam Smith, one of the first economists, studied needle production. He showed that division of labour allowed for a much greater scale than if every employee went through each separate step alone. In terms of the three dimensions, he reduced **u** (unity) to benefit **p** (pluriformity). The most iconic economic example of this kind of consideration is the Model T Ford from the early 20th century. The assembly line transformed the automobile from a luxury to something many people could afford. Somewhat later, this radical division of labour (enlargement of **p**) inspired Frederick Taylor to come up with his ideas about professional management and an even greater separation of planning (management), mental work, and execution tasks. This is something that I think is working out disastrously at the ever-larger societal scales of our age, but at the time and on that scale and with those points of departure, it was a logical idea. It did, however, clearly change the employees' motivation and involvement; the relationships became superficial, business-like, calculating, lean, and cold. Apparently, one can overshoot in reducing **u** and increasing **p**, and it cannot be made right by taking on more and more managers: paradoxically, they increase **p** even more! Social relationships are deep, warm, and inclusive, and they assume that we see and share large parts of our lives, both the good and the bad, with others.[287] We even fuse with each other (the essence of the dimension of unity). As a result, nuance returned to rational ideas in the late 20th century, and once again there were flexible teams, working to make things like Volvos. This can be seen as a pull towards a better balance between the three dimensions. Our age of intensive automation and robotization shed a new light on this issue.

Thus, the balance can be shifted among the three dimensions given a fixed q, but not without consequences. You can have **p** grow at the expense of **s** and **u**, but if you overshoot in dividing labour, you get chaos (too many separate and simple actors, with the result resembling a kindergarten playground). In response, you can have **u** grow at the expense of **p** and **s** (the manager/planner comes onstage to put some structure back in), but then you get a single rigid, largely unresponsive whole with uninvolved employees. And if you have **s** grow (and the other two shrink) then you're left with a bunch of loose sand.[288]

The examples above are small and rather economic, but the same holds true at all societal scales and for all societal connections, social as well as economic. The first perspectivist balance only allows the dimensions to grow and shrink in an inversely proportional relationship to each other, given a fixed quantity of perspective q available to a societal

[287] See also Dan Ariely, *Predictably Irrational* (2008), Chapter 4, The Cost of Social Norms.

[288] And I mean really loose sand, each grain identical. They do not even form a mountain, since that would presuppose a minimal unity (the mountain as a whole) and pluriformity (with each grain taking its own position). This opens a pragmatic window on answering the classical philosophical question of at what point, when adding grains of sand one by one to the first one, the pile becomes a mountain of sand (the heap paradox; the mountain paradox). This question is not answerable. From a perspectivist viewpoint, of course it is not at all a paradox. It just happens once the number of grains attains a size such that it begins to figure in perspectives that interpret the separate grains as a mountain. Thus it's not a paradox (an apparent contradiction) at all.

practice. You can also have various societal practices 'living' parallel to each other, which are better plotted as separate points on lower trampoline mats in the perspectivist space. Take groups of hunter-gatherers, with each group self-sufficient but not having any relationship to each other. They form different points at lower mats. The sum of the q's of the points is then q_{total}.

In recursive perspective, the above ideas about economic and social contexts can be expressed very concisely on all kinds of scales. There is another remarkable perspectivist relationship that the three dimensions display.[289] It can be summarized as follows: A society with a fixed perspectivist size q that is extremely diverse (**p**=q, **s**=1, **u**=1: pluriformity dominates) will fragment. A society with high similarity (**p**=1, **s**=q, **u**=1) can hardly specialize, adapt, or improve. A society that is extremely uniform (**p**=1, **s**=1, **u**=q: unity dominates) takes away its components' freedom of movement. Overstretching one dimension (one particular value) at the cost of the other two, or disregarding one of the three will result in regression and a suboptimal societal practice.

A value-oriented, powerful societal practice prefers using the power of *all three* dimensions in coherence. In a harmonious family, every member has their own place, there is kinship, and the family is one entity – simultaneously. This applies to social and economic relationships as well. We see it in the ways people coexist in our 'advanced' societies. The number of actors and specializations (**p**) is enormous, the size of the conglomerates (**u**) is enormous, and the number of similar uniform products (**s**) is enormous. The economic mindset has outstripped the social mindset precisely at these higher scale levels. We are not always happy with this situation. Wasn't the economy there for us, as social beings? Didn't the term 'economy' come from a Greek root meaning 'household'?

We see these developments in our healthcare and educational systems, our construction industry, the development of our cities, our production and consumption processes, and so on. All three dimensions increase. A societal practice always seeks balance in this particular sense; there is a certain inclination to balance *between* the three dimensions, and it is easily observable at all scales, especially the larger scales, and thus for the larger societal practices.[290]

There is a great deal of hair-splitting (and worse) about exactly where the balance lies. Political ideologues, for example, have their preferences, such as fascism (relatively high **u**), liberalism (relatively high **p**) and communism (relatively high **s**). However, a broader human intuition feels that things are not right out so close to the axes, and that the balance

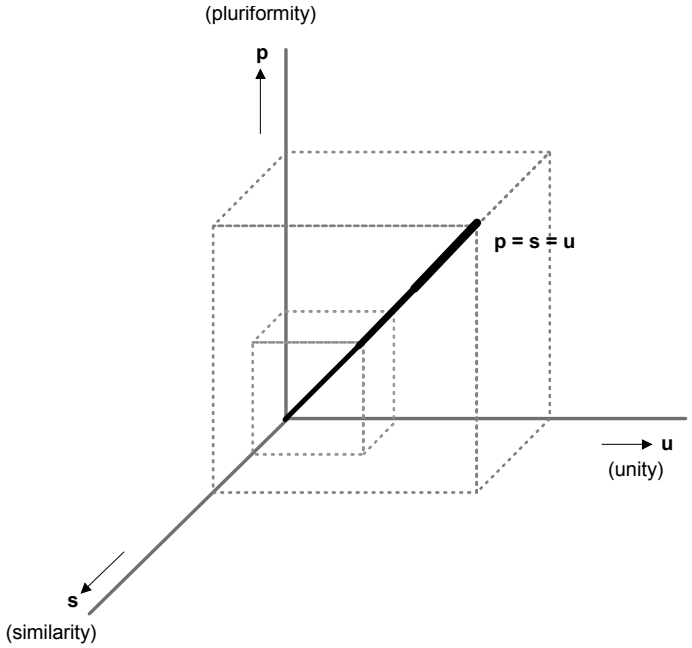
[289] Here, in keeping with the nature of recursive perspectivism, the boundaries between the humanities, natural sciences, and social sciences are blurred.

[290] I have the strong intuition that because of this perspectivist layer under all three dimensions, there are no coefficients needed in this formula, and that it fits better and better as the perspectivist scope of a society increases, which is why we see the development along *the path of humanity* best over the long term and with a wide view.

lies somewhere in the middle. This can and will, of course, be different in different situations – I am really generalizing here, about average conditions of a societal practice. This search for balance among the three dimensions leads to the *second perspectivist balance*, which unlike the inversely proportional first is *proportional*:

$$\mathbf{p} = \mathbf{s} = \mathbf{u} \quad (\mathbf{p}, \mathbf{s}, \text{ and } \mathbf{u} \in \mathrm{N}) \quad \text{Second perspectivist balance}$$

The balance is on the diagonal. It is expressed in adjustments in the degree of specialization (**p**), group size (**s**), and size of scale (**u**). Take a fixed group of hunter-gatherers in which all the men make weapons and hunt. In this particular situation, **p** is relatively low, and consequently, **s** is relatively high (all the men are more or less the same in this regard). Now let us suppose that some men are better at making weapons, and others are better at hunting, which is going to be the case in an activity as complex as hunting (**u** is substantial here, so for simplicity's sake I will assume that it does not change). Then it is obvious that the men who excel at making weapons should be given that task, and the men who excel at hunting should hunt. Thus **p** increases and **s** decreases. We can expect the group's weapons as a whole to be better, and consequently that the meat supply for the group will increase. The weapon maker can devote his energies to making *even* better weapons, and the hunter can specialize in being an *even* better hunter; the potential is there in abundance, after all, given the talents they have already shown. The weapons will then be expected to be *even* better, and the meat supply *even* greater.



Balanced actor configurations (the proportional second perspectivist balance) for increasing values of q. The ultimate balance (the optimal societal mix) is along the diagonal.

In this example, specialization takes place because **p** is relatively low, and **s** is relatively high (a uniform society). Societal practice then goes in search of balance. If the number of available perspectives is fixed, as it is with a group of hunter-gatherers, this will involve shifts *on* the mat (first perspectivist balance) towards the centre (second perspectivist balance). If we overshoot, then **p** will become much larger than **s**, and there will be a looming danger of *fragmentation*. Any one of the three dimensions can take a relatively large share, but it will always be at the expense of the other two. Or any one of the three dimensions can actually be underrepresented, resulting in the other two being overrepresented.

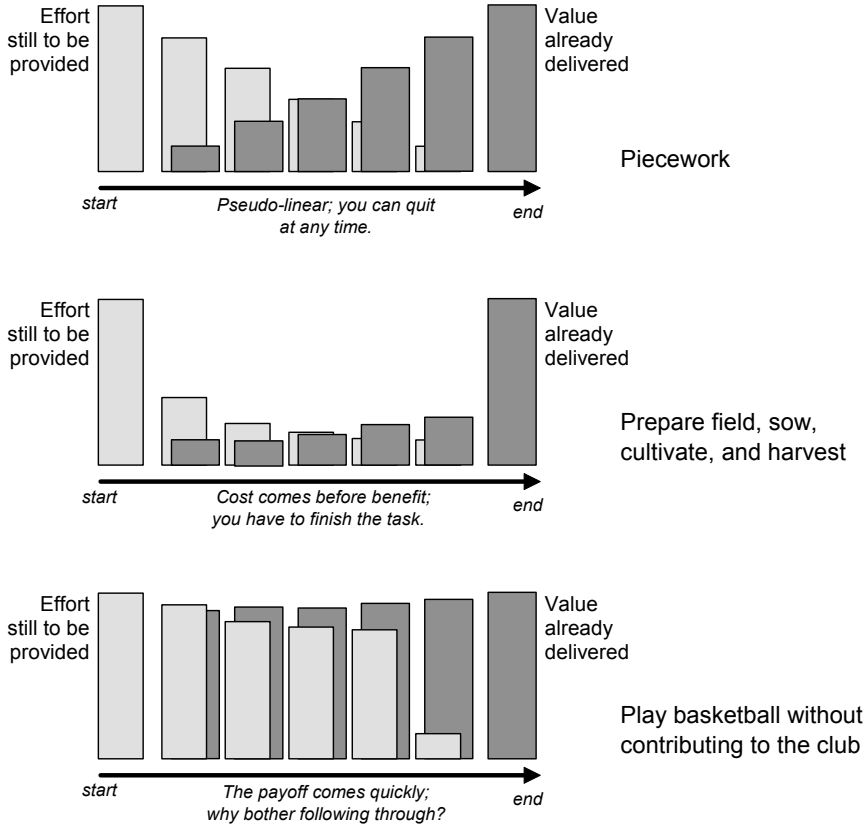
Specific circumstances also play their parts, of course. If a drought causes the hunt to be less abundant for a time, for example, a weapon maker may start to doubt the expertise of the hunters, and maybe go out hunting himself. But even the temporary settlements of early prehistoric hunter-gatherers had workplaces for making stone tools. Experiments done in the Vézère valley in France demonstrate that making flint weapons is really a profession. Flint weapons and tools were used for hundreds of thousands of years, and their designs stayed the same for tens of thousands of years (as hand-axe finds demonstrate). From today's perspective, their societal innovation was terribly slow. However, even within groups of hunter-gatherers, thus on the small scale of a few dozen people, the available perspective was used in better plurimodern coherence, which gave added value. Assuming that the size of the group stayed the same (and thus the number of perspectives (q), the specializations in making weapons and hunting increased the pluriformity (**p**) further at the expense of similarity (**s**) and unity (**u**), more in accordance with the second perspectivist balance.

We can say that the diagonal and its immediate surroundings is the preferred habitat of the multi-actor, the team actor composed of various smaller actors who is able to use the combined advantages of pluriformity, similarity, and unity alternately, but spread in a healthy balance over time and space. Societies can certainly temporarily deviate from the second perspectivist balance because of specific circumstances. This is exactly what happens in our late-modern societies, causing our typical late-modern tensions as well as dangerous unsustainability, to which I will return. But specific circumstances average out over the long term, which is ultimately why things boomerang again and again.

Various societal themes have been explained using the three dimensions and the relationships between them: harmonious families, brilliant soccer teams, the relationship between the three dimensions and political persuasions, the cuckoo chick disturbing the balance in our late-modern society, and lastly, the rise of the issue of sustainability at just this time. The ignition of the ICT revolution and the enormous growth of the internet and social media can also be explained as a correction of the growing disorder between the three dimensions, and thus in line with the second perspectivist balance.

Value and effort developments

For composite perspectives with similar net efforts and values, the relationship between making the effort and enjoying the value can unfold in very different ways. The figure below depicts a pseudo-linear example.[291] A pseudo-linear development has the double advantage that every partial perspectivist step realizes value, and that you can stop at any point with impunity. 'The journey (or the process) is the result', or so it is said by people who confuse process with results.[292] A simple example is being paid per unit of effort or result, or piecework pay (see the top example in the figure on the next page).



Three completely different effort–value profiles

[291] Pseudo-linear because value and effort stagger depending on the perspective. Practically speaking, if this involves many perspectives with small jumps, it gives rise to continuous lines, but in essence recursive perspectivism is discrete.

[292] A thermodynamics expert would say that the contour integral of a tour like this is not zero. Besides, a process is never a result. However, something that is a process in one perspective can take on the role of a situation in another. But that does not make processes and results, or situations and changes, the same!

There are many other possible models. A farmer growing crops puts in the effort at the beginning of the process (clearing the field, fertilizing, etc.) and only realizes the value at the end, after the harvest is in (the second example in the figure above). This introduces a certain element of risk, since the harvest may fail and the effort will have been in vain. This is why, for example, someone lending money charges interest, and they lend at a higher rate if the risk is greater or the term longer.[293] Reversing the direction, if the value is realized early on, there is a great temptation not to make the effort, for why should you? This is why kids playing basketball often run out of the gym when they're finished playing, without putting the equipment away. It's why we all throw plastic packaging into our oceans, resulting in the now-famous plastic soup. We have what we wanted, so why bother cleaning up…. This last variant often leads to short-sightedness and buck-passing. Many sustainability issues are in this category. As a producer or consumer, you use plastic packaging, which is convenient and easy, and it ends up in our oceans. As a farmer, you put an extra sheep out to graze on the common pasture, since all the advantage goes to you, and the disadvantages of overgrazing are shared by everyone.[294] We are able to drive our fast, comfortable cars to visit our in-laws, and we emit CO_2 in the process (the Maldives are already partly submerged because of rising sea levels). Most members of a basketball club want to play, but not to volunteer for any of the tasks involved in running the club. They raise their own value–effort ratio compared to that of the few people who do want to help out the group. This is not a problem if those people are happy to do the work, but this is far from always the case. Ultimately it's just 'free rider' (freeloading) behaviour.

If it really does turn out that we are overheating our planet and destroying the environment we inhabit, or if no one sets up the basketball hoops, does the administrative tasks, or takes in the membership dues anymore, the perspective will keep growing towards pseudo-linearity by itself if there is still time. Ultimately the tide will turn. If we see this too late, it will mean the destruction of our environment, radical changes in our climate, and the demise of the basketball club. A ship without a captain will eventually run into the wharf *in any case*, for better or worse. Either you'll turn the ship when you see it heading for the wharf, or the bow will be shattered and your ship will sink.

The profiles above give an initial idea of how actors deal with value and effort. An optimum linearity of value and effort has its advantages. It reduces the long-term risks for the farmer, and in multi-actor situations, it is a natural weapon against egoism, short-sightedness, and unsustainability, very human qualities that are always raising their heads. A society benefits from people who stick with the process to the end, and organizing linearity can help this. Humanity still has much to learn in this regard. Value and effort have many nonlinear faces, and the experience of them has highly relativistic effects.

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[293] Short-term risk and long-term repayment also have a perspectivist correspondence principle. See the next section, on the third perspectivist balance.

[294] See also 'The tragedy of the commons', first formulated by William Forster Lloyd (1833) and elaborated much later in an article by Garrett Hardin (1968). This is a now-classic formulation of the mechanism underlying environmental pollution and the broader lack of sustainability.

Correspondence hypotheses: the third perspectivist balance

The effort–value sequences above (piecework pay, arable farming, and playing basketball in the previous figure) provide some insight into how actors deal with the trinity of perspectives, value, and effort. A linear relationship offers advantages. On the basis of these three concepts, we can draw up three correspondence hypotheses (which I will explain shortly):

1. The perspective–value correspondence hypothesis
2. The perspective–effort correspondence hypothesis
3. The value–effort correspondence hypothesis

1: As an actor, it is smart to distribute the amount of perspective available (q in quantity) optimally over things you *value*.[295] The things you find to be of value are important. Precisely because of this, correspondence between a number of perspectives and value is likely, especially for somewhat larger recursive networks and sequences of perspective. In individual cases, there can be huge deviations, since you always have windfalls and setbacks, for example, winning the lottery or becoming an invalid after suffering a fall. We like to know how our windfalls and setbacks happen, since we want to either repeat or avoid them as the case may be. The law of large numbers and the continuous reordering of perspectives by a consciousness do their job of averaging things out. We even determine what a windfall or a setback with respect to this average is.

Therefore, the *perspective–value correspondence hypothesis* states that there is a meaningful average value $\underline{v}$ that generates individual improvement perspectives.[296] Here *value* is conceived of strictly as *that which a relevant actor wants to attain, achieve, or maintain*, since it may save the actor effort.[297] Value is thus a relative concept at its basis. Every consciousness experiences its own values and weighs them against each other. For one, money will take priority, for another, it will be paying attention to the children, and for a third it is solidarity; there are many other values and mixes of them, shifting and relating to each other in many ways. In the case of composite perspectives, we add up the values of the component perspectives.

Because of this correspondence hypothesis, if you perceive perspectives, the relationship between perceived quantity of perspective (**q**) and perceived value (**v**), if there are more and more perspectives, quickly becomes pseudo-linear, as in the last figure. Then for large

[295] **q** corresponds to the number of perspectives in a consciousness.

[296] The same is true for the occurrence of the negative value of deterioration perspectives.

[297] Value is a relativistic notion. Value is perceived by actors, after all, and different actors perceive different value. The unit $\underline{v}$ enables us to bring different value systems under one heading, and it can do this by calibrating value to the amount of perspective and the total perceived value in a consciousness. Purchasing a house can be an impulse buy for a billionaire, but for an ordinary labourer it may be the most important purchase in his or her life. The value $\underline{v}$ straightens out these kinds of differences.

quantities, you ascribe a more or less fixed average value to each perceived perspective. For larger quantities of perspective, you multiply q by v, which amounts to the sum of the values of the q individual perspectives.

2: It is also smart for an actor to distribute the quantity of perspectives available (**q**) optimally over the *effort* (including mental effort) they require. After all, you handle the quantity of effort you can supply with care, since you want to make optimal use of it, and maximize the value you realize from it. The *perspective–effort correspondence hypothesis* therefore postulates that there is also a meaningful average *effort* e required for realizing (going through) individual improvement perspectives.[298] Here, effort is strictly interpreted as *the effort as perceived by the relevant actor* required to generate value.[299] This effort can take many forms, such as physical and cognitive. Some people like to go for a long run after a day of thinking hard; it balances things out for them. But thinking long and hard can be physically exhausting, and after strenuous physical effort one may also be cognitively exhausted and can only plop down on the couch, so I'm not so sure these two are really so fundamentally separate.

Effort, too, is a relativistic concept. Marathon runners have different experiences than shot-putters, intelligent people have different experiences than the less intelligent, and the physically fit have different experiences than the out-of-shape. Every consciousness perceives its own efforts and weighs them against each other. With composite perspectives, you simply add up the efforts of all the perspectives you distinguish.

In some cases, large deviations can also occur here. Taking a beautiful hike can be less than enjoyable if the weather is extremely hot, and people have even died doing so. Sometimes a soccer team plays a virtually effortless match, and everything just seems to happen by itself. A country's economy may flourish 'all by itself', and sometimes may be struggling. The deviations are all based on an idea of what is 'normal' or 'average'. Therefore, correspondence is likely, especially for larger networks of perspective (the law of large numbers again). The relationship between perspective (**q**) and effort (**e**) is also pseudo-linear, as in the example of piecework pay in the last figure above. You, in fact, attribute a fixed average effort to every perspective perceived. If you multiply q by e for larger quantities of perspective, it is the same as the sum of the efforts of the q individual perspectives.

3: The third correspondence hypothesis, that of value and effort, follows automatically from the first two. After all, if there is a pseudo-linear relationship between **q** and **v**, *and* between

[298] This also holds true for the effort needed to prevent deterioration perspectives. Because a deterioration perspective destroys value, preventing it delivers value.

[299] Like value, effort is a relativistic notion, since effort is perceived by actors, and thus different actors will perceive different efforts. For Dutch gold medallist Epke Zonderland an exercise on the high bar is 'no big deal', but for me it will require considerable effort. Playing in the World Cup is a possibility for Ajax, while for an amateur team it requires more effort (of course Ajax had to start somewhere).

q and **e**, *there is also a pseudo-linear relationship between* **q** *and* **e**. This *value–effort correspondence hypothesis* is familiar, and actually fairly obvious, to most of us. To get more value, you make more effort. Of course, our perceptions in *specific* situations differ quite a bit from the value–effort correspondence. After all, life has its ups and downs, and variety is the spice of life. With a windfall, we perceive greater value for less effort, and with a setback we perceive less value for greater effort, evaluating each using a clear picture of what is 'normal' and 'conventional' (compared to our regular, average lives). Windfalls and setbacks are the deviations from an average.

The three correspondence hypotheses can be expressed together as a formula, leading us to the *third* perspectivist balance. This third perspectivist balance has a different character than the first two, since it is not purely about perspective, but in fact links perspective to value and effort. It goes like this: I assume that for larger quantities of perspective mixed over various dimensions – and these conditions are crucial – there is a *direct proportionality* between quantity of perspective (**q**), value (**v**), and effort (**e**):

$$\mathbf{q} = \mathbf{v} = \mathbf{e} \quad (\mathbf{q}, \mathbf{v}, \text{and } \mathbf{e} \in \mathrm{N}) \qquad \textit{Third perspectivist balance}$$[300]

Speaking strictly entropically/statistically, the *third* balance will apply better and better despite a bit of experiential flux as it increases in size.[301] This is just like the way the average of 3.5 emerges more clearly the more times you throw a dice. Sometimes it takes a bit longer, sometimes a bit less, but if it takes too long, you should doubt the dice and not the third balance (you should probably replace the dice). If this becomes structural, you adjust your expectations on the basis of your experiences, which cannot be ignored any longer. You then change your consciousness, adapting it to restore the balance.

Our aversion, as collective as it is deeply rooted, to systematic and deliberate 'free riders', people who use a collective value but who knowingly and for no other reason but their own interest do not make any efforts, is precisely because they disobey this third balance.[302]

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[300] Equating value and effort strongly resembles the equation of energy and mass (in Albert Einstein's $E=mc^2$). Perspective provides the missing link that can directly equate value and effort with each other, thus without a constant (as in $E=mc^2$). The equivalence between value and effort emerges if it is expressed in the perspectivist relativistic units $\underline{v}$ and $\underline{e}$. In the weak interpretation they can only increase or decrease together. In the strong interpretation, value and effort are also truly equivalent and thus can be converted into each other. The strong interpretation applies fully in an economy and in a society. In nuclear fission, mass is converted into energy. In a society, in a very similar way, effort is continually converted into value, and value into effort. That is useful, precisely because the equivalence in terms of perspective, $\underline{v}$ and $\underline{e}$, works out differently for different actors.

[301] This condition will be explained in the following chapter, 'The Relativistist Bridge: Experiential Value'. I will explain how the continuous and objective illusions actually apply better and better as the number of perspectives increases.

[302] Collective actors (multi-actors) and shared improvement perspectives are necessary to consciously realize collective values. Examples are dykes and schools, but in fact this principle is behind any form of collective action, and thus societability and societal consciousness. See also the economist Mancur Olson, who has put

They are using the value generated by others but do not contribute to constructing the perspective on which this value is based. In other words, they make no effort.

v is thereby expressed as $\underline{v}$ (the average relativistic value per perspective in a consciousness) and **e** as $\underline{e}$ (the average relativistic effort per perspective in a consciousness). Thus:

$$\mathbf{v} = \mathbf{q}\cdot\underline{v} \quad \text{and} \quad \mathbf{e} = \mathbf{q}\cdot\underline{e}$$

This ensures that every consciousness will still have its *own* value–effort balance, and that every conscious actor still calibrates this balance to the perspectives in that actor's *own* consciousness, and that the actor can *change* the balance (over time). The third perspectivist balance places the relationship between value and effort firmly on a relativist underlayer of perspective.[303]

The practical scale invariance of the perspectivist space

Now we can calculate the 'objective' value sequence of random paths through the three-dimensional perspectivist space (the effort sequence is identical for larger paths). We then are varying the trinity of pluriformity, similarity, and unity, and looking at what it does with the total number of perspectives and thus the value (according to the third balance). We know the number of perspectives from the first balance at each place in the perspectivist space, which is q=p·s·u. According to the third perspectivist balance, the absolute value is directly proportional to the number of perspectives: q=v=e.

With an increasing number of perspectives n, the value chart develops towards a specific form that is constantly unique at the microlevel, but barely changes at all at any given point on the macrolevel. The connection between perspective in the three dimensions and objective value is *practically scale-invariant.* On the microscale the curves are different, but at the macroscale they resemble each other more and more: practically speaking, they become equal.

For very large values of n, the development into a scale-invariant form is the easiest to see. Below are the graphs of the two-dimensional diagonal paths (n, 1) to (1, n) for n=1000 and n=100000. (Notice that I am talking in this specific case about different diagonals than normal ones: they form a triangle with the axes.) The scaling shows that the forms of the graphs start to resemble each other more, to the degree that *the difference is practically invisible*. Scale invariance means that properties of an object do not change if they are modified by an equal factor. The two illustrations below are of a linear path through a two-dimensional space, the first from (1000, 1) to (1, 1000) and the second from (100,000, 1) to (1, 100,000), but on the macroscale their shapes are *practically* identical. The perspectivist space, and thus the effect of a multi-actor consciousness is *practically* scale-invariant for

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the dilemma of collective action squarely on the map. He coined the term 'free riders' for people who use the value but do not make the effort.

[303] I will elaborate later on the fact that $\underline{v}$ and $\underline{e}$ are relativistic.

large quantities of perspective. At the edges, the value disappears: we are focused on value, so we do not notice (or no longer notice) something with no value. It disappears in the noise.

I emphasize *practically*, and I also speak emphatically of *practical* scale invariance, because there really is a difference: the micropatterns *are* unique for every n, for every scale. This is shown by the particular numbers in the 'value' column to the left of the rows of x's. They match the scale factor more and more as n increases, but are never 100 % scaled. A more correct term may be *self-similarity* (a term from the fractal world). However, I prefer to use 'practical scale invariance' since it is the way in which this phenomenon expresses itself in a consciousness.

This is not so very different from the way that index fingers of different people can be similar but have different fingerprints, or how soldiers on the battlefield determine military might but also are individuals and are specific sons, friends, husbands, and fathers (and today we are seeing the first women in combat, which makes the picture even more complex). We have run into the generalization-specification phenomenon: something that is superficially the same as something else but at closer inspection is always different. This holds true excellently for recursive perspective, the bearer of perception and consciousness.

starting position (1000 1 1)
ending position (1 1000 1)
scale factor value 0.031936128 % (4/12525) one x = 3131.25 perspectives
scale factor position 4.0 % (1/25)

```
PLURIF SIMIL  UNITY  VALUE          value and position scaled

1000   1      1      1000
975    26     1      25350          xxxxxxxx
950    51     1      48450          xxxxxxxxxxxxxxx
925    76     1      70300          xxxxxxxxxxxxxxxxxxxxxxx
900    101    1      90900          xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
875    126    1      110250         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
850    151    1      128350         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
825    176    1      145200         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
800    201    1      160800         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
775    226    1      175150         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
750    251    1      188250         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
725    276    1      200100         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
700    301    1      210700         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
675    326    1      220050         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
650    351    1      228150         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
625    376    1      235000         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
600    401    1      240600         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
575    426    1      244950         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
550    451    1      248050         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
525    476    1      249900         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
500    501    1      250500         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
475    526    1      249850         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
450    551    1      247950         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
425    576    1      244800         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
400    601    1      240400         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
375    626    1      234750         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
350    651    1      227850         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
325    676    1      219700         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
300    701    1      210300         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
275    726    1      199650         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
250    751    1      187750         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
225    776    1      174600         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
200    801    1      160200         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
175    826    1      144550         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
150    851    1      127650         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
125    876    1      109500         xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
100    901    1      90100          xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
75     926    1      69450          xxxxxxxxxxxxxxxxxxxxx
50     951    1      47550          xxxxxxxxxxxxxxx
25     976    1      24400          xxxxxxxx
1      1000   1      1000
```

starting position (100000 1 1)
ending position (1 100000 1)
scale factor value 3.199936e-6 % (1/31250625) one x = 3.1250624e+7 perspectives
scale factor position 0.04 % (1/2500)

```
PLURIF SIMIL  UNITY  VALUE          value and position scaled

100000 1      1      100000
97500  2501   1      243847500      xxxxxxxx
95000  5001   1      475095000      xxxxxxxxxxxxxx
92500  7501   1      693842500      xxxxxxxxxxxxxxxxxxxxxx
90000  10001  1      900090000      xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
87500  12501  1      1093837500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
85000  15001  1      1275085000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
82500  17501  1      1443832500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
80000  20001  1      1600080000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
77500  22501  1      1743827500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
75000  25001  1      1875075000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
72500  27501  1      1993822500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
70000  30001  1      2100070000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
67500  32501  1      2193817500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
65000  35001  1      2275065000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
62500  37501  1      2343812500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
60000  40001  1      2400060000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
57500  42501  1      2443807500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
55000  45001  1      2475055000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
52500  47501  1      2493802500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
50000  50001  1      2500050000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
47500  52501  1      2493797500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
45000  55001  1      2475045000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
42500  57501  1      2443792500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
40000  60001  1      2400040000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
37500  62501  1      2343787500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
35000  65001  1      2275035000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
32500  67501  1      2193782500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
30000  70001  1      2100030000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
27500  72501  1      1993777500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
25000  75001  1      1875025000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
22500  77501  1      1743772500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
20000  80001  1      1600020000     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
17500  82501  1      1443767500     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
15000  85001  1      1275015000     xxxxxxxxxxxxxxxxxxxxxxxxxxxx
12500  87501  1      1093762500     xxxxxxxxxxxxxxxxxxxxxxxx
10000  90001  1      900010000      xxxxxxxxxxxxxxxxxxxx
7500   92501  1      693757500      xxxxxxxxxxxxxx
5000   95001  1      475005000      xxxxxxxxxxxxx
2500   97501  1      243752500      xxxxxxxx
1      100000 1      100000
```

We can also look at the value sequence on the 'real' diagonal. In three dimensions it is all about the development of value and thus the number of perspectives from (1,1,1) through (n,n,n). The number of perspectives in three dimensions is then equal to n^3. The number of perspectives and thus the objective value development in three dimensions unfolds as follows: 1 8 27 64 125 216 etc.

Below is the three-dimensional diagonal development for n=10, n=1000 and n=100,000. The macrodifference between the first two illustrations (10 and 1000) is still strong, but between the last two (1000 and 100,000) it is essentially no longer observable, and this effect increases with even higher values for n:

starting position (1 1 1)
ending position (10 10 10)
scale factor value 8.0 % (2/25) one x = 12.5 perspectives
scale factor position 100.0 % (1)

PLURIF	SIMIL	UNITY	VALUE	value scaled
1	1	1	1	
2	2	2	8	x
3	3	3	27	xx
4	4	4	64	xxxxx
5	5	5	125	xxxxxxxxxx
6	6	6	216	xxxxxxxxxxxxxxxxxx
7	7	7	343	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
8	8	8	512	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9	9	9	729	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
10	10	10	1000	xxxxxxxxxxxxxxxxxxxx

starting position (1 1 1)
ending position (100,000 100,000 100,000)
scale factor value 8.0e-12 % (1/12,500,000,000,000) one x = 1.25e+13 perspectives
scale factor position 0.04 % (1/2500)

```
PLURIF SIMIL  UNITY  VALUE          value and position scaled

1      1      1      1
2501   2501   2501   15643757501
5001   5001   5001   125075015001
7501   7501   7501   422043772501
10001  10001  10001  1000300030001
12501  12501  12501  1953593787501
15001  15001  15001  3375675045001
17501  17501  17501  5360293802501
20001  20001  20001  8001200060001  x
22501  22501  22501  11392143817501 x
25001  25001  25001  15626875075001 x
27501  27501  27501  20799143832501 xx
30001  30001  30001  27002700090001 xx
32501  32501  32501  34331293847501 xxx
35001  35001  35001  42878675105001 xxx
37501  37501  37501  52738593862501 xxxx
40001  40001  40001  64004800120001 xxxxx
42501  42501  42501  76771043877501 xxxxxx
45001  45001  45001  91131075135001 xxxxxxx
47501  47501  47501  10717864389250 xxxxxxxxx
50001  50001  50001  12500750015000 xxxxxxxxxx
52501  52501  52501  14471139390750 xxxxxxxxxxx
55001  55001  55001  16638407516500 xxxxxxxxxxxx
57501  57501  57501  19011929392250 xxxxxxxxxxxxxx
60001  60001  60001  21601080018000 xxxxxxxxxxxxxxxx
62501  62501  62501  24415234393750 xxxxxxxxxxxxxxxxxx
65001  65001  65001  27463767519500 xxxxxxxxxxxxxxxxxxxx
67501  67501  67501  30756054395250 xxxxxxxxxxxxxxxxxxxxxx
70001  70001  70001  34301470021000 xxxxxxxxxxxxxxxxxxxxxxxx
72501  72501  72501  38109389396750 xxxxxxxxxxxxxxxxxxxxxxxxxx
75001  75001  75001  42189187522500 xxxxxxxxxxxxxxxxxxxxxxxxxxxxx
77501  77501  77501  46550239398250 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
80001  80001  80001  51201920024000 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
82501  82501  82501  56153604399750 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
85001  85001  85001  61414667525500 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
87501  87501  87501  66994484401250 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
90001  90001  90001  72902430027000 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
92501  92501  92501  79147879402750 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
95001  95001  95001  85740207528500 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
97501  97501  97501  92688789404250 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
100000 100000 100000 10000000000000 xxxxxxxxxxxxxxxxxxxx
```

If we go from 2 to 3 in one dimension, then the total number of perspectives grows by 1. Now if we go from (2 2) to (3 3), then the total number of perspectives grows from 2x2=4 to 3x3=9. In terms of blocks, we add on two rows of 2 blocks each (in light grey) plus one block (in black), 5 altogether. Here we recognize the equation $(x+1)^2 = x^2 + 2x + 1$ for x=2. The reverse is true for the step back $(x-1)^2 = x^2 - 2x + 1$: we remove two rows of x, but we must add an extra block to compensate for the corner block that we have just taken away twice. Take $(3-1)^2$. We remove two rows of 3 (which add up to six) and put one back (the one we took away twice). Altogether, 5 blocks are removed.

In three dimensions, we add three sides of 2x2 (light grey), then we have to fill it out by adding three edges of 2 blocks (dark grey), and the corner block (black). In this way we can have the number of dimensions increase starting from 1:

$(x+1)^0 = 1$

$(x+1)^1 = x + 1$

$(x+1)^2 = x^2 + 2x + 1$

$(x+1)^3 = (x^2 + 2x + 1)(x+1) = x^3 + 2x^2 + x + (x^2 + 2x + 1) = x^3 + 3x^2 + 3x + 1$

$(x+1)^4 = (x^3 + 3x^2 + 3x + 1)(x+1) = x^4 + 3x^3 + 3x^2 + x + (x^3 + 3x^2 + 3x + 1)$

$= x^4 + 4x^3 + 6x^2 + 4x + 1$

$(x+1)^5 = (x^4 + 4x^3 + 6x^2 + 4x + 1)(x+1) = x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1$

$(x+1)^6 = (x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1)(x+1)$

$= x^6 + 6x^5 + 15x^4 + 20x^3 + 15x^2 + 6x + 1$

If we examine this closely, and keep the picture of the blocks in our minds, we see that this is a series expansion:

$$(x+1)^n = x^n + 1/1\ nx^{(n-1)} + 1/1{\cdot}1/2\ (n)(n-1)x^{(n-2)} + 1/1{\cdot}1/2{\cdot}1/3\ (n)(n-1)(n-2)x^{(n-3)} + \ldots$$

This series is developed through the n^{th} term, which is the term in which x is taken to the power of zero, since $x^{(n-n)} = x^0$. This last term gives us the + 1 at the end (since $x^0=1$ for every random x).

What we have done here, in fact, is a variant of Newton's binomial theorem derived from stacking blocks (or actually stacking perspectives). The binomial theorem expresses a whole power of the sum of two whole numbers, such as $(2+3)^5$, as a sum of terms, and these terms use separate powers of these numbers. (Newton generalized this formula for all complex numbers, with certain restrictions, but that is not relevant for recursive perspectivism, since it works with quanta). For whole numbers, the binomial theorem is:

$$(x + y)^n = \Sigma_{k=>n}\, \text{Comb}\ (p, k)\ x^k y^{n-k}$$

in which Comb (p, k)= p! / k!(p-k)!

Comb stands for Combinations: I have Comb (p, k) increase from 1 through p, and it gives me the binomial coefficients for p, otherwise known as the elements of Pascal's triangle. The results of this formula for n=0, 1, 2, and 3 are respectively:

$(x+y)^0 = 1$
$(x+y)^1 = x + y$
$(x+y)^2 = x^2 + 2xy + y^2$
$(x+y)^3 = x^3 + 3x^2y + 3y^2x + y^3$

If we fill in y with 1, then the resulting values are for $(x+1)^n$ (see previous page). This series gives us Pascal's triangle for increasing n in its coefficients (this will be discussed in more detail in Theme IV at the perspectivist analysis). Pascal's triangle is created by continually adding two numbers, and placing the sum on the row below between those two numbers. Thus both 4+6 and 6+4 give us 10; see the underlined numbers in rows 4 and 5 in the Pascal's triangle below.

$(x+1)^0 = \mathbf{1}$
$(x+1)^1 = \mathbf{1}x + \mathbf{1}$
$(x+1)^2 = \mathbf{1}x^2 + \mathbf{2}x + \mathbf{1}$
$(x+1)^3 = \mathbf{1}x^3 + \mathbf{3}x^2 + \mathbf{3}x + \mathbf{1}$
$(x+1)^4 = \mathbf{1}x^4 + \mathbf{4}x^3 + \mathbf{6}x^2 + \mathbf{4}x + \mathbf{1}$
$(x+1)^5 = \mathbf{1}x^5 + \mathbf{5}x^4 + \mathbf{10}x^3 + \mathbf{10}x^2 + \mathbf{5}x + \mathbf{1}$
$(x+1)^6 = \mathbf{1}x^6 + \mathbf{6}x^5 + \mathbf{15}x^4 + \mathbf{20}x^3 + \mathbf{15}x^2 + \mathbf{6}x + \mathbf{1}$

... 1 ... row 0
... 1 1 ... row 1
... 1 2 1 ... row 2
... 1 3 3 1 ... row 3
... 1 <u>4</u> <u>6</u> <u>4</u> 1 ... row 4
... 1 5 <u>10</u> <u>10</u> 5 1 ... row 5
... 1 6 15 20 15 6 1 ... row 6
... 1 7 21 35 35 21 7 1 ... row 7
... 1 8 28 56 70 56 28 8 1 ... row 8

Pascal's triangle up to and including row 8 (more about this in Theme IV)

Now, as x increases, the higher powers in the series of terms for a given n become more dominant. This phenomenon explains the practical scale invariance. With lower x the lower powers remain more or less steady. With increasing x, ultimately the highest power (the first term after the = sign) becomes the most dominant: it squeezes the lower inputs away, as it were, the terms at far right going first. The first term, as the fastest-growing cuckoo chick, requires the most attention, the second somewhat less, and so on.

Take $(x+1)^1 = x + 1$. The following table shows how the first term x 'wins', and the (term + 1) gradually puts less and less weight on the scale.

x	(x+1)	(x+1)/x
1	2	2.0
2	3	1.5
3	4	1.3333334
4	5	1.25
5	6	1.2
10	11	1.1
20	21	1.05
30	31	1.0333333
40	41	1.025
50	51	1.02
100	101	1.01
200	201	1.005
300	301	1.0033333
400	401	1.0025
500	501	1.002
1000	1001	1.001
2000	2001	1.0005
3000	3001	1.0003333
4000	4001	1.00025
5000	5001	1.0002

We see here, in essence, the *sorites paradox*, also known as the *heap paradox* (sorites is Greek for 'heap' in the sense of a pile or mountain), at work. This paradox is attributed to Eubulides of Miletus, a disciple of Socrates in the 4th century BC. The paradox revolves around grain kernels. You start with one grain. You put one next to it, and then you have two. Do you have a mountain of grain? Not really, you would say. All right, put one more down. Still not really what you could call a heap of grain. But there comes a time when you cannot deny that continually adding just one grain at a time has resulted in the presence of a heap of grain. When exactly does this happen? You cannot pinpoint it (at least not if you are a dualist), but it happens definitively, somewhere along the way, which is why it is called a paradox.

The process above shows in essence how going further and further in one dimension inevitably leads to the synthesis and the emergence of a new concept (the heap) that contains the original concepts (the individual grains), but also loses them somehow. The same holds true for more dimensions. It can also go backwards of course, with a mountain becoming a number of grains.

In terms of perspective, the sorites paradox is not at all paradoxical. In recursive perspective, grain kernels largely figure in different perspectives about heaps of grain. You can count individual grain kernels, you can pick them apart, all sorts of things. You can put heaps of grain in a wheelbarrow, or even in a lorry, and transport them, and you can feed a city with them. These are the perspectives that determine when a quantity of grain kernels changes into a heap of grain (see also chapter 5). Apart from these perspectives, neither the grains nor the heap exist. There is a close relationship to getting older: a child changes into an adult, but at what point that happens is always guesswork. And very old people can also relapse into a 'second childhood'. It is also clear that different perspectives are at work with a small child, an adolescent, and an adult.

Experiencing repeated perspectives (similarity) automatically leads to new composite perspectives (unity). The same holds true for pluriformity, which also leads to unity. Conversely, proper analysis of unity leads to pluriformity and similarity. The alternative is that you lose your interest (I will discuss this more in the next section on experiential value).

This all sheds some remarkable perspectivist light on the search for smaller and smaller subatomic particles, or for the outer limits of our universe. It could be, strictly statistically and in perspectivist terms, the logical and inevitable consequence of a growing and evolving quantity of perspective, thus a growing and evolving humanity. Seek and thou shalt find. *That* we find when we seek is inevitable, at least assuming the presence of a much greater potential perspectivist richness than we humans are capable of experiencing. But precisely *what* we find in this infinite richness also partly depends on us.

Of course the same holds true for more dimensions. Take $(x+1)^2 = x^2 + 2x + 1$. The table below shows how the terms 2x and 1 put less and less weight on the scale. In the last column, we see how x^2 and $(x+1)^2$ approach each other when x increases.

x	$(x+1)^2$ $=x^2+2x+1$	x^2+2x	$(x+1)^2/x^2+2x$	x^2	$(x+1)^2/x^2$
1	4	3	1.3333334	1	4.0
2	9	8	1.125	4	2.25
3	16	15	1.0666667	9	1.7777778
4	25	24	1.0416666	16	1.5625
5	36	35	1.0285715	25	1.44
10	121	120	1.0083333	100	1.21
20	441	440	1.0022727	400	1.1025
30	961	960	1.0010417	900	1.0677778
40	1681	1680	1.0005952	1600	1.050625
50	2601	2600	1.0003846	2500	1.0404
100	10201	10200	1.000098	10000	1.0201
200	40401	40400	1.0000248	40000	1.010025
300	90601	90600	1.0000111	90000	1.0066777
400	160801	160800	1.0000062	160000	1.0050062
500	251001	251000	1.0000039	250000	1.004004
1000	1002001	1002000	1.000001	1000000	1.002001
2000	4004001	4004000	1.0000002	4000000	1.0010003
3000	9006001	9006000	1.0000001	9000000	1.0006667
4000	16008001	16008000	1.0000001	16000000	1.0005001
5000	25010001	25010000	1.000000…	25000000	1.0004001

Or take the following example: $(x+1)^3 = x^3 + 3x^2 + 3x + 1$. The table below shows how the remaining terms $3x^2 + 3x + 1$ put less and less weight on the scale, with those at the right quickest to lose importance.

x	$(x+1)^3$ $=x^3+3x^2+3x+1$	x^3+3x^2+3x	$(x+1)^3/$ x^3+3x^2+3x	x^3+3x^2	$x+1)^3/$ x^3+3x^2	x^3	$x+1)^3/x^3$
1	8	7	1.1428572	4	2.0	1	8.0
2	27	26	1.0384616	20	1.35	8	3.375
3	64	63	1.0158731	54	1.1851852	27	2.3703704
4	125	124	1.0080645	112	1.1160715	64	1.953125
5	216	215	1.0046512	200	1.08	125	1.728
10	1331	1330	1.0007519	1300	1.0238461	1000	1.331
20	9261	9260	1.000108	9200	1.0066304	8000	1.157625
30	29791	29790	1.0000336	29700	1.0030639	27000	1.1033704
40	68921	68920	1.0000145	68800	1.0017587	64000	1.0768906
50	132651	132650	1.0000075	132500	1.0011396	125000	1.061208
100	1030301	1030300	1.000001	1030000	1.0002922	1000000	1.030301
200	8120601	8120600	1.0000001	8120000	1.000074	8000000	1.0150751
300	27270901	27270900	1.00000..	27270000	1.000033	27000000	1.0100334
400	64481201	64481200	1.00000..	64480000	1.0000186	64000000	1.0075188
500	125751501	125751500	1.00000..	125750000	1.0000119	125000000	1.006012
1000	1003003001	1003003000	1.00000..	1003000000	1.000003	1000000000	1.003003
2000	8012006001	8012006000	1.00000..	8012000000	1.0000007	8000000000	1.0015007
3000	27027009001	27027009000	1.00000..	27027000000	1.0000004	27000000000	1.0010003
4000	64048012001	64048012000	1.00000..	64048000000	1.0000002	64000000000	1.0007502
5000	125075015001	125075015000	1.00000..	125075000000	1.0000001	125000000000	1.0006001

If we now compare the last columns of the three tables for the steps from 4000 to 4001, and from 5000 to 5001, then we see the following:

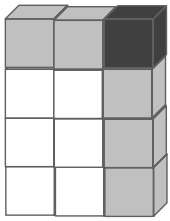
	$(x+1)^1/x^1$	$(x+1)^2/x^2$	$(x+1)^3/x^3$
4000 => 4001	1.00025	1.0005	1.00075
5000 => 5001	1.0002	1.0004001	1.0006001

Incrementing by one is equal to 1/x, since 1/4000 = 0.00025, and 1/5000 = 0.0002.

We also see how squaring leads to a doubling of this deviation, and raising to the third power triples it. Raising a number to a given power becomes multiplying it.

The tables above show that there is no such thing as pure scale invariance, but instead practical scale invariance. In general, for higher x the input of the lower powers is negligible, as in the charts, but with a large enough magnifying glass they become definitively visible again (see the tables). Or, to turn Eubulides around: if you look long and hard ('objectively') and with concentration at a heap of grain, then you can see all the grain kernels that make it up. In other words, you can't see the forest for the trees. Whether or not you mind that is another story. This is about experiential value. Someone walking in the forest looking for a Christmas tree will be seeing the trees differently than the park ranger who is responsible for the entire forest. Experiential value is relativistic *par excellence* (see the next section).

Analogous considerations apply to asymmetrically diagonal steps, but the relationships are different, of course. Take the step from position (2 3) to (3 4) in the figure below.



Asymmetrically diagonal steps in the two-dimensional perspectivist space.

If we go from (2 3) to (3 4), then the total number of perspectives grows from 2x3=6 to 3x4=12. In 'block terms' we add the two light grey rows/columns (one on top, one to the right), the first having two blocks (the horizontal) and the second (the vertical) three blocks. The corner block (in black) also has to be added. The new sum is 2·3 + 2 + 3 + 1 = 12. All together, we have added 6 blocks (2 + 3 + 1). We recognize here the equation (x+1)(y+1) = xy + x + y + 1 for x=2 and y = 3. Conversely, for the step back (x-1)(y-1) = xy – x - y + 1: we remove two rows over the whole length, but we need to add a block to compensate for the corner block that we have 'taken away twice'. The 1 remains an intriguing number. We can now analogously let the number of dimensions starting with 1 increase:

(x+1)

(x+1)(y+1) = xy + x + y + 1

(x+1)(y+1)(z+1) = (xy + x + y + 1)(z+1) = xyz + xz + yz + z + (xy + x + y + 1)
= xyz + xz + yz + xy + x + y + z + 1

(x+1)(y+1)(z+1)(q+1) = (xyz + xz + yz + xy + x + y + z + 1)(q+1)
= xyzq + xzq + yzq + xyq + xq + yq + zq + q + (xyz + xz + yz + xy + x + y + z + 1)
= xyzq + xzq + yzq + xyq + xyz + xq + yq + zq + xz + yz + xy + x + y + z + q + 1

If we take a good look, again keeping the example of the blocks in mind, we also see a series expansion. The outcome is the *sum* of:

the product of *all* starting dimensions (the initial value, e.g. xyz)
the products of all dimensions minus one dimension (e.g. xy + yz + xz)
the products of all dimensions minus two dimensions (e.g. x+y+z)
…
1

If we compare the non-symmetrical formula for, e.g., three dimensions with the symmetrical formula for three dimensions (see below), we see immediately how equating x, y, and z converts the asymmetrical comparison into the symmetrical (and vice versa):

(x+1)(y+1)(z+1) = xyz + xz + yz + xy + x + y + z + 1

leads for x = y = z to:

$$(x+1)^3 = x^3 + 3x^2 + 3x + 1$$

Symmetrical positions thus provide an enormously practical advantage over asymmetrical ones in determining objective values.

6.6 The relativistic bridge: experiential value

The third perspectivist balance states that there is – for larger amounts of perspective, mixed and applied over different dimensions – a *direct proportionality* between the quantity of perspective (**q**), value (**v**) and effort (**e**): **q** = **v** = **e**. Value **v** is therefore expressed as $\underline{v}$ (the average relativistic value per perspective in a consciousness) and effort **e** is expressed as $\underline{e}$ (the average relativistic effort per perspective in a consciousness). That means that: **v** = q·$\underline{v}$ and **e** = q·$\underline{e}$. This ensures that every consciousness has its *own* value and effort balance, that every conscious actor continuously calibrates these to the perspectives in their *own* consciousness, and can *change* those over time according to their own preferences and needs. The third perspectivist balance thus places the relationship between value and effort firmly on a relativistic foundation of perspective.

At various points in this book, I use the concept of *improvement potential*. This concept is closely related to the concept of *experiential value*. A perspective (or a composite perspective) has a certain improvement potential. As soon as you deploy this perspective, this improvement potential is achieved, and the result is experiential value. Improvement potential still needs to be achieved, and the experiential value is the value that is experienced as the improvement potential is deployed, or actualized. It could formally be broken down as follows: the potential that exists prior to the use of perspectives becomes value as soon as they're achieved. But in practice, value and potential converge fairly rapidly. After all, high-potential perspectives often seem valuable, and perspectives of value often have great potential – but not always. The potential of a random lottery ticket isn't seen as very likely to yield any winnings, until it turns out to be the golden ticket. And a promising holiday can turn out to be an absolute lemon. Expectations may not necessarily come true, and perspectives are above all the bearers of expectations; intentional logic is the logic of expectations. But those are exceptions to the rule. That's why the estimated potential of a lottery ticket is low, and why we refer to a holiday as promising.

6.6.1 Experience of perspectives is relative

The experience of value and effort is therefore relative. And not just in the ordinary sense that different actors may perceive value and effort in very different ways. That's a well-

known experiential fact. However, the experience of value and effort is also relativistic in the very exact sense[304] that they take on various easily calculated values in very different positions of the perspectivist space, which *on average* (statistically) apply to *that position and direction* of a consciousness. It's not about objective value and effort, nor about specific societal issues, but about the average development of experiential value and experiential effort along a path in the perspectivist space.

With an equal q and Δq, it's the general rule that movement upwards close to the diagonal, again strictly statistically speaking, has a higher experience of value and a lower experience of effort than the positions away from the diagonal, near the axes. I'll elaborate on this phenomenon below. It explains the pull towards higher positions on (or near) the diagonal, which I've primarily substantiated so far based on qualitative experiences, and now also substantiate in an exact and relativistic way.

It's a well-known phenomenon that losing something that cost a lot of effort, something that you invested a lot of effort in, feels a lot worse in terms of experience of value than the loss of something that just fell into your lap. Conversely, achieving a position that cost a lot of effort feels a lot more valuable than achieving the same position almost by accident. Two actors that end up on an equal position in relation to a *third actor* can thus experience this in a very different way. This is because they have each taken a completely different path to reach this position, in perspectivist terms. And that's why they're each at a different place in the perspectivist space according to their individual experience.

For example, compare the pilgrim who uses his last strength to reach Santiago de Compostela in Spain on foot, walking all the way from the Dutch town of Utrecht, to his neighbour that he coincidentally runs into on the street there, who made the same journey by plane and car. In strictly objective terms, they're really in almost the same position. But who do you think will attach more value to it, and will feel more satisfied with their accomplishment? And can't you understand that this pilgrim might feel misunderstood or even hurt if others were to look at a photo of him in Santiago and assume he also travelled by plane and car to get there? Feeling hurt is a relativistic phenomenon that is fully explained by the path in perspective that happened before all this, and the different network of perspectives that both of them experience, and by the fact that the pilgrim travelling by foot doesn't get the appreciation that he feels should go along with that.

A comparable difference in experience exists between someone that has to work hard for a degree and someone that decided to obtain a degree on the side without effort. Even though it involves the same degree, the first student will usually be more happy and satisfied at graduation, and will perceive the accomplishment as more valuable.

In the longer term, both value and effort increasingly correspond (correlate) to the number of perspectives that were experienced. After all, in the longer term, more and more

[304] Exact means precise in this case; the values are rational numbers.

perspectives are overlooked, so consciousness becomes more objective.[305] This is because the v and the e are becoming increasingly easier to assess, and the statistics are having an impact.

In more concise terms, it means that every occurrence is a new and unique experiential story on its own. The relativistic story explains why people make up increasingly more complex multi-actor practices, along the diagonal. It explains many of our intuitions. Recursive perspectivism puts an exact perspectivist formula at the base of our intuitions.[306] I'll introduce this exact relativistic story, which fully takes place in perspective, by using social psychological phenomena such as loss aversion and risk avoidance, anchor points, and the obstinacy of cultural phenomena. Firstly, this happens by means of only one of the three dimensions of perspectivism. Subsequently, I generalize the story to the three dimensions of perspectivism of the actor space.

6.6.2 Loss aversion and habituation

Loss aversion is an intriguing relativistic phenomenon. Loss aversion is, for example, the fact that the risk of losing 100 euros is seen as worse to most people than the chance of winning 100 euros. That creates a certain conservatism, a resistance to innovation. Risk aversion is a related phenomenon that describes how people would generally rather avoid risks than try to utilize opportunities, and will therefore hang on to what they have.[307] This also results in a certain aversion to innovation. It's useful, considering the desire for societal innovation moving towards Team World, to analyze the nature of loss aversion and related phenomena.

The strong focus on loss aversion in science and the media shows how remarkable and special we think this phenomenon is. If you think in objective terms, loss aversion initially seems strange, a phenomenon that cannot be rationally defended, hardly even taken seriously. It needlessly stands in the way of innovation and decisive action. Sometimes it even becomes a cognitive bias, an error in judgement, an undesired bias. What does it

[305] Objectively, this means in perspectivist terms that all perspectives are accounted for in the final assessment. You'll then have an overview of literally everything, and will be able to pass an ultimate judgement. Subjectively speaking, it means in perspectivist terms that a very small part of the perspectives are used in the final assessment. You only have an overview of part of it, so your judgement is biased (subjective). In other words, ultimately subjective and ultimately objective do not exist, since that would mean, respectively, that no other perspectives would be considered or that all perspectives would be considered, and no consciousness is able to handle that. You can experience more objectively or more subjectively, by taking into account more or fewer less perspectives.

[306] In this way, recursive perspectivism, which rejects absolute objectivity and absolute subjectivity, offers an exact relativistic formula for many intuitive societal phenomena. You could call this ironic. It substantiates the feeling I've carried with me since secondary school, that there is more than just objective and subjective, that they blend gradually and seamlessly, and that intuition can in fact be expressed precisely.

[307] Risk aversion is about preventing deterioration perspectives, even if you therefore exclude improvement perspectives. Improvement perspectives have opportunities, deterioration perspectives have risks.

matter anyway? Whether you get it or lose it, isn't 100 euros still 100 euros? If you think about it rationally, you'd be able to notice this right away?

The differences between an objective and a subjective experience (of sensory stimuli) were first scientifically described around 1830 by the German doctor Ernst Heinrich Weber, one of the founding fathers of experimental psychology and psychophysics. He observed that people experience sensory perception in terms of ratios, and not in terms of absolute differences. Although he was not yet familiar with the term, he was referring to the phenomenon of scale invariance. A well-known example is difference in weight. If you notice a 10% difference in weight of a crate of apples that weighs 10 kilograms in total (1 kg), you'll also notice the difference in weight of a larger crate containing 100 kg of apples (10 kg). You won't notice the difference between 100 or 101 kilos. He also noted that you'll more easily perceive a difference if it's too light than if it's too heavy.

In 1860, the field of psychophysics underwent a massive growth spurt thanks to the book *Elements of Psychophysics* by German scientist Gustav Theodor Fechner. He formulated a law, naming it Weber's law in honour of the man who inspired it:

The intensity of a sensation is proportional to the logarithm of the intensity of the stimulus causing it.

This law shows a relation to the concept of entropy because of the emerging logarithm relationship. It's also known as the Weber–Fechner law. Sensations (subjective) are thus proportional to the logarithm of the stimulus causing them (objective).[308] In 1957, the American psychologist Stanley Stevens, a specialist in different qualitative and quantitative measurement systems, thought of an alternative: he suggested that the sensation is proportional to a constant increase in the magnitude of the stimulus.

I suspect that the differences between objective (external stimulus) and subjective (sensation) not only apply to the experience of physical stimulation, but also in a wider sense, to all the perspectives we experience, so also to completely mental factors and strongly mixed phenomena (such as loss aversion[309]). I want to provide this broader perspectivist interpretation, which is based fully on recursive perspectivism, with relativistic formulas. In doing so, I'm basing myself on the harmonic series and the perspectivist space.

Indeed, objectively speaking, it doesn't matter whether those 100 euros are added or subtracted, but in terms of experience it makes a world of difference where you are and where you're heading, and that's entirely appropriate. We intuitively have an excellent

[308] Concisely: the logarithm of the stimulus plus a constant, as Weber's law indicates.

[309] In essence, I'm advocating a rigorous re-interpretation and re-evaluation of the intuitive way of experiencing as a basis of all experience compared to the objective way that is dominant at this moment. They each have their own value, but it's the experience that drives human actions, and not some kind of external objectivity.

consciousness of this. The experience of value and effort isn't linear and depends on the position and direction. The second hamburger may be equal to the first, objectively speaking, but the value of the experience of the second hamburger is rarely equal to the first; the second is substantially less positive to most people. You'll increasingly lose your appetite. If you only have one, you perhaps won't just give the hamburger to someone else, but maybe you'll split it if you're very sociable (after all, you then are together one actor, a multi-actor). If you have a hundred, it's completely different. And this doesn't apply solely to hamburgers. When you've earned your first hundred thousand euros, the next hundred euros you earn are experienced very differently than the very first hundred euros you earned as a young teenager. And what you do with your first paycheck is the subject of deep consideration – or at least you perceive it as such. A millionaire, however, doesn't really care whether he earns €100 or spends it. He won't even remember at all. Unless there's a bet involved, of course, but then the stakes are very different; now it's about his honour. Intuitively, that's all as clear as day. We often perceive experiences as valuable at first, but their value diminishes as we continue to experience the same thing again and again. Examples include the phenomenon of *habituation*, or *diminishing returns*. This law is not set in stone, since there are also such phenomena as acquiring a taste for something. Dutch children usually have to learn to appreciate olives. But those are truly the exceptions to the rule. Statistically, value decreases with repetition. Repetition involves *almost* the same phenomenon (almost, it's a repetition after all). Watching your child grow isn't an example of repetition in this strict sense of the word and developing an acquired taste is often paired with learning to appreciate the phenomena and the rituals that come with them.

If you objectively think about 100 euros, you'll act like it doesn't matter which consciousness you're operating from. We then assume it's some sort of highest common denominator. That's why we objectively see the 100 euros as something you would use to buy a reasonably decent second-hand bike, a ticket to a festival, a pair of jeans, or about 50 loaves of bread. But not a house or car. And when you don't associate it with a specific consciousness, a specific actor, or a specific intentional logic, and strictly think using the broadest generalizations, the 100 euros as an objective value loses all direction and value.

When we forget the more original and intuitive value, we tend to fall into the trap of calling loss aversion a subjective fault of the mind. But our lives aren't ruled by objective values and ultimate generalizations. Our lives are determined by our specific experience, our specific intentional logic, because that's what makes our consciousness take aim, awakens our interest, builds up our perspectives, and leads us to take steps. 100 euros is only worth something if you want to achieve something with it (even if it is certainty). If you don't have it and want to spend it, then the value is high, and if you do have it and don't want to spend it, ever, then the value is low. "My kingdom for a horse!" is what Richard III cried out, in the immortal words of Shakespeare. It is unlikely that he would have said that a year earlier in a different place.

6.6.3 The relativistic experience of value and effort

To generate conscious (intentional) value, a conscious actor or multi-actor will have to deliver, show a bit of effort.[310] And to consciously (intentionally) want to show effort, the conscious actor or multi-actor has to have their eye set on value.

The relationship between value and effort is superficially obvious. You're more willing to put in *more* effort when you expect a *lot* of value in return than when you expect *little* in return. And if you work harder than you expected, you expect more value than when you put in less effort. As conscious actors (humans), we therefore assume at first that there's a proportional, linear relationship between value and effort. The correspondence hypotheses express a discrete, linear proportionality, and with good reason. That offers all kinds of advantages (see earlier examples of piecework pay, working on a farm, and playing basketball). The third perspectivist balance therefore shows – for larger amounts of perspective, mixed and applied over different dimensions – a *direct proportionality* between the total quantity of perspective (**q**), value (**v**) and effort (**e**): **q** = **v** = **e**. With every perspective, value and effort increase. The expression 'Equal pay for equal work' expresses this proportional linear relationship clearly and concisely, and therefore appeals to us. It doesn't always come true exactly like that, since life has its ups and downs, but as a general rule and average guiding principle (after all, we reason statistically), it works perfectly.

The phenomena of loss aversion, habituation, and the law of diminishing returns express typical non-linearity and inverse proportionality between value and effort. These are very dependent on the *specific* experience of actors, which is always subjective. Therefore, keep in mind that *experienced* value and effort is something very different than *objective* value and effort. Experienced value is about how much value is experienced by an actor, and objective value is how the effort is experienced by the actor (or conversely: how much resistance has to be overcome before attaining that value). If something becomes more and more plentiful and easily available, the experienced value decreases. Conversely, when something becomes scarce, its value increases. Therefore, the perceived inverse proportionality and non-linearity do not show up in the relationship between value and effort. In the experience, the realization of the situation you came from, and the situation you're headed to, is what determines your experience. The path doesn't matter for an 'objective' experience.

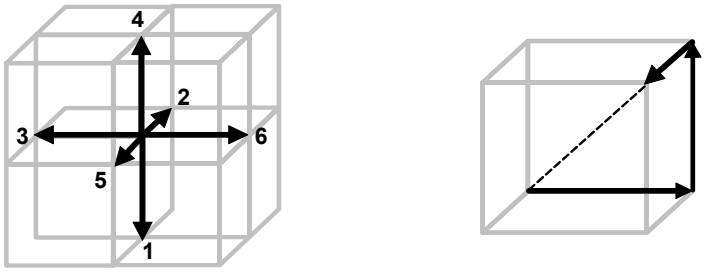
Below, I use recursive perspectivism to formulate a relativistic theory of value and effort. This solves the mystery, the tension between objective and subjective experience, in a gradual and discrete way. In doing so, I'm reasoning strictly based on statistical averages. Deviations upwards and downwards will happen, just as we have ups and downs in our lives in respect to the 'equal pay for equal work' rule. In discussing the relativistic experience of value and effort by a consciousness, I'll clarify exactly how a subjective and

[310] I'm not talking about stumbling onto something valuable, even though that happens too of course, but about deliberately generating value. Statistically, in a completely random world, you'd be able to stumble upon something valuable just as often as something awful.

objective worldview measures up to the relativistic worldview. At the ultimate fringes of the perspectivist space, pseudo-objectivity and pseudo-subjectivity emerge naturally. They are the emergent fringe phenomena of the recursive perspectivist impression of society.

6.6.4 Relativistic value in a one-dimensional consciousness

Every multi-actor practice has its own place in the perspectivist space and has clear degrees of freedom to change the number of perspectives. There are six directions in total to take just one basic step, per set of two belonging to one of the three axes of similarity, pluriformity and unity: three moving away from the origin (adding perspectives) and three moving towards the origin (removing perspectives).[311]



The six directions in the perspectivist space. Diagonal steps require three basic steps. Position and direction determine how much perspective one step takes.

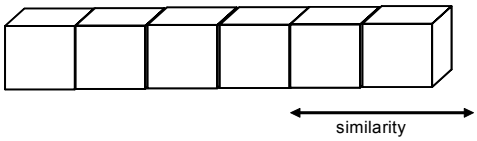
It matters to the perspectivist scope of a basic step (the number of perspectives that this step takes) in the perspectivist space where the actual position is. One of the three sides of the content bar will then be raised by one step or lowered by one, and it matters a lot to the content of that bar which specific side that is, especially if there is strong asymmetry. Let's say the beam has the shape of a door: 200x5x90 (the measurements are expressed in terms of the three perspectivist dimensions). If you increase the *thickness* by 1, from 5 to 6, this will result in a lot more extra content (namely 1x200x90) then when you increase the *length* from 200 to 201 (1x5x90). The step from 5 to 4 involves changing exactly the same quantity as the step from 5 to 6, *objectively*.

Only the points on the diagonal are neutral in this sense: on this triple symmetry axis, every step along any of the three dimensions also increases or decreases the number of perspectives proportionally. For only one step *along the diagonal* upwards or downwards (a diagonal step), there should be three axis-parallel steps taken, one along each axis, but it doesn't matter in which order (see figure above, on the right). In an absolute sense, in strictly objective terms, exactly the same increase or decrease in perspective occurs when one of the three axes of the perspectivist space goes up or down when taking basic steps.

[311] The perspectivist space constitutes a *state space*. By necessity, steps are orthogonal and discrete. Movement along the sails also involves taking discrete steps, which have to respect the prime numbers.

When the amount of perspective corresponds to value and effort, as the third balance tells us, an equal quantity of value is then also added or subtracted (the objective interpretation). To be precise: it's about a change moving 1 up or down, on any of the three axes; the positions on the other two axes remain constant.

I'll specify this example even more for just one dimension (and will generalize it to three dimensions again later on): It's only about steps of just one perspective along one axis, the similarity axis (**s**). It's about the repeated occurrence of a single perspective. The other two axes (pluriformity and unity) are fixed at 1. We now pretend it's about an actor with a one-dimensional consciousness, limited to the similarity dimension **s**.



A one-dimensional consciousness, with only the similarity dimension

When a consciousness considers a step, it finds itself in a specific position and looks left or right (there is only just one dimension after all), depending on whether it takes a step forwards or backwards (adds or rejects a perspective). Every step left or right, added or subtracted, now has the size of exactly 1 perspective (see figure). Objectively, it doesn't matter in terms of the value whether you take a step to the left or right. A step in either direction is basically the same: a perspective is a perspective.

But relatively, it sometimes matters a lot where you're coming from and which direction you're heading in. If you're *aware* of position and direction (and that's a conscious actor, he's aware of the past, present and future) then the average *experience* of value and effort is calculably different in a predictable and precise way. Depending on where you are (higher or lower on the axis), and depending on where you're coming from (left or right), the experience is different, and has a different perceived value and effort. The way in which a consciousness is aware of position and direction in the perspectivist space (consciousness of past, present and future) causes the difference between a relativistic and objective experience.

This requires further elaboration, which I shall provide shortly. First, I will make it a bit less abstract by using an example. Let's say we have just one specific improvement perspective:[312] making a gardening tool. For example, making a spade from scratch: Materials; Manufacture; Spade. In absolute terms, this step delivers a certain value to a

[312] Strictly speaking, of course, a spade is a composite improvement perspective, because the manufacture and the result are both a composite factor. Then the positions along the other two dimensions are no longer 1. For the sake of argument, I'll pretend it's an atomic perspective. In one single direction, this does not affect the argument.

conscious actor, and this same step costs a conscious actor a certain amount of effort. We now repeat exactly this improvement perspective over and over. Now we walk along dimension **s** step by step, moving towards a higher value. So more and more spades are made. The number of spades correlates neatly with the number of revised perspectives, and therefore with the position on **s**. Objectively, every step that follows is the same. But the experienced value decreases with every step. It becomes increasingly difficult to continue to keep pushing yourself: other improvement perspectives become increasingly attractive, and it therefore takes more effort to be enthusiastic about spades. The relativistic value decreases and the relativistic effort increases, as the number of steps increases in only one direction.[313]

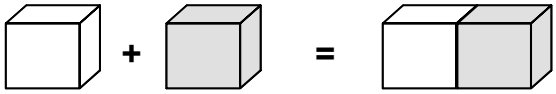
This is an *average reason* for repeating the *same* perspective. In specific cases, it may increase slower or faster, but in the end, it applies to every repetition and on every scale. Eventually, the tide will turn. Say a 15th-century blacksmith makes a spade for himself. He may make an extra one as a back-up and another one for his brother; his interest in the spade decreases as he repeats the action, and therefore the value decreases (it would yield less and less value and therefore more effort, motivation, and expense to continue). In modern society, if there is a factory that makes spades and continues to do so, the same thing applies, but it may take a bit longer. Eventually, this factory will also oversaturate its own market if **s** is the only dimension that continues to increase, while the value decreases (overproduction) and the resistance that needs to be overcome and the effort involved both increase. It's a universal fact that you cannot repeat the same perspective over and over limitlessly. Eventually, the decreasing value even turns into increasing damage, and the pressure to spend your attention and energy on other things becomes unbearable. And so you start to do different things; you aim your consciousness differently. If you don't, then you are subject to a destructive addiction, and will become pathologically monomaniacal. If you're wise, you'll quit far sooner, when the value is still high and the effort is still low. In any case, continuously moving along only one axis-direction in the perspectivist space is therefore *always a terrible idea*.

How can the decreasing experience of value and the increasing experience of effort be calculated exactly? The crux is that a consciousness positions itself differently over and over again with every new step in the dimensional perspectivist space, that the consciousness changes as a result, and that it is aware of doing so. (It's a consciousness, after all!) It knows where it came from, where it's going, and the positions between which it travels (again the three-part nature of the perspective). There's a temporal order, a primitive consciousness of time, and that is irreversible, because a consciousness is aware of past, present, and future. For example, a consciousness is different from a melting ice cube: it changes, but we do not attribute a consciousness to it; it is not aware of the past or future. We could freeze it and then let it melt again, over and over, and nothing changes. A consciousness, on the other

[313] That makes the intentional logic, the driving force significantly weaker!

hand, *knows* when it's the first, second, or even third time it's happening, and therefore experiences it differently.

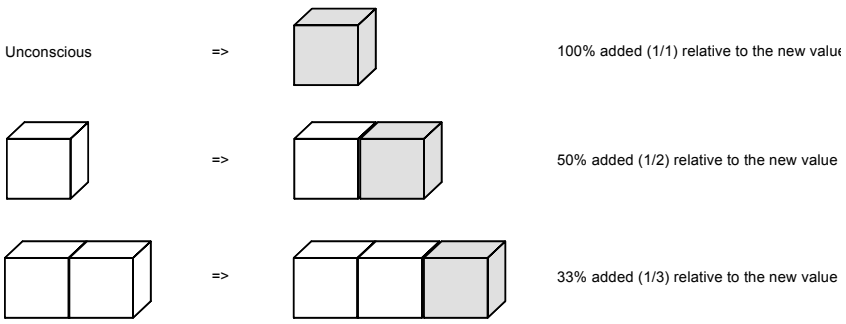
I therefore suggest that what's at the *end* of the perspectivist step is a consciousness that's 100% present. After all, that is the *new current position* of the actor that bears this consciousness. The difference in experiential value is now equal to the *relative* difference that the completed step represents in relation to the value that's left *after that step is taken*. This is far easier to explain in an image:



The second perspective adds 1/2, i.e. 50% value;
seen from the new position, the new part is completely on position 2.

In this way, I give a one-dimensional perspectivist consciousness (and therefore a one-dimensional perspectivist actor) a consciousness of both position and direction. The actor becomes conscious as it experiences the first perspective. The increase is 100%. If the actor adds a second perspective to the first one, he will experience this perspective again, in which case the new position is 2, which is half again (1/2, 50%) more than position 1 where it came from.

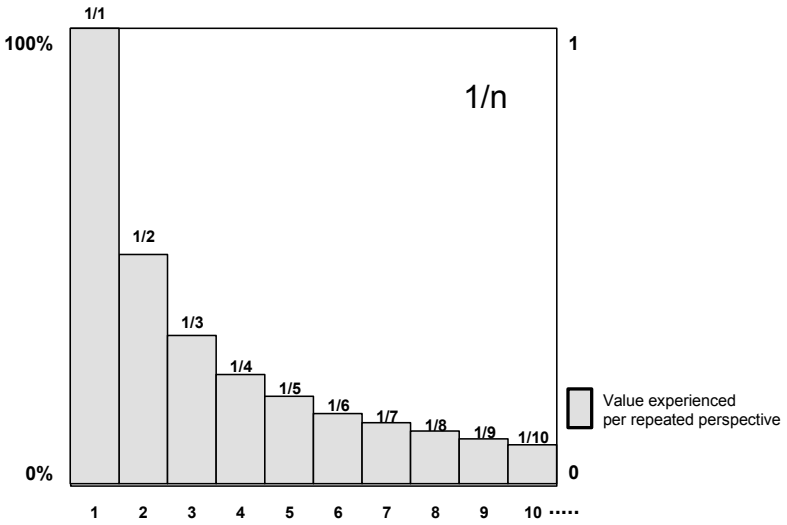
I'm marking the very first perspective as a value of 1 (or 100%). Every perspective that follows will decrease in value when taking steps to the right, because their share in the new whole decreases (see figure on the next page).



The first perspective adds 100% value (1/1) because there was nothing there before this; you were not conscious. The second perspective adds 50% (1/2) from the context of the new position, the new whole. The third perspective adds 33% in value (1/3), and so on.

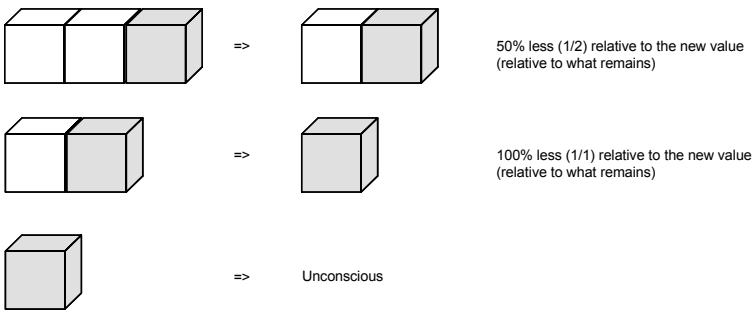
This is an average progression, since one phenomenon may move faster than another. But eventually statistics will be victorious, and all possible perspectives will exhibit an average decrease in experiential value for each subsequent perspective moving along one dimension

(the similarity axis), according to what is known as the *harmonic series* (1/1, 1/2, 1/3, 1/4, … 1/n).



Diminishing valuation with 1/n in the context of increasing similarity. (increasing number of repetitions), s and u are 1.

If we move past the left along the similarity axis, moving downwards, then I'll follow exactly the same procedure as when moving upwards. I once again equate the difference in experiential value to the difference in percentage that a step makes compared to the value that's left *after the step was taken*. Now the results become dependent on direction; the consciousness develops a fully-fledged sense of direction, because it's now clear that the reversed step *leads to different values*. This step is similar in size in terms of objective perspectives, but exactly opposite to its counterpart in direction, and is experienced differently by a consciousness in terms of value and effort. The consciousness knows, looking back, where it came from and, looking forward, where it is trying to go along the path. The figure below shows the exact same steps as the one above, but now reversed.



If the third perspective vanishes, that results in 50% less, in the context of the new position (1/2). If the second perspective vanishes, that results in 100% less, from the context of the new position, the new whole (1/1). If the last perspective vanishes, you are no longer conscious.

Experiential value from a perspective seems to be dependent on position and direction.[314] It reveals itself to be relativistic. This aligns with our intuitions, and is therefore now *exactly calculable for average situations*. From 1 to 2 is 50% added, and from 2 to 1 is 100% subtracted. From 2 to 3 is 33% added, and from 3 to 2 is 50% subtracted.[315]

So why is it now a valid option to calculate the *average progression of experiential value* in this *relativistic* way? Why does the experiential value align with what initially seems to be a simple calculation? This comes directly from the workings of a perspectivist consciousness. Time and time again, experiential value perceived by a consciousness will be calibrated to the **total number of perspectives** on which it focuses and the **total value** these perspectives represent (and the *total effort* this takes). A perspective is gained by moving one step up, and subtracted by moving one step down (assuming the other two dimensions are 1). And so, time and time again, after each step, a new number of perspectives and a new average relativistic value v per perspective come into existence, calibrated to the total value perceived by this consciousness. The total experienced value at a given point in time is the point of reference by which a consciousness calibrates its experience of the individual perspectives. In other words, both directions look very different from each position.

In individual cases, perspectives will deviate from this (I will keep repeating this). When you listen to African drums, for example, you could very well determine that the experienced value becomes *greater* as the monotonous drumming continues a while longer. It's an unmistakably lovely form of monomania. And in some cases, you'll experience a complete distaste from the get-go, and this dislike will also statistically comparably decrease with repetition. Even for a negative value, there are positive and negative outliers, and a consciousness calibrates these from the average.

Statistically, however, equating the difference in experiential value to relative difference *(between the starting point and the resulting position)* compared to the resulting position is consistent with how a perspectivist consciousness works.

The chart below shows the average progression of experiential value in response to increasing repetition. The three grey columns show the objective steps in terms of perspective. In the first grey column, a value keeps being increased by one from the starting point to the resulting position (a perspective is added). In the second column, precisely the opposite is being described (the inverse: the perspective is dropped). The newly increased value from the first column is again lowered by one, and in doing so, you objectively end up

[314] In the case of perspectives that cause misery and negative value, exactly the opposite applies: you'd rather lose them than gain them. When they happen to you, you feel worse than when they don't.

[315] What's also special is the progression from 1 to 2 (50% added) to 3 (33% added) to 2 (50% subtracted) to 3. The last step from 2 to 3 would normally add 33%. But it's now the fourth time the perspective is experienced, since we're moving from 2 to 3 for the second time. Therefore, if we're consistent, the experiential value for this step will be 25%. If we move directly in one straight line to 3, then the total 100 = 50= 33 = 183% v will be 0.61. If we move back that same step, then the total is 100 = 50= 33 = 158%. v will be 0.32 (divided by 5 steps).

on the original starting value of the first grey column. But precisely because you come from the other side, the experiential value is different. The difference between the starting position and the resulting position is expressed relatively in relation to the *resulting position*, after all.

I repeat the example again in different terms: when a conscious actor (for example you) goes from 1 to 2 (1=>2) 1 is added, but this is 1/2 (50%) when you express it as a fraction of 2. And when a consciousness goes from 2 to 1 (2=>1), then 1 is subtracted, and this consciousness loses 1/1 as a fraction of 1, which is 100%. A consciousness experiences things over and over again from the new position where it stands, looking ahead to where it wants to go and back to where it came from.[316] A consciousness is situated in perspective and has knowledge (is conscious of) of its past, where it is from, its future, and where it expects to go. Position and direction do not matter objectively, but a consciousness is explicitly directed, and position and direction make a world of difference in relative experience, especially for smaller n. For very large numbers n, it barely makes a difference at all.

+1	Δ	Δ%	inverse	Δ	Δ%	-1	Δ	Δ	Δ ⇔	Δ la
0=>1	1/1	100%	1=>0	?	?	0=>-1	-1/1	-100%	?	200%
1=>2	1/2	50%	2=>1	1/1	100%	1=>0	?	?	50%	?
2=>3	1/3	33%	3=>2	1/2	50%	2=>1	1/1	100%	17%	67%
3=>4	1/4	25%	4=>3	1/3	33%	3=>2	1/2	50%	8%	25%
4=>5	1/5	20%	5=>4	1/4	25%	4=>3	1/3	33%	5%	13%
5=>6	1/6	17%	6=>5	1/5	20%	5=>4	1/4	25%	3%	8%
6=>7	1/7	14%	7=>6	1/6	17%	6=>5	1/5	20%	3%	7%
7=>8	1/8	13%	8=>7	1/7	14%	7=>6	1/6	17%	1%	4%
8=>9	1/9	11%	9=>8	1/8	13%	8=>7	1/7	14%	2%	3%
9=>10	1/10	10%	10=>9	1/9	11%	9=>8	1/8	13%	1%	3%
99=>100	1/100	0.01%	100=>99	1/99	0.01%	99=>98	1/98	0.01	0%	0%

Experiential value as fraction and percentage of the 'objective' standardized starting value 1 and 100%.

The second and third columns show how the experiential value of an initial occurrence of a perspective (0=>1), standardized to 1 (100%), relativistically approaches 0 (0%) through the harmonic series[317] 1/n. This is equal to the previous graph showing diminishing valuation.

[316] The step from 0 to 1 can be seen as the coming into existence, the appearance of a new consciousness. The step from 1 to 0 can be seen as the disappearance of a consciousness. It's about ultimate outliers.

[317] In terms of taste, you could eat a large bag of liquorice sweets until you're feeling sick; by the end, you won't even want to see them anymore. The improvement perspective ceases to exist, and is replaced by a deterioration perspective. The same goes for an over-saturated supply for which there is no demand: it turns to waste. Generating excessive waste is also a deterioration perspective. An improvement perspective

An improvement perspective makes the best impression the first time. As more and more steps are taken, and the experience is lived again and again, the experiential value becomes lower with each subsequent step, and it approaches the upper end of 0 as it continues.[318]

In the third, a sixth column shows the difference in experience between the step upwards and the reversed one going down (the inverse situation). One step upwards feels less valuable than the exact opposite step. It's obvious that the *direction* matters to the *experience* of value.

The inverse relationship underestimates the phenomenon of loss aversion a little, since loss aversion is about the 100 euros added *or* subtracted. Therefore, loss aversion is about the difference in experiential value, seen from the *resulting position*, between a step upwards or downwards *from the same starting point.* Both resulting positions are therefore two steps apart. That's why the third grey column shows how the starting position of the first column is now lowered by one. Loss aversion is explained by the various value experiences of the first and third *grey* column: you go one step up and one step down from the same starting position (n+1 and n-1), and from that new position you experience the result differently in terms of value.

The two dark grey columns to the far right (see previous table) display the differences in experience between the inverse relationship and the loss aversion relationship. The column titled Δ ⇔ shows the difference in value experience between x=>y and y=>x (therefore the inverse relation: ⇔ represents inverse). The column with title Δ la (la stands for loss aversion) shows the difference in experience between step n+1 and n-1, therefore a similar step in objective terms, but in exactly the opposite direction from the same starting position. I point out inverse direction (reverse direction) as well as loss aversion from the table because it is so remarkable:

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generates value, while a deterioration perspective destroys value. Just like you try to achieve an improvement perspective, you try to prevent the realization of a deterioration perspective.

[318] Maybe you're thinking: this may be true, but sometimes the experiential value decreases before it increases? Isn't that exactly the crux of the principle of increasing and decreasing value? I will elaborate on that in a moment, because as the increasing value turns into decreasing value, we move through the perspectivist balance, and that happens near the diagonal in the perspectivist space. But here I'm assuming that the first step is the experience of the very first perspective by a consciousness. We find ourselves at the very origin of the perspectivist space and take steps upwards along only one of the axes, the similarity axis. It's about a one-dimensional consciousness. (A fully analogous reasoning applies to the other axes.)

Inverse difference (Δ ⇔)	Loss aversion (Δ la)
2-1 is experienced **50%** more than 1+1 and experienced	**67%** more than 2+1
3-1 is experienced **17%** more than 1+1 and experienced	**25%** more than 2+1
4-1 is experienced **8%** more than 1+1 and experienced	**13%** more than 2+1
5-1 is experienced **5%** more than 1+1 and experienced	**8%** more than 2+1
9-1 is experienced **1%** more than 1+1 and experienced	**3%** more than 2+1
99-1 is experienced **0%** more than 1+1 and experienced	**0%** more than 2+1

The inverse effect and loss aversion are greatest when they near 0, and then decline rapidly.

The strongest effect occurs closest to the origin.[319] The difference becomes smaller quickly and seems to disappear into the static. But it does not actually disappear; as long as there is perspective, it will continue to decline by smaller and smaller values, in precisely convergent serial progressions. Value experience changes by 1/n (the harmonic row). The series of loss aversion from n is described as $1/n - 1/(n+2)$.[320] The series of the inverse difference is described as $1/n - 1/(n+1)$ if n is the lowest value of the 2, and by $1/(n-1) - 1/n$ if n is the highest value of the two.

The diminishing value experience across the uniqueness axis (**s**) is known in various forms under different names, such as habituation or boredom or oversupply (an economic term). And that is why each subsequent 100 euros is worth less as you experience it, until you no longer consciously experience the difference anymore. 'Subjective' is the very first valuation for n=1. 'Objective' is what we call a situation in which the specific experience, the specific position and direction in the perspectivist space plays (virtually) no noticeable role anymore, which is relevant when n is extremely large and the position on the **s** axis is very high. In between, the relativistic effect occurs, and the valuation will switch from virtually completely subjective to virtually completely objective.

How long we still have a perceivable effect not only depends on n on the similarity axis, but also on the position of the other two of the three dimensions of perspectivism. The decrease may still grow smaller, but the harmonic series will still continue to progress. When this decrease applies to a large number of perspectives due to multiplication with the other two

[319] This resembles the Lorentz transformation. The further the position on the axis, the more objective/classic and subjective/relative become equal. The closer to the origin, the bigger the deviation. That makes it clear how objective and subjective need to be understood in perspective: objective means that you include all perspective in your judgement, while subjective means you only assess a small part. When different people assess different parts, you do indeed get different judgements. And when you assess everything, you can try to observe the utmost objectivity. Of course that will leave society dead in the water, as it actually flourishes with pluriformity, similarity, and unity in balance.

[320] It is about serial progression. The term (n+2) is a result from reasoning from the two resulting positions. The series 1/1, 1/2, 2/3, 3/4, 4/5 …, 199/200 ….. converges from below to 1. The series 1/1, 2/1, 3/2, 4/3, 5/4 …, 201/200 ….. converges from above to 1. The series 1/1, 1/2, 1/3, 1/4, 1/5 …, 1/200 ….. converges to 0. When dealing with large quantities of perspective because the other two axes are much higher, the total effect will still be significant.

dimensions, the effect in this specific direction will remain perceivable. The progression of the harmonic series stops at the limits of the capacity of the perspectivist consciousness.

6.6.5 Development of experiential value and habituation

The previous section shows that we can express the average experiential value with an increasing repetition n as follows:

$$v(n) = 1/n$$

The total experiential value would then be:

$$v_{total}(n) = \Sigma_{1\text{-}n}\ 1/n$$

$v_{total}(3)$ for example is $1/1 + 1/2 + 1/3 \approx 1.833$

Habituation increases as a perspective repeats itself more often. The experienced value of each subsequent perspective will diminish; the relative difference will be less and less significant. A habituation curve can be expressed as the development of $\underline{v}$ (the average value of the perspectives) as n (the number of repetitions of the same experience, the same perspectives) increases. In a formula:

$$\underline{v}(n) = (\Sigma_{1\text{-}n}\ 1/n) / n$$

The term $\Sigma_{1\text{-}\infty}\ 1/n$ is the harmonic series. In more detail, that would be $1/1 + 1/2 + 1/3 + 1/4 + \ldots$. This sum is divergent, and it will therefore continue to become bigger (that has already been proven by Nicole Oresme in the fourteenth century). That growth happens more and more slowly. To reach a total of approximately 100, it takes an n of no less than 10^{43}, a number with 43 zeroes![321]

The first time it is $\underline{v}(1) = (1/1) / 1 = 1$; all subsequent valuations will be standardized according to that. After three experiences (two repetitions), the result is $\underline{v}(3) = (1/1 + 1/2 + 1/3) / 3 \sim 0.61$. (The symbol ~ represents approximately; after all, this is a decimal expression of an exact rational value.) The value of the total of 3 would then be n times $\underline{v}$ is 3 times ~0.61 is ~1.833. For the first 10 experiences (9 repetitions), the value of the new perspective and the average value per perspective $\underline{v}$ and the experienced total value v_{total} progress as follows:

[321] The On-Line Encyclopedia of Integer Sequences. OEIS Foundation.

n	1	2	3	4	5	6	7	8	9	10
v_n (=1/n)	100%	50%	33%	25%	20%	17%	14%	13%	11%	10%
v	1.000	0.750	0.611	0.521	0.457	0.408	0.370	0.340	0.314	0.293
v_{total} (=n·$\underline{v}$ =$\Sigma_n v_n$)	1.000	1.500	1.833	2.084	2.285	2.448	2.590	2.720	2.826	2.93

In the event that we continue to experience more of the same perspectives, then the number of repetitions will continue to increase and the average valuation $\underline{v}$ would diminish. Within a limit, $\underline{v}$ will continue to get closer to 0. For n = 10,000, v_{total} is still not 10. That will slow down more and more, but the value remains substantial up until high values of n. Even past the 700th step (n=700) the effect is still approximately 1 percent, and it is only until past the 9000th step that it gets below 0.1 percent (see following table).

n = 1 v = 1.0000000
n = 2 $\underline{v}$ = 0.7500000
n = 3 $\underline{v}$ = 0.6111111
n = 4 $\underline{v}$ = 0.5208333
n = 5 $\underline{v}$ = 0.45666668
n = 6 $\underline{v}$ = 0.40833333
n = 7 $\underline{v}$ = 0.37040818
n = 8 $\underline{v}$ = 0.33973214
n = 9 $\underline{v}$ = 0.3143298
n = 10 $\underline{v}$ = 0.29289684
n = 20 $\underline{v}$ = 0.17988698
n = 30 $\underline{v}$ = 0.13316624
n = 40 $\underline{v}$ = 0.106963575
n = 50 $\underline{v}$ = 0.089984104
n = 60 $\underline{v}$ = 0.07799784
n = 70 $\underline{v}$ = 0.06904052
n = 80 $\underline{v}$ = 0.062068492
n = 90 $\underline{v}$ = 0.056473006
n = 100 $\underline{v}$ = 0.051873773
n = 200 $\underline{v}$ = 0.029390154
n = 300 $\underline{v}$ = 0.020942213
n = 400 $\underline{v}$ = 0.016424824
n = 500 $\underline{v}$ = 0.013585647
n = 600 $\underline{v}$ = 0.011624964
n = 700 $\underline{v}$ = 0.0101843
n = 800 $\underline{v}$ = 0.009078065
n = 900 $\underline{v}$ = 0.008200184
n = 1000 $\underline{v}$ = 0.0074854707
n = 2000 $\underline{v}$ = 0.004089184
n = 3000 $\underline{v}$ = 0.00286125
n = 4000 $\underline{v}$ = 0.0022178476
n = 5000 $\underline{v}$ = 0.0018189017
n = 6000 $\underline{v}$ = 0.0015461356
n = 7000 $\underline{v}$ = 0.001347279
n = 8000 $\underline{v}$ = 0.0011955594
n = 9000 $\underline{v}$ = 0.0010758056
n = 10000 $\underline{v}$ = 0.0009787607

Diminishing average value $\underline{v}$ per perspective in case of increasing n (one single dimension, for instance similarity). The increasing average effort is equal to 1 – $\underline{v}$.

For a constantly increasing n, it is therefore increasingly valid to state that $\underline{v}$ is constant, and that there is therefore a meaningful average value per perspective. This is the same clause as the previously presented correspondence hypotheses between q and v, and q and

e, and the third perspectivist balance: they apply more and more accurately for an increasingly large n. Between 1000 and 2000, a jump of 1000 in n, $\underline{v}$ changes from 0.0074854707 to 0.004089184, say roughly 50%. Between 9000 and 10,000, also a jump of 1000, $\underline{v}$ changes from 0.0010758056 to 0.0009787607, the difference here is only in the order of 3% (see following table). And this phenomenon continues for an increasingly large n.

In case of extremely high n, $\underline{v}$ and the relative value of the n^{th} perspective will converge steadily. This is where the objectivity illusion takes effect, but we will go into more detail about that later. *But n cannot continue indefinitely*. We cannot continue experiencing perspectives. That is not possible in one dimension, and not in three dimensions either. Each perspectivist consciousness is restricted, limited in terms of perspective. Take a person; q_{max} is the number of perspectives that are available to them on average and therefore the maximum number that he can use. Or take the current q_{max} of humanity: the limit is 7 billion times the personal q_{max}. From a perspectivist-structural point of view, the intentional capacity of humanity is therefore limited (and the same therefore applies to knowledge, see also the concept of *cognitive threshold* in my thesis).

A theoretical conscious being with only one single dimension and q perspectives is limited on two sides, at the bottom as well as at the top. Below n = 1, we cannot experience any value. Similarly, we can no longer experience value above $n = q_{max}$. A consciousness that only has the similarity dimension **s** (a theoretical concept) at its disposal is limited by the standardized value 1 at n = 1 and the value $v_{rest} = 1/ q_{max}$ (the valuation of the final perspective) at $n = q_{max}$.[322] At $n = q_{max}$, we can also carry out the ultimate definition for the average value per perspective: it is $\underline{v}_{rest}$ (the average valuation of all q_{max} perspectives). For n = 0 and n = q + 1, when no value is experienced, there is no consciousness. This also applies to all values smaller than 0 and bigger than q+1, of course. (It applies outside each random focus of q perspectives of each random one-dimensional consciousness.[323])

6.6.6 Value and effort play a remarkable game together

Perspectives are sometimes like slippery pieces of soap in a full bathtub: you need to know how to get a grip on them. That certainly applies to the relationship between the experience of value and effort. The relativistic experience of effort is comparable to the relativistic

[322] This is reminiscent of invariant mass and the invariant energy of particles from physics.

[323] The one-dimensional habituation $v(n) = (\text{sigma}_{\mathbf{1-n}}\ 1/n) / n$ can also be expressed as a recursive function (I will explain that in more detail later in the book). Then:
Limiting condition at bottom: v (0=>1) = 1
Limiting condition top: $v(q\text{-}1 \Rightarrow q) = \mathbf{v_{rest}}$
$v(n) = (n\text{-}1) \cdot v(n\text{-}1) + (1/n) / n$
The starting condition would then be v (1) = 1. The stopping condition would be when the total number of available perspectives q has been reached. The value from v (q) will then be equal to v (q-1, q) and equal to v_{rest}. This is reminiscent of the principle of complete induction. If there were no starting condition, then the value of v would be undetermined. If there were no stopping condition, the recursion would continue indefinitely. It would stop at delivering $\mathbf{v_{rest}}$. It is therefore also possible to calculate back to an earlier point.

experience of value, but exactly opposite. As the value experience decreases, the effort experience increases. Each subsequent step takes extra effort (as the pictures below show). Objectively, each step takes the same amount of effort, and it delivers the same amount of value, but because the experienced value decreases, you actually experience the delivered effort (the experienced effort) as relatively greater. Each next candy from the bag tastes less delicious, and therefore it takes more and more effort to put another one in your mouth. And if you play a game for a very long time, you are bound to get sick of it.

The first time that you experience the value of a truly new improvement perspective, it is a surprise; it is new, after all. You have never experienced it before; it confronts you, it happens to you. That is why the effort is set at 0%. With each subsequent repetition, the experienced effort will now increase according to the series (1-1/n) (see the following figure).

Just like with experienced value, there is a directional dependence, but then exactly reversed: a step forward is experienced as more effort than the same step back. After all, the value is relatively less.

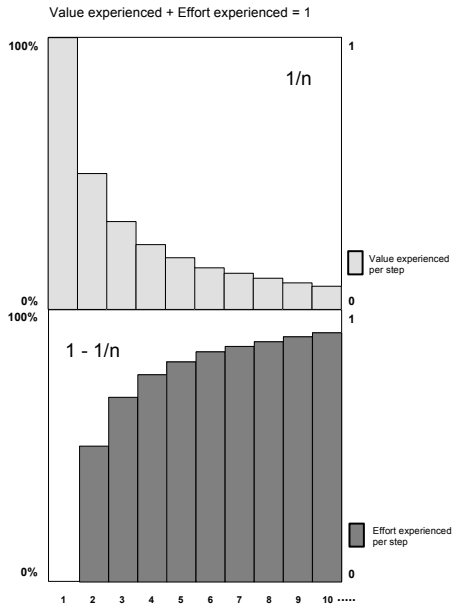
Loss aversion has its effort-related counterpart here: *habituation*. Everyone knows the phenomenon of having a hard time getting rid of something you appreciate and have been doing all along, and in which considerable effort has therefore been invested. It is much easier to keep going. That applies to individual habits, but also societal ones. Consider culture, which is highly persistent due to the huge repetition upon which cultural phenomena are based. Fashion, on the other hand, comes and goes as if it is nothing, and that suits individual people at a much lesser frequency of repetition.

Habitual behaviour is much more tenacious the further you are removed from the origin, and the repetition is higher. On average, it is more difficult to wean off an often repeated and therefore deeply rooted habit than to simply continue it. The more often the habit is repeated, the stronger this effect is. After all, when quitting long-term habits, you discard steps which you know have taken tremendous amounts of collective effort. It is very hard to tackle deeply rooted bad habits!

The perceived value (the experiential value) develops according to the series 1/n for each subsequent new step in a single perspectivist dimension. The perceived effort (the experiential effort) develops according to the series (1-1/n) for each subsequent new step. This leads to the following equation:

$$\text{experiential value} + \text{experiential effort} = 1/n + (1-1/n) = 1.$$

Visually, that looks like this:



Experienced value plus experienced effort is equal to 1 (100%).

Experiential value and experiential effort are exactly equal when they are both ½. This applies after the first conscious step (from 1 to 2). At that point, effort corresponds exactly to value. If you continue to go up along this dimension, the experienced effort will continue to grow bigger for each subsequent step, while the experienced value will continue to grow smaller. The ratio value / effort will then continue to become worse. That can be expressed as 1/n **/** (1-1/n).

A consciousness will always aim for a high experiential value / experiential effort ratio, and avoid a low experiential value / experiential effort ratio. If there is only one single dimension, there is, of course, no choice; if you want more value, you will have to go on. But precisely that is of course different in case of more than one single dimension, as I will explain in a moment for the three-dimensional situation. Then it soon becomes interesting to pursue a different direction.

The following table shows the progression of the experienced value / effort ratio for n from 1 to 10, and then also for 100, 1000, 10,000 and 11,000. It is highest at n=2, when experiential value and experiential effort are both ½ and their ratio is therefore 1. After that, it diminishes with 1/(n-1).

n	Experiential value 1/n	Experiential effort 1-1/n	v/e 1/(n-1)
1	1/1	0	x
2	1/2	1/2	1
3	1/3	2/3	1/2
4	1/4	3/4	1/3
5	1/5	4/5	1/4
6	1/6	5/6	1/5
7	1/7	6/7	1/6
8	1/8	7/8	1/7
9	1/9	8/9	1/8
10	1/10	9/10	1/9
100	1/100	99/100	1/99
1,000	1/1,000	999/1,000	1/999
10,000	1/10,000	9,999/10,000	1/9,999
11,000	1/11,000	10,999/11,000	1/10,999

$\underline{v}$ and $\underline{e}$ interact comparably to the experiential value and the experiential effort for the n^{th} perspective. After all, the following applies:

$$\underline{v}\,(n) = (\Sigma_{1\text{-}n}\ 1/n) / n$$

$$\underline{e}\,(n) = (\Sigma_{1\text{-}n}\ (1 - 1/n)) / n$$

That is why this applies:

$$\underline{v}\,(n) + \underline{e}\,(n) =$$

$$((\Sigma_{1\text{-}n}\ 1/n) + (\Sigma_{1\text{-}n}\ (1 - 1/n))) / n =$$

$$(\Sigma_{1\text{-}n}\ 1)/n = n/n = 1$$

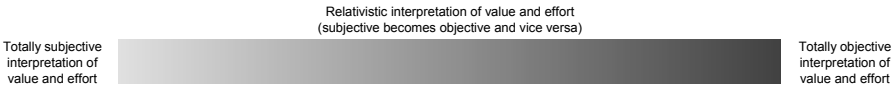
The average value $\underline{v}$ and the average effort $\underline{e}$ are exactly equal when they are both ½.

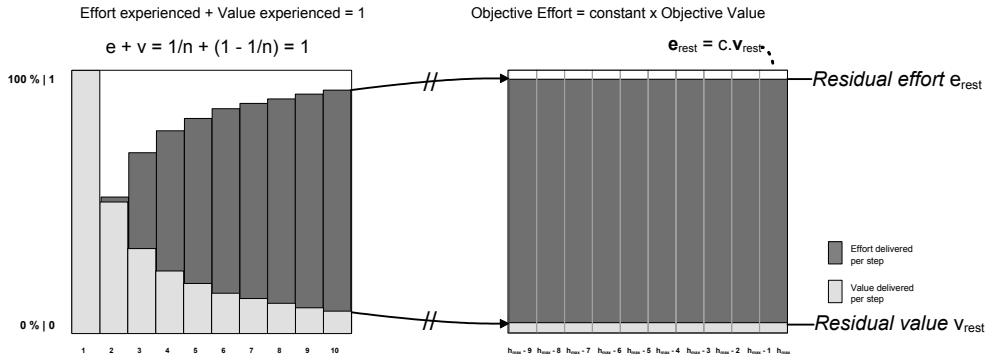
Improvement means more value for less effort. Something that will cost a conscious actor considerable effort (difficulty), and results in hardly any value, will be left unpursued. Something that results in significant experiential value in exchange for hardly any effort will be a strong focus for a conscious actor. They will therefore gladly trade in low-quality perspectives for higher-quality ones. We call that shifting focus, learning and forgetting when it concerns mental perspectives. We call it displacing when it concerns spatial perspectives. Both take place in time; that is the change in the flux of perspective. Matter and thinking, time and space all emerge on the recursive stream of experienced

perspective.[324] The expected levels of a ratio between the experienced value and the expected effort of the possible steps determine the force of the intentional logic, and will aim the consciousness that way. Vice versa, intentional logic is the principle that places, aims and changes aware actors and aware multi-actor perspectivistically.

6.6.7 The relativistic perception between subject and object

The following figure shows the entire range of a one-dimensional perspectivist consciousness of considerable scope, from 1 to q_{max}. Like in the previous situation, it only involves the similarity axis. For practical reasons, only the parts to the far left and far right have been displayed, and a big part in the middle has been left out, as is shown by the two slashes in the middle (//). Now you can see how the graph for q from 1 to q_{max} corresponds to the previous figure of the relativist transition from strictly subjective (one single perspective is experienced, left) to as objective as possible (all experienced perspectives are taken into account, right). They are both shown in the following figure.





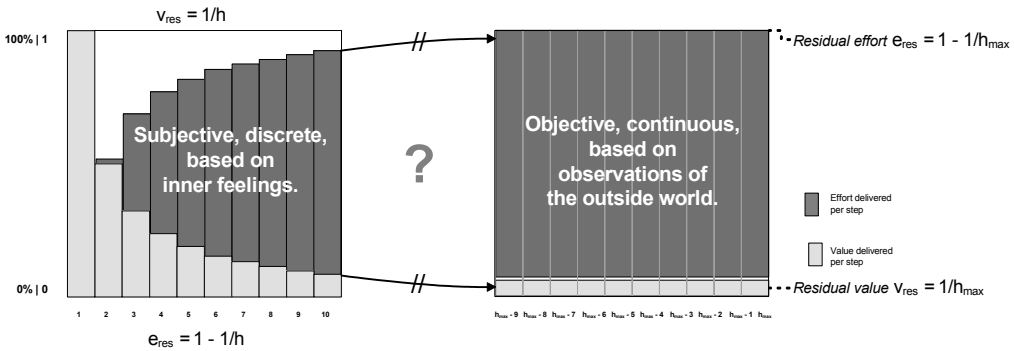
How a subjective, discrete, and non-linear phenomenon (left) transforms into an objective, continuous, and linear system (right). Or, conversely, how an objective, continuous, and linear system (right) transforms into a subjective, discrete, and non-linear phenomenon (left).

[324] For a more detailed explanation, see Society in Perspective, An Approach to Improving Societal Practices, Volume I: A Philosophy of Societal Practice, Henk Diepenmaat, 2009.

For an increasingly larger q (constantly more to the right in the figure above), $\underline{e}$ and $\underline{v}$ are approximated better and better by a constant value. After all, we know that the harmonic series will diverge increasingly slowly, eventually even extremely slow. In case of a high q, $\underline{e}$ and $\underline{v}$ will therefore change increasingly slowly, and eventually hardly change at all. In case of an increasingly higher q (right in the figure above), e approaches the residual effort e_{rest}, and v approaches the residual value v_{rest}. That is reached at q_{max}.

That is why, practically speaking, in case of a high q, the right side shows a linear relationship between value and effort. On the left side, the relativistic formulas show a non-linear effect between value and effort. They offer an explanation for non-linear phenomena such as loss aversion, habituation, diminishing returns (consider the spade factory), and increasing added effort.

The experienced value of each subsequent repetition does not go down to zero when q increases. Absolute 0 is never reached. Analogous to that, the experienced effort of each subsequent repetition does not always go down to 1. Absolute 1 is never reached either. Perhaps you might think that it is caused by the harmonic series 1/q. The series 1/q and (1-1/q) operate as limits, after all, and that means that it makes sense to entertain that notion. But there is a far more practical reason why the process necessarily already stops (practice takes precedence over theory here). That is because all available perspectives of a consciousness have already been deployed at a given point in time. We regularly reach those limits. After all, each consciousness is limited in perspective to q_{max}. At that point, the value cannot decrease any more, and the effort cannot increase anymore. This residual value and residual effort of a perspective can be compared to the residual mass and residual energy of a particle in physics. It is determined by the number of perspectives available to an actor or multi-actor.

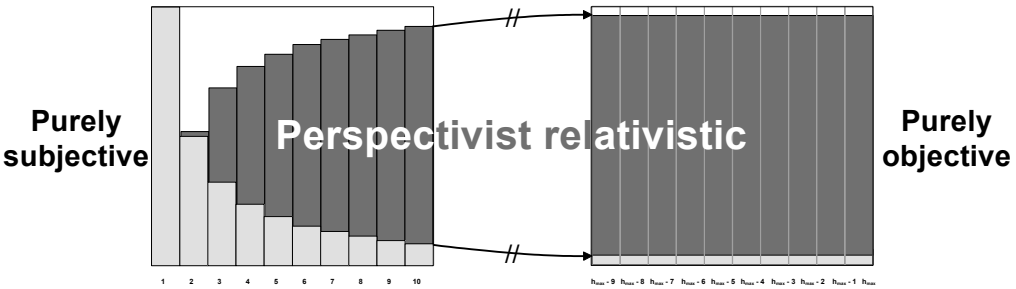


Dualism: the subjective discrete worldview is placed on the left in the experience, and the objective continuous worldview on the right. The wide transformation at the question mark is not understood.

We can use the following pseudo-objective approximation formula on the right-hand side of the figure:

$$e_{rest} = c \cdot v_{rest}$$

in which e_{rest} is a pseudo-objective effort, v_{rest} is a pseudo-objective value, and c is a big constant with regard to v_{rest}.[325] I call them pseudo-objective, as the harmonic series also has an impact here. When q changes, then they change of course, even if a little bit, and then they appear to be non-objective. If q becomes very big, the relativist effect will be hardly detectable and therefore practically negligible, and e_{rest} and v_{rest} will be excellent pseudo-objective approaches for a sizeable region on the right-hand side. That is precisely why we can use the constant c. But of course the series 1/q and 1 – 1/q also have their relativistic effect here, and the constant is not actually consistent. It changes very slowly for a very big q, but it does change. Deviations from objective values are usually dismissed as measurement errors. But because the graph only applies statistically, we must actually simply expect these 'measurement errors'. That is not as much to blame to imperfect measuring systematics, but it is inherent to the statistical nature of the objective experience itself.



Perspectivism bridges the gap between subjective and objective, and covers the entire spectrum of experience. Purely subjective and purely objective are outside the area of experiencing (they are transcendental). Perspective is the building block of experiencing (and is therefore immanent).

Subjective is often interpreted as linked to a person or actor; it concerns a subjective inner world. Objective is generally applicable; it concerns an objective outer world that can be experienced by everyone. Perspectivist relativism bridges the gap between objectivity and subjectivity. Our societal life, our multi-actor practice takes place in this wide area in between (see figure above).

[325] In physics, the energy of a particle at rest is equal to (a constant times) mass. This is the famous formula $E=mc^2$ of Einstein that describes mass as equivalent to energy, where the constant is the square of the speed of light. There is a certain analogy between the formulas **i**=c·**w** and $E=mc^2$. In the formula **e**=c·**v** the constant is big, because **e** and **w** continue to diverge. You can consider them pseudo-objective because the harmonic series will constantly diverge more and more slowly, until its divergence becomes exceptionally slow. In Einstein's formula, the light speed constant is also very large, because there is a certain analogy between objective effort and energy, and between mass and objective value.

6.6.8 All three perspectivist dimensions are relativistic

We now understand how – strictly statistically speaking – a conscious actor[326] repeatedly experiences a similar, or at least strongly comparable perspective. The explanation above is based on just the similarity dimension (it concerns repetition). But the perspectivist actor space has *three* dimensions. In addition to similarity (**s**), there is also pluriformity (**p**) and unity (**u**). Our society revolves around how actors experience and achieve value and effort in interaction within three-dimensional space.

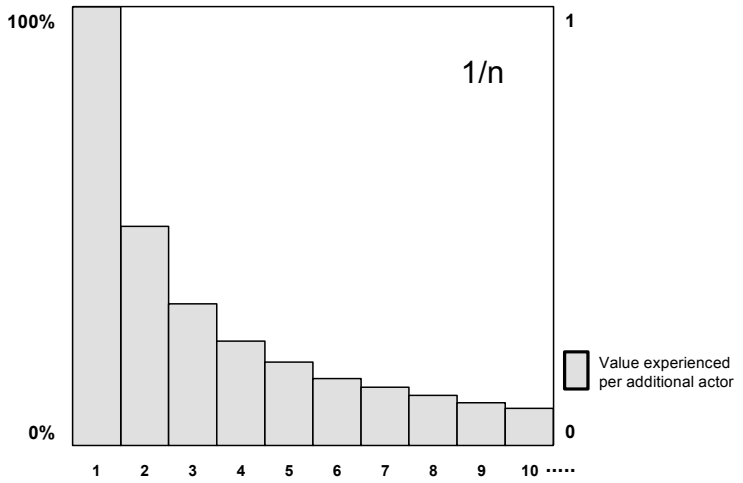
The relativistic effects substantiate why you cannot continue in just one direction as a conscious actor. It will result in constantly harder work for less value, which is why you will quickly try to approach things from a different angle. You focus on something else; you start looking for it in another dimension. That is why a sugar beet farmer will not spend 100% of his time growing sugar beets. He will need to rest, eat, and have a social life in addition to his work. There is much more to experience, perceiving more value and less effort. The laws of diminishing returns and increasing added effort also kick in mercilessly here. That is how a consciousness focuses in its experiential world. I will get back to that in a bit.

Each perspective is a perspective just like any other. I therefore presume that a perspectivist consciousness in each of the three dimensions of perspectivism handles perspectives exactly the same: it calibrates value and effort to the quantity of perspectives q. The relativistic experience of value and effort works exactly the same for pluriformity and unity as for similarity: the same assumptions, formulas, and graphs are applicable. I will also explain that for pluriformity and unity here.

If the dimension *pluriformity* keeps on increasing (**p** increases, **s** and **u** are 1 or straggle behind p in practice), the experienced value as a result of each subsequent actor will diminish in relative terms and the experienced effort will continue to increase. So pluriformity actually behaves exactly according to the previously shown tables and graphs for similarity, including the inverse, averse, and relativistic relationships. Intuitions are also strong and telling here. The phenomenon explains why we have valuable relationships with just a handful of actors, and less valuable relationships with more and more actors (also see the figure below). That is why it takes more and more effort to have valuable relationships with an increasing number of actors (the effort graph is not shown). We are also dealing with statistic facts here: the pattern will look different here for various actors, but on average the formulas will apply. Often, someone with two children will not differentiate much between the two, and someone with six children might set that limit at six; there may be one favourite. Some people have a small and intense group of friends, others a bigger and less intense. But strictly statistically speaking, averaged out across more and more examples, the experienced value decreases and the experienced effort

[326] Conscious actor is of course a tautology, just like white fungus or cold ice.

increases when the pluriformity increases. That is why most people choose to engage in an intense relationship with one or at best only a few people. That is also why meetings with many different actors (a very high **p** and a very low **s** and **u**) will result in a cacophony. That does not rule out in any way that 100 excellent musicians can provide a magnificent performance of Beethoven's Ninth Symphony, or that you could listen to a pop concert with 100,000 people in perfect harmony. In addition to pluriformity, however, that would also require similarity and unity of experienced perspectives to be quite high. The fact that it is possible is therefore a matter of balance.

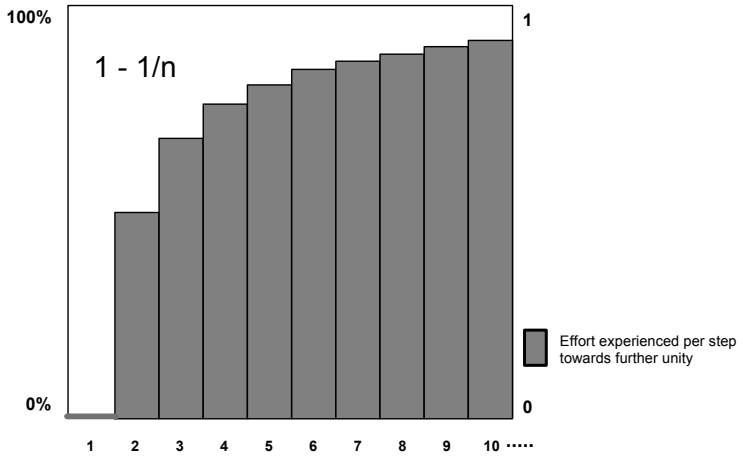


Diminishing valuation in the context of increasing pluriformity, not quantified (increasing number of different actors), s and u are 1.

Loss aversion also has its specific pluriform counterpart here. You fear losing someone you care for dearly much more than you appreciate the potential benefit of gaining a possible new friend for life. And that applies on any scale, such as allies in military conflicts or kinship and fellowship between countries.

That also applies to the dimension of *unity*. If the unit keeps on increasing (**s** and **p** are at 1 or are straggling behind **u**), the relative added value of operating *even more* as one single unit is experienced less with each subsequent next step. And the effort to comply with that increases (see figure below). People do not like to submit themselves to a constantly wider, stricter, and stronger discipline. Again, this applies strictly statistically. It might be necessary once in a while, for instance in case of a fire drill or in times of peril; then people will conform. And some people will feel more at home in unity than others. But in general, a constantly growing unity is perceived as rigid, inflexible, and undesirable. It also takes a constantly increasing amount of effort, dedication to constantly do more things for the benefit of one big monolith. That takes place to the detriment of individuality (**p**) and cultural or professional pride (**s**) of the actors involved. When people are subjected to an immense unity, their pluriformity and similarity will perish. They then become one

fascistoid entity. That is why cultural minorities so consistently resist oppression (again: statistically; there are exceptions, but they are rare).



Increasing effort with increasing unity, not quantified (increased behaviour as one rigid actor), s and p are 1

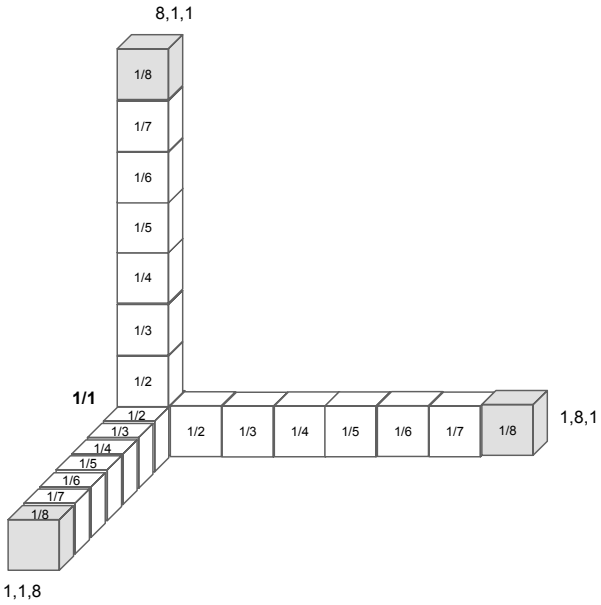
Loss aversion also has its unity counterpart here: people are much more loathe to give up an established unity than to achieve a new unity. That is why the group pressure to keep on participating is extreme, especially in smaller groups that share virtually any experiences, such as cults and national government politics. Spinoza had plenty to say about that in his private life. Even in politics and in relationships, we recognize the rule of thumb: you break it, you bought it.

The relativistic value in two and three dimensions

"But dad, a block does not have a front side, right?"
Chris Diepenmaat (aged five years old)

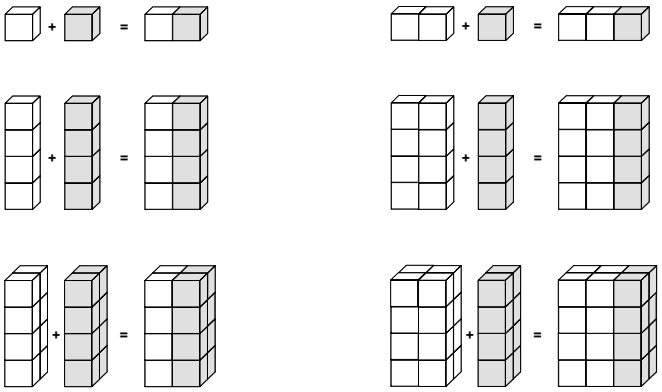
Similarity, pluriformity, and unity therefore behave according to the same formulas and figures for relativistic value and effort. That is because all three are based on the same recursive nominator, on one foundation: perspective. And a conscious actor or multi-actor will – strictly on average, statistically speaking – deal with each perspective in the same way. In principle, a conscious multi-actor in three dimensions simply does what a conscious multi-actor does: they calibrate value and effort to the number of perspectives in a relativistic way. If you standardize the experiential value for s=1, p=1 and u=1 at 1 (100 %), then this experiential value will decrease across each of the three dimensions according to 1/n. Conversely, the experiential effort will increase according to (1-1/n).

That is why, in each of the three perspectivist dimensions, there is a similar experience of diminishing value in accordance with the harmonic series. That looks like this in a three-dimensional figure:



The one-dimensional experiential values along the three axes up to and including 8.

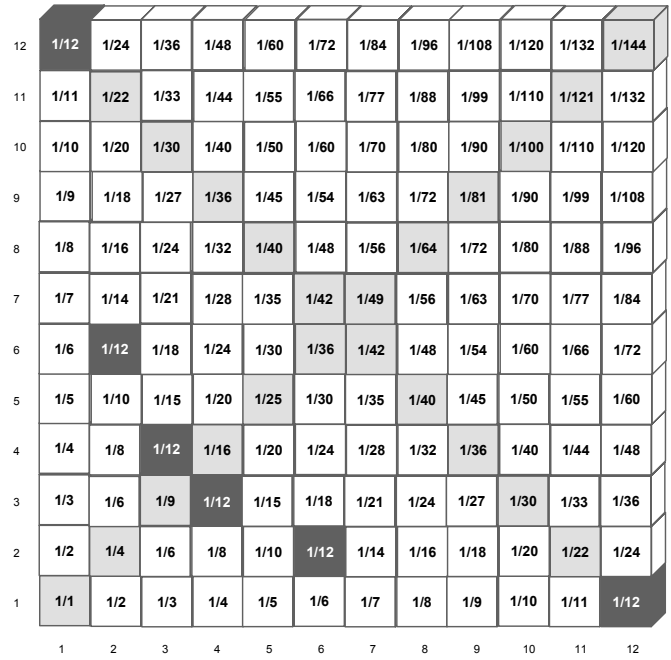
We already know that the *number* of perspectives that is added per step alongside one of the dimensions depends on the multiplication (the product) of the *other two* dimensions, and therefore on the position along the other two dimensions. I have previously used the analogue with the door: making a door thicker requires far more units than making that same door higher. The following figure clarifies this principle.



In all three cases on the left, the grey perspectives add 1/2 (50%) of the resulting value on the right, and 100% (a doubling) of the original value. In all three cases on the right, the grey perspectives add 1/3 (33.33%) of the resulting value on the right, and 1/2 (50%) of the original value. The addition on the left and the right is equal in objective terms.

In principle, this remains the same, relativistically speaking, with the big difference that each perspective now no longer represents the same value. After all, the experiential value of the starting position and the resulting position do not only depend on the number of perspectives, but also on the position (the distance of the three axes) and the direction.

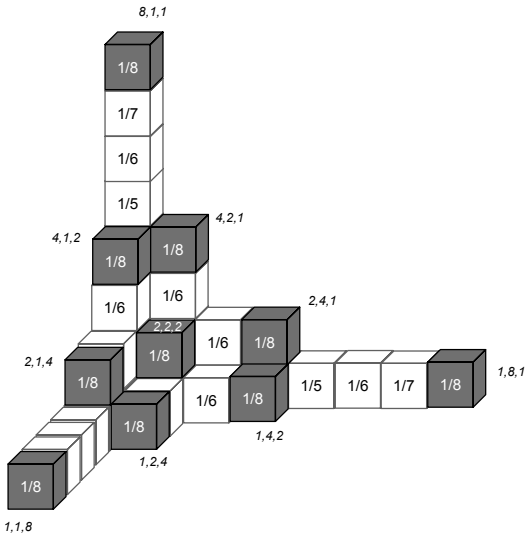
We can calculate the relativistic value for each perspectivist cube in space when we base it on growth paths and a value of 1 for the corner cube (1,1,1). That occurs for the three-dimensional version of the series 1/q, therefore 1/p·s·u. For various cells, that for instance results in: 1/(4·6·1) = 1/24 and 1/(4·7·1) = 1/28 and 1/(5·6·1) = 1/30. The number in each cube is equal to the *average value* per perspective at a standardized total value of 1. In the following figure, part of the space was filled in in 2 dimensions.



The relativistic value in two perspectivist dimensions, for instance pluriformity and similarity. Each box states the average value per perspective for that specific configuration, standardized at a total value of 1. This is 1/(p·s).

For q=12 along two dimensions, *discrete inverse proportionality* emerges: for points (6,2) and (2,6), the value at the axis is 1/6. As a consequence of this step, the second column or row needs to be multiplied by ½: 1/6x1/2=1/12. Or you can reason the other way around, of course: you depart from the axis value 1/2, and multiply by the correction value 1/6. That does not make a difference. The same applies to points (4,3) and (3,4): 1/4x1/3=1/12, and the other way around is valid too. This concerns the dark cubes in the 12 by 12 figure above. Because the relative value 1/12 applies to each number of perspectives 12, the value 1/12 is located exactly in these dark cubes. They clearly show their mutual, discrete non-linearity.

On the next page, you can see the partly filled-in perspectivist space in three dimensions.



The relativistic value effect in three dimensions.

For q=8, the average relativistic value is 1/8. Then the discrete inverse proportionality emerges in three dimensions:

The average value of the three points (8,1,1), (1,8,1), and (1,1,8) according to the harmonic series is 1/8.

For the six points (4,2,1), (2,4,1), (4,1,2), (2,4,1), (1,2,4), and (2,1,4), it is 1/4x1/2=1/8.

For point (2,2,2), it is 1/2x1/2x1/2=1/8.

There are therefore 10 positions with an average relative value of 1/8. This concerns the dark cubes in the three-dimensional 8 by 8 figure above, it shows their mutual non-linearity in the isoplane, the sail.[327]

The implementation above makes it possible to calculate the *experienced* value development (the experiential value) when following the paths from (1,1,1). Then we add up all values of the cubes that constitute the new position. If we for instance move from (1,1) to (2,2), then the experiential value is 1/1 + 1/2 + 1/2 + 1/4 = 2 ¼ (the Pascal pattern 1:2:1 can be recognized). From (1,1,1) to (2,2,2), the calculation is as follows (also see the figures above):

1/1 + 1/2 + 1/2 + 1/2 + 1/4 + 1/4 + 1/4 + 1/8 = 3 3/8 (expressed in decimals: 3.375, the Pascal pattern 1:3:3:1 can be recognized)

[327] In anticipation of the intermezzo regarding quantification: just as in the example of a number of perspectives and value, when we constantly increase q by one step in one single dimension, stack the cubes neatly and jointly in three dimensions, without any gaps and without duplicate claims for a spot.

Or take the already slightly more complex path from (4,6) to (4,7). The values up to (4,7) can be written down as follows (I am following the rows):

(1/1 + 1/2+ 1/3 + 1/4) +
(1/2 + 1/4 + 1/6 + 1/8) +
(1/3 + 1/6 + 1/9 + 1/12) +
(1/4 + 1/8 + 1/12 + 1/16) +
(1/5 + 1/10 + 1/15 + 1/20) +
(1/6 + 1/12 + 1/18 + 1/24) +
(1/7 + 1/14 + 1/21 + 1/28)

We can now see that:

The second row is 1/2 times the first row,
The third row is 1/3 times the first row,
The fourth row is 1/4 times the first row,
Etcetera.

For the first row: 1/1 + 1/2 + 1/3 + 1/4 = 2.0833
For position (4,6): (1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6) 2.0833 =5.10
For position (4,7): (1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7) 2.0833 = 5.40
Because this is 1/7 times 2.0833 bigger.

The difference in value from (4,6) to (4,7) is 5.40 - 5.10 = 0.30
Relatively speaking, this difference is 0.30/5.40 = 0.0555, or 5.55%
You can calculate the difference in this step directly as 1/7 times 2.0833 = 0.30
The difference in value experience from (4,7) to (4,6) is 5.10 - 5.40 = –0.30
Relatively speaking, this difference is 0.30/5.1 = 0,0588, or 5.88%

The calculation of the experiential value in *three dimensions* is analogous, but now with one additional dimension. From (1,1,1) to a random spot (k,l,m) you first calculate the value progression of (1,1) to for instance (k,m) as described above (it is also possible to move to (k,m) or (l,m)). Subsequently, you also carry out the procedure for the third dimension.

Take (2,2,2), calculated just now as a separate sum. According to the procedure, this happens as follows:

The value of the first *row* is (1/1 + 1/2) = 1.5
The second row is 1/2 times the first row.
For the *plane* (2,2,1) it is: (1 + 1/2) times 1.5 = 2.25.
The second plane is 1/2 times the first plane.
For the *bar* (2,2,2) it is: (1 + 1/2) times 2.25 = 3.375.

This procedure is much easier than processing and calculating all values of all perspectives separately.

In the case of (2,2,2), there will be a special bar, specifically a cube: the three sides are equal. In case of (2,2), there is also a special shape, specifically a square: the two sides are equal. In case of a square, the experiential value is the experiential value squared of a random selection from the first rows which make up the side (they are after all both equal). In case of a cube, the experiential value is the experiential value to the third power of a random selection from the first rows which make up the sides (after all, all three are equal). We can then directly calculate the experiential value as follows:

For (2,2): $(1 + 1/2)^2 = 1.5^2 = 2.250$
For (2,2,2): $(1 + 1/2)^3 = 1.5^3 = 3.375$
For (3,3) : $(1 + 1/2 + 1/3)^2 = 1.833^2 = 3.361$
For (3,3,3): $(1 + 1/2)^3 = 1.833^3 = 6.162$

The experiential values of points (8,1,1) and (9,1,1) are as follows:

(8,1,1): $1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 = 2.72$
(9,1,1): $1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 + 1/9 = 2.83$

We can now see the huge difference in experiential value between q perspectives in one dimension (the form with the least balance), q perspectives in a square, and q perspectives in a cube (the form with the biggest balance). I put a number of the values above in a table and show the average experiential value:

q	row	$\underline{v}_{row}$	square	$\underline{v}_{square}$	cube	$\underline{v}_{cube}$
8	(8,1,1)	0.340	-		(2,2,2)	0.422
9	(9,1,1)	0.314	(3,3,1)	0.373	-	

If there is only one dimension, it is at the same time also the highest possible average experiential value $\underline{v}$ (since it is the only one). In two dimensions, the square has the highest possible average experiential value $\underline{v}$. In three dimensions, the cube has the highest possible $\underline{v}$.

The general principle is that with a fixed q, the average experiential value per perspective, and therefore also the total value experience, will be bigger as the configuration approaches 'cubic' symmetry (in many dimensions), and smaller when the symmetry gets closer to the row.

6.6.9 The fundamental theorem of arithmetic in perspective

The waves are the days
the days of the year
It seems as if they tell a story
of how we are faring

But the undercurrent
which is invisible to all
Determines the direction
in each area
Stef Bos: The Undercurrent[328]

I will provide one more final calculation which proves that the diagonal positions generate the most value for societal practices. In this example, I link the perspectivist space and ratios directly to the *fundamental theorem of arithmetic*, because that is what they are based on.[329]

The fundamental theorem of arithmetic states that each integer bigger than 1 is the product of prime numbers, and – separate from the order of these prime numbers – in *exactly one way*. That also applies to each q. The possible societal configurations in the sail, the isosurface of for instance q = 12155 in the three dimensions of perspectivism p, s, and u can now be determined easily by taking all products of these prime numbers, which end up in 12155, and convert them into three dimensions.

We take for instance q=12155. That is 5 x 11 x 13 x 17 x 1 x 1= 12155. The numbers 5, 11, 13 and 17 are all prime numbers. Two 1s are added for the conversion to three dimensions, as I will explain now.

A number of possible positions[330] in the isosurface q = 12155 are shown in the left-hand column as prime number factorization (multiplication of prime numbers), and in the middle column as a three-dimensional representation. The total number of perspectives q is therefore in all of these situations 12155, and exactly the same. The right column provides the calculated relativistic experiential value according to the principles which have been explained previously:

[328] These lines, originally in Dutch, have been brought to my attention by Jan Rotmans.
[329] Conversely, the fundamental theorem of arithmetic is based on the way our perspectivist consciousness operates.
[330] We can switch the axes; take (12155, 1, 1), (1, 12155, 1), and (1, 1, 12155). These actor configurations are different regarding p, s, and u, but because the proportions of the bar are the same, it does not make a difference for the experiential values and the cubic symmetry argument. The 1 is absent in most places, even though that does not make a difference: it can be added everywhere. After all, we can multiply any random number by 1 without any other effect. For the positions listed above, q= p·s·u = 12155

Prime number factorization	Conversion to 3D	Experiential value
(5 x 11 x 13 x 17, 1, 1)	= (12155, 1, 1)	9.982753
(5 x 11 x 13, 17, 1)	= (715, 17, 1)	24.59348
(5 x 11, 13 x 17, 1)	= (55, 221, 1)	27.458956
(5 x 17, 11 x 13, 1)	= (85, 143, 1)	27.860441
(5 x 11, 13, 17)	= (55, 13, 17)	50.24602
(5 x 13, 11, 17)	= (65, 11, 17)	49.434723
(5 x 17, 13, 11)	= (85, 13, 11)	48.265244
(5, 11x13, 17)	= (5, 143, 17)	43.537094
(5, 11 x 17, 13)	= (5, 187, 13)	42.195415
(5, 13 x 17, 11)	= (5, 221, 11)	41.218132

If we place the experiential values in sequence of diminishing value, we immediately see that it is equivalent to diminishing cubic symmetry. We find the highest experiential value at (55, 13, 17). It still does not particularly display cubic symmetry, but it is the closest to cubic symmetry of the options on this isosurface q = 12155. We find the lowest experiential value at (12155, 1, 1). This is the shape that shows the least cubic symmetry of the options that the isosurface q = 12155 has to offer. (In all cases: (q,1,1) is the row shape).

We can also look at positions that may deviate from q = 12155, but that achieve far better cubic symmetry. Take the position (23, 23, 23), for example: perfect cubic symmetry. The product is 23 x 23 x 23 = 12167, so it is close. It's only 12 perspectives from 12155, approximately 0.1 percent (1/1000) more. The experiential value of position (23, 23, 23) is 52.074444, so 0.1 percent extra raises the experiential value by more than 3½%.

Something similar applies to position (22 22 22), with q = 10648 and experiential value 50.276638: far fewer perspectives, but still a slightly higher experiential value. Position (24 24 24) with q = 13824 and an experiential value of 53.837082 may require more perspective, but delivers more value for the effort. The table on the next page compiles a number of options from the discussion above and calculates the average value per perspective.

Position	q	Experiential value	v
(55, 13, 17)	12155	50.24602	0.00413
(65, 11, 17)	12155	49.434723	0.00407
(85, 13, 11)	12155	48.265244	0.00397
(23, 23, 23)	12167	52.074444	0.00428
(22, 22, 22)	10648	50.276638	0.00472
(24, 24, 24)	13824	53.837082	0.00389

I am assuming three dimensions here, because that fits with the way in which we apparently experience things in three dimensions, but an analogous line of reasoning would be just as valid for more dimensions, or recursive approaches. This offers an impression of how a perspectivist consciousness deals with position and value: extremely

pragmatically. In the short term and on a small scale, this relativistic undercurrent is difficult to detect. If a tyrant develops who has a huge desire to prove a point, and coincidentally ends up in a position to take power, the short-term course will definitely be stronger than the relativistic undercurrent. In the slightly longer term and on a slightly larger scale, however, the relativistic undercurrent will emphatically and inevitably determine the course of societal development. I described the analogy with the dice earlier: in the short term, we have no control over the individual tosses of the dice, but in a long series, an inevitable pattern will emerge; the same holds true for the relativistic undercurrent.

There are three degrees of freedom: p, s, and u. The best values for $\underline{v}$ are always along the diagonal. For that reason, a multi-actor practice which is balanced is better. The hunter-gatherers already showed us that by assigning hunting to strong men, and assigning caring for young children and gathering food to smart women. They took more steps when the stonesmith emerged. They optimized their internal distribution of tasks, until they were very close to achieving the diagonal position. Things went well for them, and their numbers grew. This growth put pressure on the land available to them. At that point, the only remaining course towards additional experiential value was to move towards higher values of q, and to seek the balance again. The first recognizable steps along *the path of humanity* were taken very early in human history.

We see the same thing in the self-organization that happens in a group of young people who head off to camp: the tasks are distributed, and if someone doesn't do their share, he or she is reminded of their responsibility.

6.6.10 Abstraction and specification and prime numbers in perspective

We see from the example above what the three-dimensional perspectivist consciousness does, and therefore what a perspectivist consciousness essentially does. The perspectivist consciousness combines products of prime numbers, no matter how complex, into positions in three dimensions with (approximately) the same product. Prime numbers cannot be factored out to be expressed as an even smaller product. That is the core characteristic of prime numbers: they can only be divided by 1 and themselves.

This step represents a considerable clean-up, which we recognize as an abstraction step. On this basis, we can rapidly shift our focus to those combinations of perspectives that have lots of value and/or take little effort in our experiential worlds. These perspectives are located closest to the diagonal. After that, we can open up the closed box, since we can now restrict ourselves to this focus. We can also close up a box after it's opened, and shift our focus elsewhere.

In essence, the perspectivist space therefore supports abstraction and specification steps. The dimensions of pluriformity, similarity, and unity help us to classify experiences in terms of the basic categories of what we experience as the same (s), what we experience as different (p), and what we feel belongs together (u). This type of step is never perfect, since

we are playing around with microlevels and macrolevels. Things that are the same at the macrolevel are always different at the microlevel. Things that are the same at the microlevel are always different again at the macrolevel. That's the way it should be; otherwise we wouldn't be able to distinguish situations as being different from one another, and we would be unable to experience a flow of perspective. It's not perfect, but it is incredibly practical, and helps us to survive in a fickle and unstructured environment. For a detailed discussion of abstraction and specification steps, please refer to my thesis.[331]

The previous section used an exact relativistic theory to express why societal practices yield more value on the diagonal of the perspectivist space from (1, 1, 1) to (n, n, n), and take less effort. The number of perspectives is **q=p·s·u** (the first perspectivist balance). Objectively, value and effort are proportional to the number of perspectives according to **q=v=e** (the third perspectivist balance). However, since the average experiential value per perspective $\underline{v}$ and the average experiential effort per perspective $\underline{e}$ have very different 'values' at different places in the space, and the highest ($\underline{v}$) and the lowest ($\underline{e}$) reside on the diagonal, strictly statistically speaking, the second perspectivist balance also becomes increasingly valid for an increasingly higher q: **p=s=u**. The Cro-Magnon stonesmith in the Vézère Valley did not yet have access to this insight as a tool for directing societal development, but acted in accordance with it anyway.

As I stated a bit ago in relation to the calculation procedure: "This procedure is much easier than processing and calculating all values of all perspectives separately." Keeping the above discussion about abstraction and specification in the back of our mind, this was more than just a side note about the complexity of the calculations as such. I think the statement says something about the practical approach that we take to our experiences, as people. In our daily lives, it is absolutely vital for us to be able to rapidly recognize and assess things, and then act according to what we decide based on sufficient perspectives. This defines our societal practices, and the experiential value and the experiential effort of perspectives play a crucial role in this context.

In every case, there is a trade-off between speed and precision. By arranging our perspectivist experiences according to the principles of the three-dimensional perspectivist space, retaining the best perspectives each time, and allowing the balance to take effect as much as possible, we can improve our value generation, and valorize our efforts more effectively. What we are essentially doing, in that case, is making optimal use of perspectivist processes such as focusing, adaptation, abstraction and specification.[332]

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[331] Henk Diepenmaat (1997), Trinity, Model-Based Support for Multi-Actor Problem Solving, University of Amsterdam.

[332] See my thesis: Trinity, Model-Based Support for Multi-Actor Problem Solving, p. 89, table 2: A typology of primitive modelling steps, for a discussion of abstractions and specifications in terms of the three dimensions of perspectivism. Appendices C and D also emphasize the coherence between the three dimensions of perspectivism.

As it turns out, three dimensions would appear to be optimal. If we use two dimensions, we have to let go of one of the three recursive-perspectivist categories: pluriformity/difference, similarity/sameness, or unity/wholeness. We can hardly imagine what that would look like, since our experiences are based on these categories. That's the way we are – or rather, that's how we configured ourselves from our very first conscious experiences. Adding more dimensions on top of the existing three would not contribute much in terms of additional effectiveness, or our consciousness would be experimenting with those dimensions. For that reason, I do not think it's a coincidence that we experience our world in three spatial dimensions, any more than it is a coincidence that we keep structuring our experiences in three perspectivist dimensions.[333] People are above all pragmatic improvers. That is our human condition. Value and effort take centre stage here, and they are linked to perspective. The three-dimensional perspectivist space is very effective for structuring and selecting our experiences with a view to future use. Moreover, the three-dimensional perspectivist space also offers a great deal of insight into how we operate in society. Until now, we primarily approach the general vicinity or close proximity of the diagonal by accident, at least where complex societal practices are concerned. In future, we could deliberately aim for that diagonal.

6.7 The path of humanity in perspective

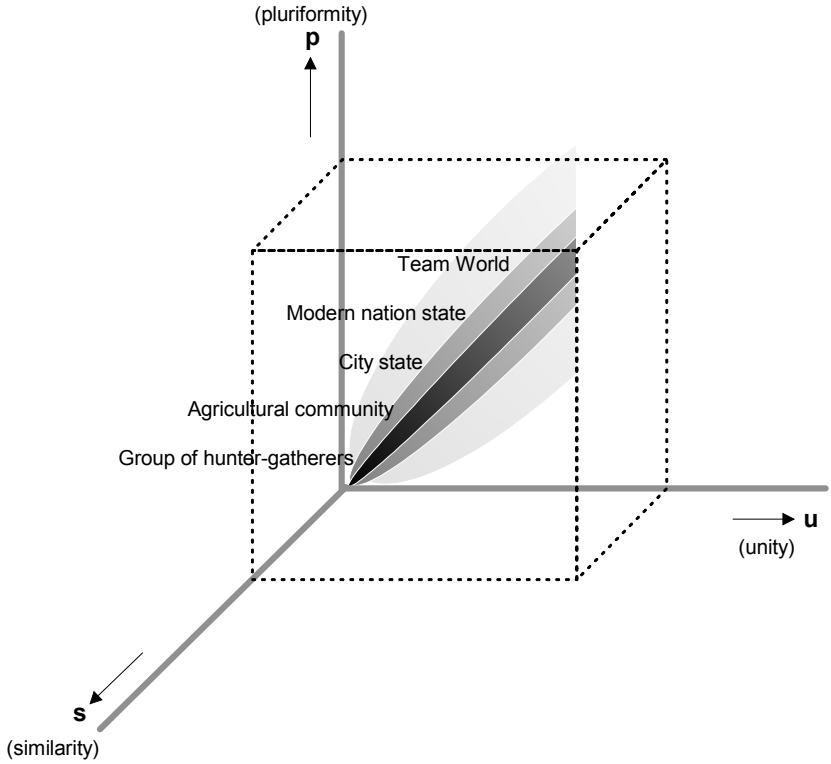
We can now place *the path of humanity* fully in perspective. For that purpose, we will return to the three-dimensional Cartesian coordinate system, noting that the axes consist solely of whole natural numbers. Each point in this space represents a societal multi-actor practice with a perspectivist scope of q = **p·s·u** (the *first* perspectivist balance): the content of the bar between the origin and this point corresponds to the number of perspectives q (since volume is length times width times height).

Each of these three dimensions represents a *specific* societal force, but if any one becomes dominant, quality suffers as a result. It is therefore interesting to have *all three* dimensions reach the *highest possible level*: you want to maximize the three forces, but not to let them undermine each other. Recursive perspectivism reveals the main structural difference between an underdeveloped society and a developed society. If societal practices that follow are better than their predecessors, they achieve better scores in all three dimensions than previous forms of society along *the path of humanity*.

[333] All in all, I think that our material world is not three-dimensional in spatial terms, but that our consciousness makes it three-dimensional. For all practical purposes, that makes little difference in our everyday lives. It does make a difference in guiding a society, however. So what is the material world beyond our experience? I have absolutely no idea, nor could I. I am following fully in the footsteps of Immanuel Kant here, who referred to this concept as *die Dinge an sich* (or *das Ding an sich*).

The dimensions do not randomly reinforce each other. The ultimate society constantly seeks to achieve a balance between the three dimensions[334]; this is the essence of plurimodernity. If things get out of balance, if one dimension grows too strong or too weak, it results in societal weakness. Extremely uniform societies are weak because they have similarity, but lack unity and pluriformity. Extremely pluriform societies lack similarity and unity. They therefore have a tendency to fall apart to the point at which the balance has been restored for the crumbling fragments, but at a lower level.

The three dimensions are in balance at, or in any case near the line **p**=**s**=**u** (the *second* perspectivist balance). This is the diagonal from the source moving up and over into the space (see figure on the next page). A bar share implies imbalance according to the *second* balance (the sides p, s, and u are not the same size). The bigger the imbalance becomes, the less probably it is (balance is a statistical phenomenon), so a bar will eventually turn into a cube again (p=s=u).



*The path of humanity weaves more or less from the origin along the diagonal **p** = **s** = **u** (the second – proportional – perspectivist balance). In general terms, our societal development follows this path, with ups and downs.*

[334] And this at various recursive multi-actor levels!

If the quantity of available perspective q is fixed, then this search for balance, this pull towards the diagonal, will by necessity move along the available points of the sail from the first perspectivist balance. The dimension that pushes its claim too far gives ground, while less privileged dimensions grow. But there are other options, of course. You can also take your leave of each other (with or without conflict) and find a new balance at a lower level of q. Or you can add more numbers and restore the balance at a higher level of q. In each case, these are balance points, and therefore cubes of varying sizes, of which – in cases involving significant imbalance – some involve a major leap forward, and others represent a significant step back. That's how *the path of humanity* progresses.

If you scale up, you will eventually have to respect the balance: **p** and **s** and **u** will increase. That is exactly what Frederick Taylor discovered in the early twentieth century when he introduced scientific management or Taylorism in his division of labour. If you raise **p**, you can raise **s**, but that does not work out well; you lose unity. Inevitably, the **u** (which safeguards unity) will also need to rise.[335] The three dimensions combine and leapfrog in time, but at the same time, an optimal actor configuration seems as though it's linked to the diagonal balance situation with a rubber band; putting it under too much pressure leads to a loss of societal value.

The path of humanity constantly seeks the highest possible point, moving as far as possible on the diagonal of the second perspectivist balance in the actor space. Hunter-gatherers lived in many autarkical groups, each consisting of a few dozen people; traces of coherence on larger scales are also found later. Within such a group, balance was achieved to a significant extent at some point. However, there was no large-scale coherence *between* the groups: at that scale, **s** was very high, while **u** and **p** lagged far behind. There was a vast amount of untapped potential from all these perspectives in coherence. In response, **u** and **p** increased: the pull, the transition to a higher position on the diagonal with a stronger sense of unity (**u**) and more specialization (**p**), culminating in the sedentary agricultural society.

We follow the path farther and farther upwards, in a furious climb of diagonal-seeking stair steps varying in height, into the space near the diagonal, jumping from sail to sail, from configuration to configuration, because – on average – the three dimensions grow stronger as high as possible and as close as possible to the diagonal, so that's where the most societal value can be generated.

During our journey, we sometimes take a large step away from the diagonal, and fall back, due to natural influences or societal forces. Natural influences include such factors as the climatological drought in the Yucatan (the Mayans) that occurred in the late ninth and early

[335] Ironically, Taylor came up with a professional manager (planner was the term at that time) who increased **p** even further. Stacking management layers is therefore doomed to failure. The consequences are sometimes bizarre, as we see e.g. in the healthcare sector, which is sometimes over-managed, but at the same time experiences staff shortages for bedside care.

tenth century. Societal forces include such factors as the communist and fascist regimes of the twentieth century, which overemphasized **s** and **u**, respectively, and shared an extreme hatred for a free and dynamic **p**.[336] These societies did not survive in that unbalanced form. It is no coincidence that Western societies cherish a free and dynamic **p**. That has its disadvantages, too: we are pushing the limits of our living environment in many ways, and this has a significantly worse economic impact on specific actors (less well-educated youth) than on others. When we are out of balance, we sometimes find our balance again at a lower level (we revert to a smaller cube), and sometimes we leap up along the diagonal (we find a bigger cube). The tide eventually turns, time and time again.

In the very long term, we follow *the path of humanity* more or less upwards along the diagonal in the three-dimensional actor space. We certainly can't manage that completely unscathed; we do take the occasional tumble, sometimes falling quite far. So far, these setbacks have generally not been deliberate, but they still are very much caused by our own actions. The fact that we are not doing it deliberately is simply unwarranted. There are major societal opportunities at our disposal here.

We could continue our staggering path, moving upwards slightly more often than downwards, in the hope and expectation that the tide will turn again; exactly where we'll end up, where we'll return to the diagonal is anyone's guess. Or we could proactively resolve the tensions of our current late-modern societies by deliberately working together to seek the diagonal. That could provide an enormous boost for our next step towards the plurimodern society of Team World. Huge reservoirs of prosperity and well-being still lie untapped there, and we could open the floodgates together.

Plurimodernity in perspective

Plurimodernity refers to a position along the diagonal deeper into the space, a balance between **p**, **s**, and **u** at a greater height. This makes it a specific variation on a much more general principle. After all, it is preferable to keep the dimensions of pluriformity (**p**), similarity (**s**), and unity (**u**) in balance, even for societal practices on a much smaller scale (with a far lower quantity of perspectives q), such as a nuclear family, an extended family, or a city. As a society grows (the perspectives that constitute this societal practice increase in number), then the second perspectivist balance states that all three dimensions will ultimately stay together, more or less. This explains all sorts of societal phenomena on all sorts of scales. This is the mechanism behind specialization and social differentiation, on any scale. If you put lots of similar people together, like at a youth camp, then pluriformity will increase (tasks are distributed, people take on the jobs they're good at or enjoy) at the expense of similarity and unity, producing a coherent and value-generating whole. If the human population grows to 9 billion unique individuals, the need for unity (coherence and cooperation) will grow, while specialization will continue unabated. A global population of

[336] The completely different statements issued by such completely different people as Hayek and Hannah Arendt warning against the totalitarian alliance between fascism and communism find a perspectivist explanation here.

9 billion people begs for the balance of the second perspectivist balance, and thus for the plurimodernity of Team World. If we do not meet these preconditions, the youth camp will be no fun at all; very similar considerations are relevant to our global society on a much bigger scale. The plurimodern transformation is intended to provide more deliberate access to the vast opportunities offered by this new scale.

The question of *what* also gains its first answers here. Our societal development along *the path of humanity*, plurimodernity, and Team World is explained further in terms of recursive perspective. The plurimodern transformation demands that we take a more in-depth look at the others around us to continue improving the quality of life in our society in new, even bigger, but certainly also much more close-knit and diverse coherence and cooperation. It demands of us that we continue the process of comprehending our societies as coherent assemblies (**u**) of pluriform (**p**) and similar (**s**) actors. And we will have to ensure that those societies can be self-sufficient and add clear value in basic ways, at various levels from the bottom up, so they do not collapse like a house of cards if circumstances change. Just look at the collapse of the Union of Socialist Soviet Republics (USSR), and the frictions within our current European Union (EU).

In any case, it is concerning that more and more people have no alternative food sources except for anonymous supply chains via supermarkets. Problems with food safety are not anomalies; they are a direct consequence of an extreme disregard for the second perspectivist balance. Pluriformity and similarity are very strongly present in our late-modern age, but unity is very, very far away. That is symptomatic of all our late-modern, large-scale production–consumption chains. Supervisory authorities play the role of Taylor's planner, and official supervision is certainly always a good thing. However, if the sense of unity is not palpable, if it is not experienced, then pluriformity simply continues developing, so the supervisory authorities must grow to massive sizes and receive enormous amounts of power. Who would opt to embrace such an authoritarian society? Supply chains are efficient as long as they run smoothly, but they are also far from plurimodern; they combine pluriformity (between links) with similarity (within links), causing unity to play second fiddle. They are completely skewed according to the second perspectivist balance. If you don't think there's any way this could go wrong, consider food safety in our society, which is the subject of frequent debate. Or consider the famine during the 'hunger winter'[337] at the end of WWII, which was a much harsher experience for the people affected – and that was just over 70 years ago.

[337] The 'hunger winter', the final winter of World War Two in the Netherlands (1944-1945) was accompanied by terrible famine and fuel shortages, especially in the big cities. Weak as they were, people were forced to head out on long trips to find food in the rural areas, which were much more self-sufficient, in some cases even producing a slight surplus. Thousands and thousands of people died of starvation or froze to death.

Why our experiences are in three dimensions

Even as a child, I wondered why we intuitively experience space in three dimensions, and whether there was really no other way to do it. While working on my thesis, I discovered to my surprise that we also intuitively *think* in three dimensions.[338]

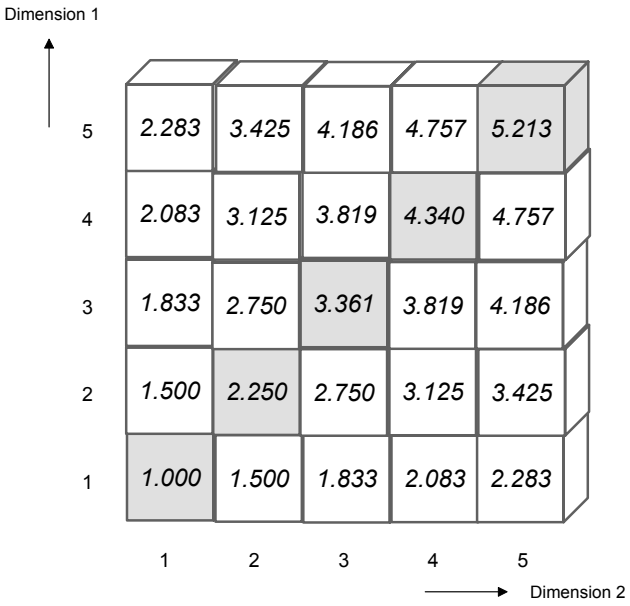
It may not be immediately evident, but the three dimensions of perspectivism – p, s, and u – define experience just as the three spatial dimensions (from near to far away) define movement, and the concepts of classes, members, and systems (from few to many perspectives) define thinking. We experience space in three dimensions, and we think in three dimensions. A general summary could therefore be that we **experience in three dimensions**.

Why are our experiences in three dimensions? It seems like an impossible question, because it is transcendent from the point of view of our experience. Even so, it is possible to start to formulate an answer, based on a perspectivist assumption of purposefulness. After all, what a perspectivist consciousness does is playing with and adapting networks, configurations of perspectives, with the aim of constantly compiling as much value as possible while expending as little effort as possible (in whatever terms it uses to define that value).

Just imagine, we keep bringing more and more perspective into coherence and cooperation, and experiencing more and more perspective. It would be efficient to do so in such a way that the improvement potential is maximized (in all probability, the experiential value will also be maximized after realization). By now, it is clear that we would be wise not to seek solutions solely in one dimension. It makes sense to switch dimensions, as soon as the harmonic series makes it unappealing to continue in a certain direction.

We know *exactly* when, on average, it becomes productive to start seeking solutions in an additional dimension: once the total number of steps in one dimension exceeds 3. See the example in the figure on the next page (repeated) of the two-dimensional combined harmonic series: 2.083 is less than 2.250, so – when 4 perspectives are deployed – position 2,2 is more interesting in terms of improvement potential than position 4,1. When we search for an optimal value for each perspective, for an increasing number of perspectives, the following pattern occurs: (1,1)(1,2)(1,3)(2,2).

[338] See Appendix C of my thesis. Appendices are often where you find the most interesting details.



Improvement potential per composite perspective
(sum of the improvement potentials of the compositing perspectives)

On average, three basic concepts are in play, because we switch dimensions after three steps on average. We see this threefold nature reflected in each layer. Pluriformity, similarity, and unity are the concepts we assign to these three dimensions of perspectivism, slicing through all recursive layers and substantive domains.

Pluriformity, similarity, and unity are by definition recursive, systemic dimensions: they apply in every layer, have a significance and function in every layer and subdomain, and cheerfully leapfrog over each other. Something which represents a unity at a lower layer may well become a similar or pluriform aspect in a higher layer. Something which is similar from one perspective ('a Rembrandt') can be pluriform from a different perspective ('the Portrait of Jan Six'). In that respect, these concepts are different than such concepts as giraffe, or solar system. These concepts can also lay claim to a certain degree of universality, but are condemned to specific scales, areas of application. The recursive, systemic properties of the perspectivist dimensions are not remotely approximated.

Accordingly, *the path of humanity* is – loosely – linked to the three-dimensional diagonal, whether or not we want it to be, or know that it is. I think it would be enormously helpful to be more aware of that.

6.8 Quantum leaps in societal development

'A quantum leap is a change from one energy state to another by the same particle. This can only take place from specific energy levels to other specific energy levels, in fixed energy leaps that are characteristic of this specific particle.'

The title of this section is about societal competence, while also referring to quantum leaps, a concept from the field of quantum theory. That is not a coincidence. The first serious academic field of study I encountered was chemistry; in that context, the microstructure of matter was also addressed. People like Boltzmann, Einstein, Bohr, and Schrödinger were highlighted, along with their theories. At that point, I hadn't the vaguest idea how deep those insights went; I mainly saw the associated examinations as hurdles to be surmounted during the life of a young student. I completed the course of study, but hardly did anything with it after graduation, and have forgotten much of it since then. I went to work at knowledge institutes specializing in environmental technology and research, as well as delving deep into the fields of cognitive psychology, symbolic programming languages, sociology, theories of society, and knowledge technology (expert systems). I did my PhD on multi-actor processes, and then launched a small company specializing in multi-actor process management. It's been decades since I went back and looked at the structure of matter. However, in the past few years, I've been realizing how much recursive perspectivism is subconsciously based on many insights that I must have had as a young chemistry student. I would like to clarify some of those early roots here. Let me be very clear: I am in no way an expert in quantum mechanics (I am fully susceptible to the risks described by Schrödinger in the foreword to this book). It is also entirely possible that some of the following concepts that are completely familiar to quantum physicists may seem like mysterious mumbo-jumbo to others. Even so: the analogies are present, they are significant, and they are intriguing. There is much to be said in favour of a perspectivist societal quantum theory. (See also paragraph 8.7 A societal quantum theory.)

A discrete landscape

Actors experience perspectives, and compile societal practices. One of the foundational principles of this essay is that improvements can deliberately be understood as improvement perspectives. Above all else, people are improvers; they improve things based on perspectives, and in that capacity, they organize themselves into actors. Actors organize themselves into societal practices, resulting in societies. Perspectives are like the recursive atoms[339] of an actor, while actors, in turn, are the recursive building blocks of a society.

[339] *Recursive* atoms; in this sense, of course, they are very different from an atom (*a-tomic*: literally: indivisible). Strictly speaking, perspectives can be divided (a discrete concept), which is not the same thing as randomly divisible (a continuous concept).

'Recursive atoms' seems like a contradiction in terms; doesn't 'recursive' also mean that they are made up of various layers? But points in the perspectivist space are in no way randomly divisible. Each point in the perspectivist space can only be divided by very specific factors, which are determined by the prime numbers.

But which is considered 'better' varies quite a lot. It depends on the experiencing actor, and (therefore) on his experiential world, the perspectivist network that he experiences at any given moment. Obviously, a person is framed within the context of his experiences and is both guided and limited by his insights, but he generally prefers to use the smartest and most effective approach to make improvements. That means that he will compile and manage the perspectives at his disposal with all due care, even if he is largely unaware that he is doing so.

In tangible terms, this means that every perspective should generate as much value as possible while expending as little effort as possible. This process is almost evolutionary in nature: a consciousness processes perspectives as if it were an adaptive, optimizing system. In the slightly longer term, a consciousness manages its perspectives; in the shorter term, it focuses its attention and efforts on value that can be realized immediately by means of perspectives.

As a consequence of this, I assume that at any given moment, a consciousness (individual or collective) and therefore an actor (individual, group, or multi-actor) has a useful value for the average effort per perspective at its disposal, as well as the average value that a perspective yields. Perspectives thus yield an average improvement potential, which can be interpreted as value per effort. A consciousness constantly adapts its perspectives on the basis of these averages. Whether something is considered better or worse than expected is constantly determined against the backdrop of these averages, which change over time. Windfalls are carefully inspected and incorporated, setbacks are preferably avoided, and useless aspects should ideally be forgotten and never noticed again (there is no attention or perceptiveness for those aspects).

The three-dimensional perspectivist space and the various balances that occur within it now offer an intriguing context for societal competence. Societability is placed in this space as configurations, as networks of perspective.

First, the perspectivist space is a *discrete* space (to be precise: a discrete state space). Only the points where similarity, pluriformity, and unity form an entirely natural number are included. It is all about relationships between perfect whole numbers. The total number of atomic perspectives q is then $q = p \cdot s \cdot u$. Theme I (the prelude) already covered how this leads to all sorts of quantum effects in improvement potential, if we keep allowing the number of perspectives to increase in increments of one, as close as possible to the diagonal in two dimensions. The Thracian servant girl did not move forward, that much is true, but Thales fell into the well, which was not ideal either. At the time, I noted that it would have been better for them to hold hands.

By now, we have identified three main perspectivist dimensions: similarity, pluriformity, and unity. At this point, we can add various perspectivist quantum effects. Suppose we find ourselves at configuration (s1, p1, u1). Now we can determine the possible leaps. This is strongly reminiscent of the possible orbitals of electrons in quantum chemistry: electrons can only be present at specific levels of energy, and leap between them.[340] For instance, if we jump in the perspectivist space from configuration (s1, p1, u1) to configuration (s2, p2, u2), then the number of perspectives that accompany this leap are associated with both position and direction. That number can easily be calculated as the difference between the products of s·p·u at the two positions. The step from (4, 1, 1) to (5, 2, 2), for example, takes 5·2·2 – 4·1·1 = 16 perspectives. The step from (4, 4, 4) to (5, 5, 5) takes 5·5·5 – 4·4·4 = 61 perspectives. Even so, both steps increase all three dimensions by one.

In principle, the perspectivist space as a state space consists of many vacant configurations, but that does not mean that they are also always possible or obvious.

For starters, the number of perspectives q that are available determines the *possible* configurations. Only when q=p·s·u is there a possible configuration. Please note that there is a threefold axis of rotational symmetry in the perspectivist space (the diagonal): if (k, l, m) is possible, then so are (l, m, k) and (m, k, l). Mirrored configurations are then also possible, e.g. (l, k, m) and (k, m, l) and their rotations. That is interesting: for every number of perspectives q, a limited number of configurations is possible, and that number is known – at least in theory. For q=1, there is only one possibility: (1, 1, 1). For all prime numbers q, there are three: (q, 1, 1) and (1, q, 1) and (1, 1, q). There are more possible configurations for non-prime numbers. Diagonal positions are particularly interesting.

Second, the more symmetrical configurations (i.e. those on or near the diagonal) are the most appealing, both in terms of the effort it takes to get there and the value that they generate. You can express this as a rule of thumb: In strictly statistical terms, we are looking for high positions close to the diagonal; we are seeking cubic symmetry. You can also calculate this. That holds true both for the macro-interpretation (s, p, u) and for any compositing components. As I already showed in Theme III, Simulation 3, stochastics leads to the harmonic series (see the formula for improvement potential (n) = $\Sigma_{1\text{-}n}$ 1/n).

I think that the Benford and Zipf patterns – and thus also the most stable societal practices – can be traced back to configurations that display a significant degree of symmetry at

[340] This immediately begs the question of whether the Pauli exclusion principle is at work here: according to the Pauli principle, two particles cannot occupy the same quantum state simultaneously. That would explain why the Zipf pattern only allows one configuration in the highest spot, 2 in the next, 3 in the one after that, and so on. In a Zipf pattern, the number of possible quantum states increases as you move lower. And in fact, some contemplation leads to the conclusion that two perfectly identical societal configurations would not be able to co-exist. They share nothing. But third parties would not be able to distinguish between the two, and would perceive them as one and the same. In other words, you would not be able to experience them. In essence, this is a *societal* Pauli principle.

various systemic levels. Take the configuration (27, 27, 27), for example. In turn, it can be constructed from (3, 3, 3), because 3·3·3 = 27. A comparable line of reasoning applies to the configuration (512, 512, 512). Not only is 512 = 8·8·8, but 8 = 2·2·2. That means that symmetrical configurations that can, in turn, be constructed from symmetrical configurations (a recursion) will turn out to be particularly appealing.

The Boltzmann principle

We see the Boltzmann principle at work here. Boltzmann stated that the probability of a macrostate is proportional to the number of micro-ways in which this state (a macrostate is a triplet of three numbers) can be realized based on q perspectives. In the three-dimensional perspectivist space, numbers of perspectives q are folded back to three dimensions, thus inevitably giving rise to what is known in quantum theory as *degeneracy*: if q is not a prime number, there are various microconfigurations that could realize the macroconfiguration in question (in the three dimensions of the perspectivist space). You do not know beforehand which will occur. The analogies between this principle and the field of quantum theory are easily established, although I currently do not yet understand all the finer details.

The leaps taken by societies and electrons

Bohr, the researcher who came up with the atomic model that bears his name, was the first to provide a theory that explained spectral data on the Hydrogen atom. His model postulated fixed energy orbits around the nucleus of the atom, pathways between which electrons could jump, in fixed energetic leaps (quanta). (An atom consists of a nucleus with electrons around it.) Rutherford, one of Bohr's teachers, postulated that an electron that was about to jump to a different orbit would "have to know" where it would end up. How else would it be able to absorb the right amount of energy for exactly the jump it can make? Einstein had written about that topic before, in relation to radioactive decay of atoms, which was also unpredictable. He proposed: even if you cannot predict this for an individual atom, could it perhaps be possible to do so statistically? It proved to be entirely possible, and eventually ended up being a key concept of quantum mechanics, in the form of transition probabilities.

It is fascinating to see how the very same questions can be unleashed on the perspectivist space and the societal structure. If a societal practice takes a leap, how does it know where it will end up, or whether it will be better off there? It is exceptionally intriguing that the perspectivist space predicts that this better place will be there as long as you follow the diagonal upwards. In individual cases, a society will not know exactly where this next stepping stone will be located. But statistically speaking, you may assume that it will be there. You can even calculate it – at least, if you can accurately determine the position in the perspectivist space. All in all, we find quantum-theoretical substantiation for well-considered, professional, larger-scale experimentation on a societal scale, for societal innovation. At this point, societal experimentation and extrapolation is no longer a leap of faith, but a calculated guess.

Wave–particle duality: location and delocation

Another analogy that often echoed in my mind as I worked on this book is the concept that light and matter have both wavelike and particle-like properties. If I understand it correctly, it is impossible to focus on a part of a whole (a particle) without simultaneously taking into account the fact that this tiny part has an effect on all sorts of locations within the whole (a wave).

We can place a societal practice with a scope of q perspectives located in a single position in the perspectivist space. That means that we choose specific values for s, p, and u, in such a way that their product is q.

We can also accept that a collection of q perspectives is always simultaneously unified (since they are collected), all different (since they can be distinguished), and all the same (since they are all perspectives). That means that we have to accept that we do not know exactly where we should place this societal practice. Remember the football team: sometimes the players listen to the national anthem as if they were a single entity, on another occasion the striker shows off a brilliant kick, and they all wear the same jerseys. Their identity swirls around the associated area in space. Remember the child jumping on the trampoline with muddy shoes. This child is most probably jumping closer to the middle of the trampoline, but it remains a wild and woolly process.

On average, the identity of an extremely balanced team will be situated close to the diagonal, in a localized spot. That is a matter of statistics. In individual cases, however, the most remote corners of the shape may be explored. The team may not be a physical particle and a Schrödinger wave at the same time – those concepts are reserved for the tiniest levels of particle physics – but the team is both localized and delocalized (scattered) at the same time. We see the statistical interpretation of quantum theory reflected here. We can put a societal practice in a location, because it spends most of its time there. Then it is a 'particle'. But it regularly slips through your fingers, evading your grasp. Then it is a 'wave'.

Energy and matter, process and identity

A final intriguing analogy that I would like to mention here is the analogy between states and processes. You could say that matter is the state mode of energy, and energy is the process mode of matter. They are based on the concepts of time and space. Einstein came up with his world-famous formula, $E=mc^2$, to express an equivalence between these two: matter represents energy, and energy represents matter. They can be converted into each other.

A comparable relationship currently exists between effort and value of a quantity of perspectives in a more complex network (a complex societal practice). Or, taking the generalization a step further, between the identity of a state and the process that this state realizes. (Energy is to matter as effort is to value, and as process is to identity.)

That must be so, since the average assumptions become more and more accurate for increasingly large networks of perspective. (For the formula Identity = Process, see also Volume I in this series: *A Philosophy of Societal Practice*.)

A quantum-theoretical prelude

Recursive perspectivism, the acknowledgement of perspective as a homologous building block of societal practices, opens new classical, but primarily also quantum-theoretical doors to understanding and developing our societal practices. These doors have only been opened a crack. In this section, I push the doors to the quantum-theoretical possibilities open a bit wider, giving them a solid shove in Theme V, but to be honest, I myself still stand on the threshold in silent amazement. It is an enthralling prospect to explore this field in more depth, characterized by vigorous use of *the path of humanity*. In this way, the smallest building block of society – perspective – directs our integral human development in coherence.

6.9 We seek the end of the path

We keep within the constraints of the second balance, and statistically keep finding the diagonal in the perspectivist space. In that context, we eventually make use of the perspectivist capacity at our disposal: along the way, encountering significant setbacks in between, we seek to achieve the highest possible position on the diagonal path. We can and will seek out and test societies of increasing complexity, higher and higher on the diagonal. The hunter-gatherers did it before us, and the children at a youth camp still do it now. They do not require a grand planner to make it happen; it occurs almost automatically (self-organization). It is an intriguing consequence that we will achieve the plurimodern society of Team World no matter what, based on statistical-perspectivist principles. The only possible exception to this destination is if all of mankind were to perish, but that falls outside the scope of what we can experience. The path that leads there will, however, pass through huge peaks and valleys if we continue stumbling forward blindly. We can limit the plunges to a minimum by actively and deliberately aiming for balance (see Part III: 'Societal innovation').

At increasingly large societal scales, it clearly becomes more and more difficult to deliberately achieve balance. Our global leaders face a considerably more complex task than the hunter-gatherers or the children at camp. The number of perspectives q reaches dizzying proportions; it becomes harder and harder to envision a comprehensive overview, and the inherent tendency to just go ahead and improve your own v and e (by raising or lowering them, respectively) soon takes precedence over seeking societal balance at larger scales. As a society, we would literally become more and more unbalanced, leading to negative consequences for societal quality (see also the description of the societal balance model in section 4.2 of chapter 4: we fall into the selfishness trap). Every man for himself

and the law of the strongest will dominate. The tide would eventually turn, it's just a matter of statistics, but we would still be very, very far from the optimal balance in the meantime. People would suffer.

I wrote the following words at the start of this book.

> *"This book recommends that we continue to study this path and start to follow it consciously, and it describes the first steps towards doing so. The subject of the book is as vast and far-reaching as the ideas presented in it. These ideas are certainly not isolated random thoughts. They have deep roots in the experiences of many people. Many ideas are in line with the insights of past and present thinkers and build firmly on them. At the same time, the basis of these ideas is still highly intuitive. They have the status of initially substantiated hypotheses, if they can be called that, since hypotheses must be experimentally falsifiable. This is hard to do on a societal scale. Although I provide rudimentary foundations for these ideas, the foundations need to be worked out in much greater detail. The ideas must be firmly confronted, they will arouse controversy, and much is certain to change."*

This route towards continuing societal quality more than fulfils the promise of these words, in my opinion, and I am keenly aware of that. Many will prefer not to accept that something as complex as a societal practice could be shaped by anything like statistical pattern laws – which perspectivist balances essentially are – let alone concede that it might be possible to use them to guide a society!

I have also had my encounters with the unruly nature of societal practices, and am well aware that deliberately developing and improving such practices is no easy task. Moreover, I do not in any way embrace single-issue causes, remote vistas, or long roadmaps that must be followed to the letter. Such things only lead to dogmatism, inhibit learning along the way, and generally cause intense misery in society.

However, I certainly do think that we could guide our societies more effectively than we are currently doing in practice. We could anticipate the institutional and process-based preconditions that would help actors to keep refinding the second perspectivist balance over and over again. We will achieve successes and experience disappointments, but in the medium and long term, the successes will sweep the disappointments off the map, entirely in line with the statistical nature of the perspectivist principles that have been implemented.

That's not new at all; we have excellent initial examples to draw on. Take democracy, for instance. As far as I can tell, democracy emerged from basic principles that are related to the foundational concepts of this book. Democracy keeps providing a platform for swelling societal sentiments, and is therefore unparalleled in its potential as a corrective tool, making it impossible for incapable leaders to stay in office in the eyes of the voters. I think

that it is no coincidence that democracies – and inclusive societies in general[341] – are amongst the most stable and prosperous countries in the world, and that structural, long-term prosperity grows in proportion to how well a democracy is functioning. Once again: there are sure to be occasional exceptions, but statistically speaking, democracy provides much better safeguards for working together to seek and find the second perspectivist balance than most other forms of government.

A democracy is only underperforming if the number of parties declines to an unhealthy extent (for example to 2, such as in the USA: a duality, a dipolar structure; pluriformity is too low). It should be noted that the opposite is also true: in a cacophony of parties, it becomes impossible to set a singular course (a separate political party forms for every two people in society; pluriformity is too high). For precisely that reason, a democratic nation should organize itself into parties (on average and in the longer term, people will follow Zipf's law). At this point, democracy is far more corrective than constructive. Debate is stronger than construction, analysis is stronger than synthesis, everything is polarizing, and I see that as an emergent imbalance. Above all, *the path of humanity* shows us that working together to actively develop and create new balance, in the broadest, freest interaction possible, also including the higher scales, can lead to the greatest leaps forward in prosperity and well-being.

We must not underestimate the enormous variety and complexity of our late-modern societies. Society cannot be reverse-engineered at this stage; there is no miracle cure for the ails of society. Recursive perspectivism clearly shows that we can never fully comprehend our late-modern societies within a single experiential world; the total number of perspectives involved is so vast that we cannot even come close to a comprehensive understanding. For that reason, we do not have the option of imperative planning and guidance. Even in the smaller societal practices, the total number of perspectives far exceeds the capacity of individuals. Even if we did all have access to the same perspective, we would end up with a failed society, high on the similarity axis and far away from the centre of the associated sail. We would abandon our pluriformity and our unity, destroying the balance and resulting in an unlivable society.

Even so, the plurimodern transformation certainly does offer a rudimentary but usable compass, and recursive perspectivism and multi-actor process management certainly do provide the initial outlines of an operational framework for continuing to follow *the path of humanity* towards Team World: a liveable, sustainable society that has achieved balance on all three axes, and therefore offered much higher quality. In Part III, therefore, our attention can be shifted to asking *how*. How on earth do we do that? How do we take a pragmatic approach to defining the concept of societal innovation?

[341] See also Daron Acemoglu and James Robinson, *Why Nations Fail* (2012) for an excellent look at the reasons why prosperous countries are succeeding, and why poor countries are failing.

Part III will be coming up soon, but two more themes will be addressed first. Theme III, 'A closer look at dice', explains the overarching analogies between repeatedly tossing dice and experiencing a stream of perspective. It helps us to gain a better understanding of how repeated stochastic processes at the microlevel can and will cause patterns at the macrolevel. That holds true for dice as well as for perspectivist consciousness. Theme IV, 'Pattern laws in perspective', takes an in-depth look at a perspectivist explanation of pattern laws of Benford and Zipf and *the path of humanity*. It explains why I think that the famous Riemann Hypothesis holds water. As the cherry on top, Theme IV presents an initial quantum-theoretical perspectivist theory of society that explains and describes why and how our societies organize themselves into actors and layers, even without us consciously trying to.

7

Theme III: A closer look at dice

7.1 Playing dice

According to recursive perspectivism, society uses all three dimensions: similarity, pluriformity, and unity, in the three-dimensional actor space. Through the three dimensions, recursive perspectivism unites the few with the many (similarity), the small with the large (unity), and the unique with the pluriform (pluriformity).[342] The three dimensions interact in an exceptional way, offering a content-oriented improvement perspective within a stochastically structured process – a process which is about probability and averages. In probability, averages, and stochastics, we quickly turn to contemplating rolling dice. Einstein is reported to have said "God does not play dice".[343]

So there we have it: dice. What can we say about dice? The probability of achieving any of the six values is the same for every roll of the dice. We rarely stop to think about that. Isn't it obvious?

Is it obvious? I would like to devote a few thoughts and experiments to considering that question. This is largely a reflection of my own dissatisfaction with the extent to which I understand dice. I want to more clearly understand and experience how dice 'work. I have always considered it odd that the outcome of a dice roll is random each time, but could be non-random for an increasingly high number of dice rolls. I don't mean this in a superficial sense, but philosophically speaking. If rolling the dice is truly random, why would one hundred and twenty sixes be more exceptional than any other random series of one hundred and twenty? And if you, by sheer coincidence, start by rolling sixes one hundred and twenty times in a row, why does that outcome not make any difference for the next one hundred and twenty dice rolls? A series of two hundred and forty rolls should also be random, shouldn't it? And shouldn't it have no effect on subsequent series of two hundred and forty rolls?

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[342] In summary, you could also say that the three-dimensional perspectivist space covers all possible experiences, from the unique experience (close to the origin) to the numinous experience of the universe (far removed from the origin).

[343] His statement was in response to the many intrinsic uncertainty relationships that are inherent to the statistical nature of quantum mechanics. Various versions of the story are told, but it would appear, as far as I can tell, that Einstein primarily had difficulty with the *intrinsic* unpredictability of things related to quantum mechanics. For instance, according to Heisenberg's uncertainty principle, it is not possible to know position and speed (velocity) at the same time. It should be noted that this issue is not new: the story of Achilles and the tortoise (by the Greek philosopher Zeno) is 2500 years old, and deals with the same uncertainty.

Right now, you might be thinking, "You should have paid better attention in statistics". That might be the case; statisticians may be frowning now. Playing dice may be old hat to statisticians. I have always had a slightly uneasy feeling about it, as if something isn't quite right; it's a feeling that I cannot quite pin down, which may well be due to my lack of comprehension. However, the following exploration of dice may help me gain a better understanding of how consciousness works in three perspectivist dimensions. If you do not enjoy dice games, you can safely skip this theme.

You may have skimmed past it, but it is absolutely untrue that a series of a hundred and twenty sixes is more exceptional than any random series of a hundred and twenty dice rolls. This is *an absolute lie*. Any random but fully specified series of one hundred and twenty rolls is just as exceptional as one hundred and twenty sixes, regardless of the sequence that this fully specified series displays. It would be possible to test it using a computer experiment. Let's say we generate an initial random series of six dice rolls, which can only consist of ones, twos, threes, fours, fives, and/or sixes. Let's say the outcome is 6 1 4 3 2 4. Now we start generating random series. The probability that the series 6 1 4 3 2 4 will occur is exactly $(1/6)^6$, or approximately 1 in 47,000. But the probability that the series 6 6 6 6 6 6 will occur is also exactly the same.

However, there are many more possibilities to roll twenty ones, twos, threes, fours, fives and sixes (collectively one hundred and twenty) *in total* than one hundred and twenty sixes. That is a matter of statistical entropy, as I have already explained in Part I during the discussion of the societal balance model. For that reason, in perspectivist dimensions, we will encounter situations that are out of balance much less frequently than situations that are in balance. That balance corresponds to maximum entropy. The six values on a dice are dimensions with properties that are related to perspectivist dimensions: they are mutually exclusive (if you roll all sixes, there is no room for other values; the same holds true for rolling only one six, because that roll then cannot be any other number), and collectively cover the entire range of possible rolls.

The standard shape of a dice is a *cube*, a regular hexahedron, one of the five possible regular polyhedrons.[344] Since the faces of a good dice are regular, and a fair roll is blind, the probability of each of the six values is identical after every roll. Therefore, a dice roll is a random process with six equally probable outcomes. The logical consequence is that it is just as probable to roll six sixes as it is to roll the series 1 2 3 4 5 6 or the series 1 6 5 2 3 4. It does not feel that way to us. We consider six sixes exceptional; it occurs only rarely. A series of six random rolls does not feel odd. It is very apparent that we respond to symmetries. We recognize them more easily. We prefer them. (And aren't 'types' simply a form of symmetry?)

[344] The five regular polyhedrons are the tetrahedron (four sides), cube (six sides), octahedron (eight sides), dodecahedron (twelve sides), and icosahedron (twenty sides). Euclid already proved that there are only five.

Like actors, dice show two radically different faces for small and large n. In the short term, a dice roll is a miracle of chance. Each and every time, any value is equally likely to occur. Even so, if a dice is rolled repeatedly, the outcomes will inevitably average out to about 3.5. That is a rock-solid prediction that you can rely on. If you take an unbiased look at it, that's actually quite extraordinary: repeated confrontation leads to anticipation and the suggestion of intentionality. The same applies to actors, but they have a consciousness. In that context, it can be stated: repeated confrontation leads to anticipation and construction, and actual intentionality. In essence, this describes the learning process in terms of perspective. There's really no better way to describe a learning actor, a learning consciousness.

We also do not know exactly what an actor we do not yet know (or a multi-actor or an environment which is unknown to us) will do. We do know more or less what we can generally expect from human actors and environments, just as we know the values of a dice – although we are much surer of the latter. As we grow more and more familiar with a person or organization, those expectations become increasingly clear.

The comparison between a multi-actor society and dice may seem odd at first glance, but it is self-evident that there are deep-rooted analogies. That warrants a thorough exploration of repeated dice rolls, as a good step towards achieving a better understanding of how the many, relatively uncoordinated activities in a multi-actor practice can automatically lead to a course of action. That course manifests itself in society as *the path of humanity*.

Whether or not a God plays dice, I don't know; I do not have the answer. People, however, definitely do. As perspectivistically conscious actors, people closely resemble dice. I am not only thinking of the randomness that most people associate with dice. There is another aspect to dice that is mentioned far less frequently, but is definitely just as exceptional: dice become a beacon of purposefulness, direction, and objectivity as long as you simply allow those dice rolls to increase to a high enough number.

The average of an increasingly high number of dice rolls n is 3.5, as is sometimes stated (and as I have said). That is actually a very sloppy way of formulating it, since this is in effect the expected value, and the development of an average value is an exceptionally complex process. If this average does not progress towards 3.5, then you will doubt the dice; that is simply not possible. But is that progression towards 3.5 inevitable, and is it justified to doubt the dice if the average takes a different path? The extreme totals for n dice rolls are n.1 and n.6, and the extreme averages for all series of n are therefore 1 and 6, regardless of how high n becomes. They can also occur after many, many dice rolls (however improbable that may be). And an average of exactly 3.5 is most often seen in exactly 2 dice rolls. The probability that you will roll exactly 3.5 on average only grows *lower* as the number of rolls increases. That offers food for thought.

The *possible average* outcomes are predestined (*a priori*) for each number of dice rolls, represented by n. Other average values are impossible. For instance, it is completely

impossible to achieve an average of 3.5 with one roll (n=1), since you can only roll the whole values 1 through 6. Many possible averages are added when the dice is rolled twice, e.g. (1+2)/2 = 3/2. Other than repetitions, this average is only possible when the dice is rolled twice, and there are two possible combinations to do this: (2 1) and (1 2). The complete distribution of the average number of points on two rolls is provided in the matrix below. In the fraction, the numerator represents the sum of the two rolls, while the denominator represents the division by two, which yields the average.

2/2	3/2	4/2	5/2	6/2	7/2
3/2	4/2	5/2	6/2	7/2	8/2
4/2	5/2	6/2	7/2	8/2	9/2
5/2	6/2	7/2	8/2	9/2	10/2
6/2	7/2	8/2	9/2	10/2	11/2
7/2	8/2	9/2	10/2	11/3	12/2

The possible averages of two rolls with a single die.

There are six ways to roll 7, and therefore to roll an average of 7/2 = 3.5, specifically (1 6), (2 5), (3 4), (4 3), (5 2), and (6 1). They are on the diagonal of the matrix above. The statement that the number of possible outcomes that yields an exact average of 3.5 increases when a dice is rolled twice is sometimes used to illustrate why the expected value is 3.5.[345]

When we move on to three rolls, new possible averages are added again, e.g. (1+1+2)/3 = 4/3. Possible outcomes disappear, too: (1+2)/2 = 3/2 cannot be achieved with three rolls, for instance. The perfect average of 3.5 cannot be achieved with three rolls either: no sum of three rolls yields an outcome of 3 times 3.5 = 10.5.

[345] It should be noted that I think this is a poor illustration. We do see an increase in the number of possibilities for which the average is closer and closer to 3.5, but that is not easy to derive from only two rolls. I will return to this point in a bit during the discussion of a number of simulation experiments.

As the number of rolls n increases, more and more average values are added, and the number of combinations that approximate or yield the exact average of 3.5 grows faster and faster. As the dice is rolled more and more times, a position closer to the middle of this set of possibilities becomes increasingly likely.

For that reason, the possible averages in a long line of rolls are easily perceived as a continuous line. The familiar Gauss curve (the bell curve) indicates the frequency of occurrence in the different positions on this line. It is the ultimate continuity illusion, because it is demonstrably not correct: no matter how high the number of rolls n becomes, the possible and impossible averages always apply.

The following table shows the average of an increasing number of dice rolls (from 1 through 2,500,000), see the top row). I repeated each series thirty times. As you will understand, I simulated these dice rolls,[346] since it would be a time-consuming undertaking to roll a dice millions of times. In the table, you see an ultimate source of chance or coincidence (the column all the way to the left) change into the epitome of purposefulness (the column all the way to the right). And the only difference is the number of repetitions: each individual roll is completely random.

	1	2	3	5	25	250	2500	25000	250000	2500000
1	5.0000000	4.5000000	4.0000000	3.2000000	3.8800000	3.2120000	3.5000000	3.5071600	3.4946960	3.5014827
2	4.0000000	4.5000000	2.6666667	2.8000000	3.6400000	3.4240000	3.5412000	3.5040000	3.4994760	3.5003430
3	4.0000000	3.5000000	4.6666665	3.4000000	2.8800000	3.4800000	3.5164000	3.4818800	3.5044240	3.5020680
4	6.0000000	4.0000000	3.3333333	3.8000000	3.4800000	3.5160000	3.4104000	3.4809200	3.4994680	3.5014536
5	4.0000000	4.0000000	3.3333333	3.4000000	2.8800000	3.5440000	3.5148000	3.5064400	3.5008720	3.4989540
6	6.0000000	5.5000000	4.3333335	3.2000000	3.7200000	3.3960000	3.4888000	3.4934800	3.4958120	3.4998715
7	6.0000000	3.5000000	3.6666667	2.8000000	3.9200000	3.3520000	3.4444000	3.5174800	3.5028160	3.5006260
8	1.0000000	2.5000000	4.6666665	2.2000000	3.4400000	3.3080000	3.4888000	3.5146400	3.4996760	3.5012567
9	3.0000000	3.5000000	4.0000000	4.8000000	3.0000000	3.6320000	3.4164000	3.5003200	3.4989200	3.4998276
10	4.0000000	1.5000000	2.6666667	3.4000000	3.9200000	3.4080000	3.5012000	3.5216400	3.4999920	3.4995797
11	3.0000000	3.5000000	4.0000000	4.2000000	3.9600000	3.2040000	3.5220000	3.4790000	3.4975160	3.4999263
12	3.0000000	4.0000000	4.6666665	4.0000000	3.1200000	3.5440000	3.4796000	3.5108400	3.4997080	3.5006980
13	6.0000000	5.0000000	3.0000000	4.4000000	3.3600000	3.3600000	3.5340000	3.5222800	3.4980960	3.5013760
14	6.0000000	3.5000000	4.3333335	4.8000000	3.1200000	3.4560000	3.5196000	3.5062000	3.4987320	3.5002625
15	4.0000000	3.0000000	2.6666667	3.6000000	3.3600000	3.3960000	3.5772000	3.5004800	3.4958160	3.4997668
16	2.0000000	2.0000000	3.3333333	4.0000000	3.4800000	3.4960000	3.4416000	3.4860800	3.5011360	3.4999350
17	4.0000000	3.5000000	3.6666667	2.6000000	3.6000000	3.5120000	3.4920000	3.4736400	3.4967880	3.4990213
18	3.0000000	5.5000000	3.6666667	4.2000000	3.5600000	3.4000000	3.4896000	3.5080800	3.4992320	3.4989045
19	1.0000000	4.5000000	3.3333333	4.4000000	3.1600000	3.3880000	3.4876000	3.5016000	3.4994280	3.5002390
20	2.0000000	4.0000000	5.3333335	3.4000000	2.9600000	3.4040000	3.4980000	3.5004400	3.4945080	3.5014672
21	4.0000000	5.0000000	3.0000000	3.8000000	3.0800000	3.3680000	3.5204000	3.5064400	3.4927200	3.5002947
22	4.0000000	2.5000000	3.3333333	3.2000000	3.7200000	3.5400000	3.5080000	3.5105200	3.4979760	3.4996536
23	4.0000000	2.0000000	5.0000000	3.2000000	3.8000000	3.5760000	3.5240000	3.4870800	3.5019760	3.4981337
24	5.0000000	5.5000000	3.3333333	3.8000000	3.6800000	3.4600000	3.4648000	3.5023600	3.5001800	3.5008771
25	1.0000000	5.5000000	3.0000000	2.8000000	3.6400000	3.4400000	3.4576000	3.5047600	3.4952760	3.5002265
26	6.0000000	4.0000000	3.3333333	3.8000000	4.0400000	3.6760000	3.4808000	3.5053600	3.5046120	3.4994507
27	3.0000000	3.5000000	2.6666667	4.2000000	3.3600000	3.4920000	3.4692000	3.4868400	3.4994400	3.5001276
28	1.0000000	3.0000000	2.6666667	3.6000000	3.2800000	3.3680000	3.5700000	3.5109200	3.5002440	3.4980595
29	4.0000000	3.5000000	2.3333333	5.6000000	3.4800000	3.6160000	3.4504000	3.5124800	3.5009760	3.5017316
30	6.0000000	6.0000000	3.3333333	4.4000000	3.8400000	3.3440000	3.5224000	3.4929200	3.5010600	3.4989371

A simulated experiment involving repeatedly rolling a single die. The columns show the average of an increasing number of rolls: from 1 through 2,500,000. The 30 rows are repetitions of the same experiment.

If the number of rolls that are averaged out increases to a sufficiently high number, the continuity illusion and the objectivity illusion almost automatically take over. The average progresses steadily towards 3.5. In the right column, any logical person could assume that there is an attempt to generate a real value of 3.5, but that there are minor inaccuracies in a continuous background. This applies despite the fact that the *possible* average values can be

[346] I performed this little experiment (and others) in Common Lisp, using a random function. Lisp is a programming language used in the field of artificial intelligence, of which I am particularly fond.

counted (the number is limited), are clearly defined, and are in a Gaussian distribution from 1 up to and including 6. It should be noted that the average value of 3.5 occurs only rarely: a couple times in column 2. That places the formulation 'on the way to 3.5' in an extraordinary context: it is a journey that is increasingly unlikely to find its destination!

When we see the average final outcome of lots and lots of rolls, we could blindly assume that there is a real objective value of 3.5. The Gauss curve then becomes a true spike. We interpret a minor deviation as an error in observation or measurement. Which is quite odd, really; it should simply be expected. It is anything but a measurement error.

This characterizes the objective continuous experience: it is a quick approach, a practical way of dealing with a random, discrete, underlying world once n reaches a very high number of rolls.

If the number of rolls n is very low, the uniqueness and subjectivity illusions almost inevitably emerge in the left column. In the left column, you can see that 1 roll of the dice (under the 1) is completely random in nature. Each roll is completely unique, and any natural number could result, ranging from 1 through 6; the outcome is uncertain. If you have never seen dice and do not understand how dice work, you will only see random results. In fact, that is the essence of reliable dice: if you only roll the dice once, the outcome is random. Each separate roll is unique every time, and you truly do not know ahead of time what the outcome will be. For that reason, it's smart to rely on your experience and move towards the ultimate confrontation in the middle of the experiences to date: 3.5, in this case. That is exactly why a goalie stands right in the middle of the goal when the other team gets a penalty kick, and is prepared for anything if his opponent is unknown to him. He knows the possible values of the game of chance he's playing, but he'll have to wait and see which ones play out. Standing in the middle of the goal is the only way he can anticipate the possible outcomes. Seeking the diagonal in the perspectivist space is essentially the same.

Pure dice and perception

Are dice actually pure? There are two ways to interpret this question: superficially and in-depth. The superficial interpretation regards the issue of whether a dice is a pure generator of randomness due to the absence of imperfections, for instance in its surface or internal distribution of weight. Dice may be loaded or crooked. If there were imperfections, the dice would preferentially produce certain outcomes rather than others. That is difficult to determine by rolling the dice. If some numbers occur more frequently, you could suspect this, but the outcome could also be sheer coincidence. And if only the 2 and the 5 occur, and just as frequently (n is an even number), you wouldn't even see that reflected in the average. (The fact that the average is very often 3.5 should make you wonder, though!) Even so, you will seriously doubt a dice if you see it exhibit deviating patterns, especially if the deviation appears to be systematic. You decide not to take a chance, to use a very misplaced expression here, and discard the dice. Trial and error is the only method we have at our disposal, so if the dice deviates from our expectations, we will not trust it and will therefore

get rid of it. *The proof of the dice is in the using*. You trust it, you doubt it, or you do not trust it at all (you think it is crooked).

The deeper interpretation of the question as to whether a dice is pure (as opposed to loaded) is a matter of whether dice are pure generators of random chance at all. That may seem like an odd question. Isn't that the essence of a dice? I would therefore like to clarify the question with a thought experiment. I came up with a sort of dice myself, a really big one, as big as 50 m^3, and I compared it to a normal die.

Suppose you have two children, one die, and a children's ball pit. The ball pit is big: some 50 m^2 and about one metre deep, filled with six colours of balls: red, white, blue, orange, green, and black. That's a lot of balls; you can use the formula for the densest concentration of balls to calculate how many. But that's not even necessary: in this thought experiment, we know that there are exactly the same number of balls of each of the six colours, and how many (a huge number). The balls are mixed together thoroughly (you may possibly want to use extra children for that purpose). Now child one can go into the children's ball pit, blindfolded, and take one ball and toss it to someone outside the ball pit each time they're asked. I'll call the person who catches the ball the counter (or numerator), since he keeps track of which colours come out of the ball pit.

Child two is sitting at a table beside the ball pit, rolling a dice at the same time (every time child one throws a ball). The counter also records the outcome of the dice roll. He ends up with two long rows: one with the colour of the ball and one with the outcome of the dice roll:

outcome	*ball pit*	*die*
1	red	4
2	blue	6
3	white	1
4	red	1
…	…	…

The series of balls closely resembles the series of dice rolls: in both cases, there are 6 probable outcomes. The dice can yield the numbers 1-6, while the balls can yield one of six colours.

The more the row deviates from the ideal balance, the less probable it is that it will occur. For the dice, that balance is an equal frequency of values 1-6.[347] For the row of balls, the balance is an equal frequency of all six colours.

[347] The sum of the numbers 1 through 6 is 21; dividing the sum by 6 yields an average of 3.5. In principle, the perfect balance of a dice can only be achieved in multiples of six. It is quite possible to arrive at the average of 3.5 without being in balance (e.g. with a 6 and a 1).

The probability of achieving maximum balance is much higher than the probability of achieving maximum imbalance. It's easy to see why. Roll a dice six times. The difference in probability between six sixes or a series in which all six possible values occur can now be calculated precisely by following a number of basic rules. The probability of six sixes is 1/6·1/6·1/6·1/6·1/6·1/6 = 1/46,656. The probability of the *series* 1 2 3 4 5 6 is exactly the same: 1/6·1/6·1/6·1/6·1/6·1/6 = 1/46,656. But the sequence does not matter for the balance: it's about the *set* 1 2 3 4 5 6, in no particular order. That means that the probability that the first roll will have the right value is 6/6 = 1. The second roll cannot have the same value as the first, so the probability is now 5/6. The third roll cannot have the same value as the first two, so the probability of rolling the right value has now dropped to 4/6. This line of reasoning leads to a probability of 6/6·5/6·4/6·3/6·2/6·1/6 = 6!/6^6 = 720/46,656.

In practical terms, given a huge ball pit to draw from, the difference in probability between six red balls or a set of six balls in all colours is the same as for the dice. The probability of six red balls is 1/6·1/6·1/6·1/6·1/6·1/6 = 1/46,656. The probability of the series red, white, blue, orange, green, and black is the same: 1/6·1/6·1/6·1/6·1/6·1/6 = 1/46,656. But again: the sequence does not matter for the balance. The same line of reasoning as described above leads to a probability of 6/6·5/6·4/6·3/6·2/6·1/6 = 6!/6^6 = 720/46,656 for a set of all six colours. I have summarized the probabilities of the dice and the ball pit in a table:

Format *Probability of:*	*Die*	*Ball pit*
Six different values	720/46,656	720/46,656
Six identical values *(e.g. six balls that are the same colour)*	6/46,656	6/46,656
Six specific identical values (e.g. 5 5 5 5 5 5)	1/46,656	1/46,656

But there is a (possible) difference between throwing balls blindfolded and rolling a dice ('possible' is deliberately parenthesized; I'll explain why in a moment). If child one completely coincidentally starts by throwing out a red ball 6 times in a row (a probability of 1/46,656), the probability of a seventh red ball is calculably lower. After all, there are now 6 fewer red balls in the ball pit than there are of the other colours. If there were originally a hundred thousand balls of each colour in the ball pit, this obviously *hardly* matters. That would mean there are 99,994 red balls, and 100,000 balls of every other colour. The bigger the ball pit is, the smaller the impact would be. *But the impact can be observed, logically reasoned, and calculated; hardly is not the same as not at all.* After more balls of a specific colour are taken out, the probability that the other colours will be chosen is higher. The colour you have seen the least frequently so far has the highest probability of occurring. Another example here is card counters in casinos; the casino shareholders are not happy with people who have that skill.

After more and more balls are thrown out of the ball pit, and neatly sorted by colour by the counter, we inevitably draw closer and closer to the perfect colour balance. No matter how unlikely the starting sequence of the series, even if it's 50,000 red balls, the tide will eventually turn. For that reason, it becomes easier and easier to predict the colour of later balls, at least, if the differences between colours grow larger and larger. In the end, if we still have 6 different-coloured balls in the ball pit, the probability of each colour is *exactly* as high as it was at the start. (You could wonder why the whole ball pit is needed if six balls are enough, and that's exactly why we also roll a dice.) That also applies to all the in-between moments when the number of balls of each colour were also exactly the same.

Only the very last ball can *always* be predicted with 100% accuracy. In the exceptional case that all the last n balls are the same colour, *all* these balls are 100% predictable. It may seem odd, but it is possible that this could be 1/6 of the total number of balls, i.e. 100,000 balls: in that case, all the other colours have completely coincidentally been thrown out of the ball pit by child one. The chance of that happening is very low: $(5/6)^{100,000}$.

There is a paradoxical difference between the children's ball pit and the dice. If *child one* starts with 6 red balls, that outcome has small but calculable probability effects for what happens next. At the same time, the ball pit guarantees that the balance point will eventually be reached. The ball pit compensates for initial deviations. If *child two* starts by rolling 6 six times in a row, our reasoning is very different. We blindly assume that that does not make any difference at all for the seventh roll. After every roll of the dice, you simply start all over again from scratch. But in this case, there is no *guarantee* at all that balance will be achieved again!

That's interesting. In the ball pit, the process to date affects the future outcome, and eventual balance is guaranteed, since that balance is an intrinsic property of the ball pit. In rolling dice, the process so far does not affect the future outcome at all, and there are no *guarantees* at all that balance will be achieved. That outcome does become more and more *probable*.

Is there a perfect dice in the second interpretation?

The throws so far (the preceding history, the experience) affect the rest of the process in the ball pit, but do not affect subsequent rolls of the dice, as we now know. But do we really know that? Not at all. The only thing we can say is: *we assume so*. How on earth could we ever know that for sure? We don't really understand the fundamental operations of a dice at all, do we? We make it as perfect as possible in terms of shape and weight, and then assume that the rolls will therefore also be as perfectly random as possible, but we cannot really test that fully in practice.

But perhaps a dice does in fact work like a much larger metaphorical 'ball', and does, in fact, have limits? To figure that out, you could analyze a huge number of very long series of dice rolls.[348] But even then you wouldn't know for sure.

Suppose child one and the ball pit that the child is in are moved completely outside the perception of the person counting the balls and any other people walking by. They are completely unaware of the ball pit, the blindfolded child, the fact that there are six colours of balls, exactly the same number of each colour, and the number and colour of the balls that are still in the ball pit. Let's say that the balls come flying out of a hole in the wall when you press a red button. The button sends a signal to the blindfolded child in the ball pit that it's time to throw a ball. The person counting and the people passing by don't know any of that; they just see a big machine that pops balls out one by one when its red button is pushed.

At that point, you have a huge die. To be more precise: a huge dice with a previous history that does affect the future outcome! You can only know the extent to which outcomes in the past affect the probable outcomes from now on if you know the exact *number* of balls and the *distribution* to date and the *specific* dice rolls so far. As stated: coincidental passers-by do not have that information.

I'm going to explore several highly improbable but possible scenarios. Someone comes by and starts pushing the button. Hey, look, 10 red balls in a row! That's funny, this machine pops out red balls when you push the button. He loses interest (that's right, repetition) and moves on. Someone else comes by and tries it. Hey, five red balls and five white balls, a bit jumbled together! His experiences are very different. He observes that two colours of balls come out of the machine, in a sequence that he isn't able to determine; it seems like it's about fifty-fifty. The two people meet later and talk about the machine. After consulting with each other, they decide that there are in any case 20 balls and two colours, three times as many red balls as white balls, and that the sequence isn't clear yet. Because two know more than one. Haven't they reached a nice conclusion together?!

Both dice and ball pits are finite. Perspective is always limited; you might lose interest, or the dice might wear out,[349] or the ball pit might eventually be empty, or you might reach the end of your life. You can expand that perspectivist limit, pragmatically speaking. If you want to ensure that, it will take more and more effort. Just as you can replace dice when they wear out, tap in a new pitcher when a person's throwing arm gets tired, and just keep throwing and rolling, you can also keep adding more balls to the ball pit.

[348] With real dice, because we do not know whether probability generators operated by computers are perfect dice. After all, we made the ball pit.

[349] It should be noted: the fact that you encounter worn-out dice at jumble sales already indicates that dice-rolling is not random, or in any case not based on shape and weight, since these change over time.

We now introduce the *filler*: a person assigned to keep the ball pit filled to maximum capacity at all times. Then you can continue for longer than the number of balls that would fit in the ball pit at once. An interesting decision now becomes relevant. Does the filler grab a random ball from an even larger, perfectly mixed ball pit,[350] or does he add the same colour of ball as the child just threw out? And wouldn't the latter option be exactly the same as putting the ball back?

In the first case, mixed supplementation, the previous history continues to affect the future outcome. If you coincidentally start with 60 red balls in a row (no matter how improbable that is), you can assume statistically that red will occur less often, since the coloured balls being added are random. On average, there are 10 red balls in every 60 balls. But each time you throw a ball into the ball pit, you also throw a ball out again. And that throw is subject to the probability distribution of *that* specific configuration. You have to mix perfectly, that much is clear. Based on the throws so far, you can make assumptions about the throws that follow.

In the second case, when the same colour of ball is returned, you could easily receive a red ball 100 times, start over, and expect red to be just as likely to come next. That's intriguing, because *that is exactly how we think the perfect dice works.* We assume a filler who knows what the counter receives and corrects for it. We can only rely on perfectly random results if the balls are always supplemented with *exactly* the colours that were removed, and then perfectly mixed. Putting the same colour back in and stirring well is the most concise way to describe it (the difference does not have any impact).

If we're putting the same colour back in, we don't need a 50 m^3 ball pit anymore either, obviously. Six identically shaped balls in a basket and a deliberate, meticulous filler that also mixes the contents thoroughly would be enough. The blindfolded child keeps randomly taking one of the six balls from the basket. In that case, perhaps you could consider using a dice after all. If it's a perfect cube, with an even surface on all sides, undamaged, and homogeneous in weight, and is rolled well, the situation is the same – practically speaking – as the filler supplementing the same colours, the little basket, and the blindfolded child. At that point, a dice does seem simpler.

Perfect randomization involving a limited number of options (coloured balls or dice values 1–6) assumes that there is *either* an infinite and well-mixed supply *or* complete control of a random choice which is always replaced by an identical option. Both are illusions. Accordingly, so is perfect randomness or perfect order.

Our experiences consist of the sum of anticipation and confrontation. We anticipate what we are aware of, basing it on our experiences. The rest of the experiences are confronting. We face many confronting experiences from all over the cosmos. I define the cosmos here as everything, the universe: that part of the surrounding environment that we do not

[350] And does he fill this larger ball pit from an even larger ball pit? We are slipping into a recursion.

anticipate plus the part that we do anticipate, and everything in between. As far as confrontations go, we have no idea whether our cosmos works like a perfect dice or a ball pit without a supplementary supply of balls. However, a well-made dice and a very sizable, thoroughly mixed ball pit without a supplementary supply of balls come fairly close to a random generator. That's excellent for our purposes, in actual practice. Theoretically, however, it's a completely different story.

Yahtzee!

The Yacht Game was a game of dice. It was developed in the 1950s by a Canadian couple. They played it on their yacht with their friends. They offered it to a toy manufacturer in exchange for 1000 game sets to hand out amongst their friends. The manufacturer changed the name to Yahtzee.[351] I myself play it occasionally with my family, generally when we're on holiday; it's sort of a tradition.

You get points for specific combinations of dice that you have to try to roll in three steps using five dice. You do not have to re-roll all five; interesting values can stay on the table. The combination that gets the most points is a Yahtzee: five identical values, for example five sixes. Getting Yahtzee is exceptional (but is it?). If you roll more than one Yahtzee in a single game, that's considered very exceptional.

Every once in a while, someone rolls Yahtzee in a single roll of the dice. Bam! Five sixes, or five twos. That's rare, and cause for rejoicing. We know exactly how rare: 1/6·1/6·1/6·1/6·1/6, and then there are six different possibilities (since there are six values). When it happens, we are experiencing an event that only happens 6 in every 7776 times, or 1 in 1296, which is in fact rare. If you're playing with four players, you each have to roll 324 first rolls. That's an awful lot of rounds.

Yahtzee does occur more frequently than 1 in 1296 times, since you are allowed to roll five identical values in three dice rolls, so you can accumulate it gradually. Every once in a while, there are four identical values on the table after rolling twice, let's say four sixes, so the fifth six still needs to be obtained with a single roll of that final die. Understandably, the tension spikes at that point. If it succeeds, that player cheers loudly (which may be one of the reasons the game is played on a boat). The other players are happy for the person who got Yahtzee, but they also look a bit glum, since their own chances of winning have just taken a nose-dive.

The cheering at this point is intriguing. After all, if you take a completely objective, neutral look at the situation, the probability of getting that fifth six is still 1/6. Getting those four sixes on the table already got you most of the way there. And the player whose turn it is does not have any control over the outcome of that last roll of the dice. In fact, it would even be nearly impossible for him to choose *not* to roll the dice, since he'd be accused of spoiling the game. One out of every six times, he'll roll that final six. So much fuss is unwarranted,

[351] Source: Wikipedia

don't you think? It's not really all that exceptional, is it? Why does the player cheer so loudly about achieving a 1 in 6 outcome that was completely beyond the scope of his influence?

The answer is simple: he's not. He's not cheering about getting that 1/6 chance on the final, inevitable dice roll, but on achieving the much smaller chance of getting total Yahtzee, and the exceptional position that this puts him in compared to the other players. His experience extends far beyond his final roll, and occurs much less frequently, and is in fact very exceptional. His experience extends into his past, encompassing at least two dice rolls, but may well extend much farther if he beats an opponent who has always won so far. And he has affected the outcome, because he made several decisions along the way: he decided to aim for sixes, rolled 4 sixes in total in the first two cumulative dice rolls, and continued playing until his victory was complete. That's why the tension builds throughout the process. The cheering after the final dice roll can only be explained by the realization that the player views the five sixes and the course leading to that outcome as a single, very exceptional, composite whole. The intense experience defies any sort of objectivity; past history completely defines future outcomes. Almost none of it involves the final step, the objective probability of 1/6. It's about the perception of a more extensive experience.

The consciousness is not solely focused on the final perspective here, but on a small group of perspectives that it interprets as a single entity. That group may also change over the course of the three dice rolls and the overall game. In a sense, the consciousness sees these perspectives as a single, changing, composite, perspectivist whole, drawn from all the perspectives that could have been experienced. The consciousness experiences joy when they are achieved, and only then releases them for repeated experience in the future. The game begins again. The original situation is restored; all the balls are back in the ball pit. All of them? The opponent who has been winning so far has still won far too many rounds, and all the players know it.

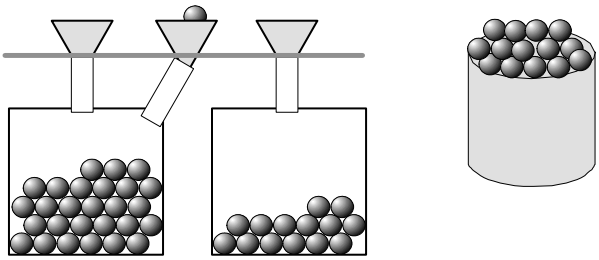
7.2 Balance, symmetry, and stability

When rolling a single dice once, we assume that there is an equal probability of rolling any whole outcome from 1 through 6, each and every time. Each dice roll is ultimately random; the dice does not care what the outcome is.

Repeatedly rolling a perfect dice is in fact characterized by progressing towards a specific balance. As the number of steps grows, the system sets a course for a very specific optimal distribution. If we reach an incredibly high number of dice rolls, we perceive an average of 3.5 as inevitable and objective, for example (see also the table of simulated dice rolls earlier in this chapter).

How can a single step (a single dice roll) exhibit ultimate randomness, while a series of the same type of steps (dice rolls) yields a very specific value?

The figure below offers an initial example of this phenomenon: the tubes and boxes are tucked away out of sight under a table, and the left-hand box inevitably fills up twice as fast as the box on the right. The bigger the box, the more precise this doubled speed becomes every time. The only precondition is that the people passing by, who are each allowed to put a ball in a random opening, do not have a collective plan or shared preference. Simply put, the balance point is the distribution that the possibilities suggest, if the input each time is random, and turns out that way.



If passers-by without any preferences are allowed to put balls in the three completely equal funnel openings on the table, the left-hand box fills twice as fast as the box on the right.

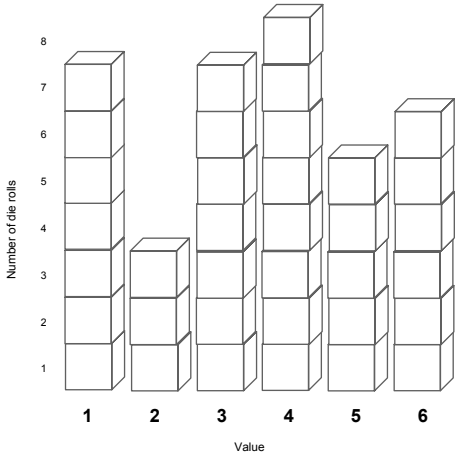
The balance point in a long series of dice rolls is similar to a coin; you can toss heads or tails with a coin, but a dice involves six possibilities. All values, 1–6, are equally probable. Working out an example involving six dice rolls previously yielded the following probability calculations for sets (not series; sequence is not relevant here) based on realization possibilities:

6 6 6 6 6 6: $1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 = 1/46{,}656$.

1 2 3 4 5 6: $6/6 \cdot 5/6 \cdot 4/6 \cdot 3/6 \cdot 2/6 \cdot 1/6 = 6!/6^6 = 720/46{,}656$.

You can see from these calculations that the probability of perfect balance is higher than the probability of maximum imbalance. The pattern is that the probability of a specific value on a dice is 1/6, and the probability of a random value is 6/6. After all, there are six possibilities every time the dice is rolled. This includes the probabilities for 1 of 2 specific values, 1 of 3 specific values, 1 of 4 specific values, and 1 of 5 specific values. These probabilities are 2/6, 3/6, 4/6, and 5/6 respectively.

The number of times that the value 1, 2, 3, 4, 5, or 6 is rolled could be represented by six stacks (see figure). The sum of the stacks is equal to how many times the dice has been rolled: the number of steps expressed as n. The stacks can only be the same height if n is a multiple of six: the maximum balance corresponds to maximum symmetry.



A possible outcome of 36 dice rolls. The total is 36 blocks.

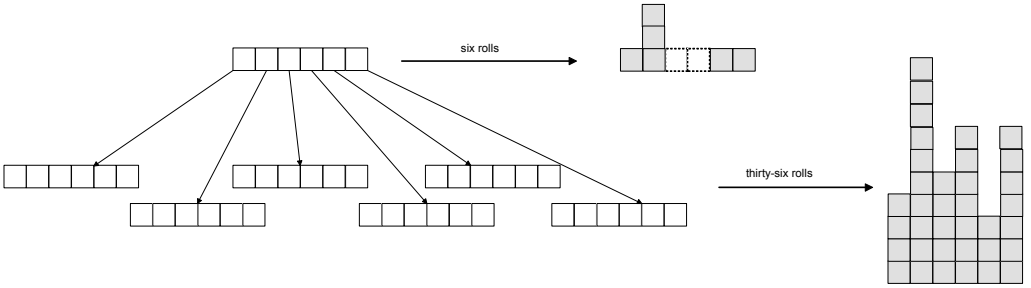
Suppose we roll a dice 36 times. The least probable outcome is a single stack, 36 high, containing for example only sixes. There is only one way to achieve this configuration: roll sixes every single time, 36 times. The probability of that outcome is incredibly low: $(1/6)^{36}$. You could interpret this in different but related ways: as a form of imbalance, even *instability* if you're not strictly following the limits of reality (a single, towering stack will fall over much more easily than several shorter ones). The low probability corresponds directly to the expected massive effort involved in *deliberately* rolling the dice to yield that towering stack. *Of course, you won't see it often.* You could encounter this outcome, although it is not likely. On average, things that are hard to achieve are seen less frequently.[352] A single high stack of 36, which exhibits the least symmetry, therefore has the lowest probability of occurring, is the most difficult to roll, must therefore yield the highest value if you try it anyway, and exhibits the worst balance.

The probability of six stacks of six is highest. That's because this variant imposes the fewest restrictions on the values that can be rolled. Or vice versa: the most possibilities (the most tubes under the table) lead to this variant. If the six series of six dice rolls had no relation to each other at all, you could simply build the towers perfectly, layer by perfect layer. In that case, the probability that you will achieve six towers of six is very small:

$(6!/6^6)^6 = (6/6)^6 \cdot (5/6)^6 \cdot (4/6)^6 \cdot (3/6)^6 \cdot (2/6)^6 \cdot (1/6)^6 = (720/46{,}656)^6$

That probability is much, much higher in reality, of course. I am not a mathematician, but that can be substantiated. The figure on the next page shows the relationship between six dice rolls and six times six dice rolls. Six rolls yields a random pattern with a significant chance of stacks of 0; 36 rolls significantly reduces the probability of a stack of 0.

[352] In *A Philosophy of Societal Practice*, this relationship was already expressed as Identity = Process.



So we roll a dice 36 times and aim for perfect balance: six stacks of six. As long as you do not exceed a stack height of 6, any value is fine. For that reason, all of the first six rolls are always right. The probability of success is $(6/6)^6 = 1$. So far, it's familiar territory; if we roll the dice six times and aim for perfect balance, the probability that the first roll will succeed is also 1.

But then we get the next values. As long as there are no stacks at all containing 6, you can continue rolling without any cause for concern: the probability of a dice roll that fits within the framework remains 6/6. The probability of a subsequent dice roll that fits does not drop to 5/6 until *after* the first stack of 6 is filled. And the probability that this will happen after just six rolls is very low indeed: only $1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 \cdot 1/6 = 1/6^6 = 1/46{,}656$ for each of the six values. The probability that it will not happen is (46,656 - 6) / 46,656. (In a bit, a simulation will show that the first stack of six generally does not become relevant until more than 20 dice rolls in a total of 36 rolls, rather than at the sixth roll.) There is a huge balance advantage to rolling a dice 36 times instead of 6, not unlike a 'majority bonus', in which the political party that gets the most votes in the election also gets any overflow votes.

Once two stacks are full, the probability of a roll that fits becomes 4/6. But the probability that this will occur after just 12 rolls is only $2/6 \cdot 2/6 \cdot 2/6 \cdot 2/6 \cdot 2/6 \cdot 2/6 = 2^6/6^6$. (In a moment, a simulation will show that the first stack of six on average does not become relevant until more than 25 dice rolls in a total of 36 rolls, rather than at the sixth roll.)

The advantage conferred by larger scales continues to play a role all the way to the last six dice rolls. Until five stacks of six have accumulated, each of the last six rolls has a probability of exactly 1/6 of achieving the perfect six times six configuration. That is exactly the same probability as building the stacks layer by layer.

In the end, there is a *much* higher probability of six stacks of six than six times a set of 1 2 3 4 5 6 (in random order). The higher the number of dice rolls, the stronger this phenomenon becomes.

The number of possibilities for realizing a symmetrical configuration – six stacks that are equal in height – grows steadily in proportion to the increasing number of dice rolls. Earlier in this book, in Part I on the societal balance model, I already explained this phenomenon

as entropy, applying it to tossing a coin and mixing two gases. Conversely, the number of possibilities for realizing an asymmetrical configuration declines in proportion to the increasing number of dice rolls. That progression is $(1/6)^n$. That is exactly why the increasingly frequent repetition of what is essentially a completely random process – rolling a dice once – moves forward towards perfect balance, perfect symmetry, in a non-monotonic manner but, in the increasingly longer term, impervious to disruption. (It becomes increasingly rare to continue repetitions without achieving this outcome.)

I ran a number of simulations using a throw-away LISP program (a throw-away program is a quick and dirty program that does the job, but isn't worth keeping) for an increasing number of dice rolls expressed as n, all in multiples of six (because then there's a chance of perfect balance) to get a clearer impression of how this works. Perfect balance occurs if the process yields six stacks that are n/6 high. I checked how many dice rolls it takes on average to get n/6 in the first stack, the second, the third, the fourth, the fifth, and the sixth. How many of these stacks occur in a simulation depends on the specific development of the stacks: at least 1 (for 1 stack of > 5·n/6) and at most 6 (all six exactly n/6, because 6·n/6= n). In the chart below, the first column shows the outcome of five simulations of 36 rolls. The second column indicates the number of rolls after which the first stack of 6, the second, the third, etc. occurs. Columns 3 through 8 show the development of the stacks at the precise moments that another stack of 6 fills up (they add up to the value of the second column).

36 rolls with symmetrical stack height 6

1						
	19	6	2	3	3	4	1
	25	7	2	4	6	5	1
	27	7	2	6	6	5	1
	31	8	3	6	7	6	1
2						
	21	2	4	3	6	5	1
	28	3	4	5	7	6	3
	29	3	4	6	7	6	3
3						
	22	6	4	1	3	3	5
	24	6	4	2	3	3	6
4						
	23	2	4	5	6	3	3
	28	3	6	5	6	3	5
	29	3	6	6	6	3	5
	33	4	7	7	6	3	6
5						
	19	2	3	6	2	4	2
	24	2	3	8	3	6	2

In the five simulations, the first stack of 6 occurs at 19, 21, 22, 23, and 19 rolls respectively. The probability of a subsequent dice roll that fits does not become 5/6 until that moment. That is significantly later than the sixth roll! The second stack of 6 occurs at 25, 28, 24, 28, and 24 rolls. The third stack only occurs in experiments 1, 2, and 4, at 27, 29, and 29 rolls respectively. The fourth stack only occurs in experiments 1 and 4, at 31 and 33 rolls respectively.

The simulations for 360, 3600, 360000, and 36000000 dice rolls are shown below:

360 rolls with symmetrical stack height 60 1

319 60 59 48 56 37 59
324 61 59 49 56 39 60
328 63 60 49 56 40 60
344 64 62 51 60 44 63

2

279 60 54 43 43 39 40
292 60 60 45 46 40 41

3

304 43 60 58 58 42 43
314 46 62 58 60 45 43
325 48 65 60 64 45 43

4

331 57 56 53 55 60 50
352 60 56 58 59 63 56

5

307 50 60 52 52 41 52
342 55 63 55 60 53 56
355 55 66 59 61 54 60
358 56 66 60 62 54 60

3600 rolls with symmetrical stack height 600

1

3318 600 549 558 562 543 506
3544 644 588 596 600 572 544
3555 645 589 600 602 573 546

2

3426 586 541 569 600 566 564
3506 600 555 585 611 578 577
3569 607 567 600 616 593 586

3

3432 593 525 600 570 588 556
3479 600 537 605 578 594 565
3522 605 549 611 587 600 570

```
          3600    620 561 629 600 610 580
4
          3468    581 567 567 570 600 583
          3531    596 574 574 578 609 600
          3539    600 574 576 579 610 600
5
          3408    593 540 531 572 572 600
          3444    600 547 536 575 578 608
          3556    624 564 557 589 600 622
```

360000 rolls with symmetrical stack height 60000

```
1
358805    59542 59842 59754 60000 59722 59945
359098    59592 59890 59806 60042 59768 60000
359741    59703 60000 59909 60151 59884 60094
2
358239    59834 59722 59379 59435 60000 59869
359078    60000 59868 59499 59587 60132 59992
359099    60003 59871 59502 59589 60134 60000
359783    60130 60000 59603 59696 60240 60114
3
358830    60000 59752 59755 59743 59620 59960
359106    60046 59789 59804 59794 59673 60000
4
357769    59423 59633 59487 60000 59564 59662
359791    59764 60000 59799 60335 59927 59966
359961    59783 60034 59830 60359 59955 60000
5
358549    59861 59318 59875 59656 60000 59839
359260    59968 59460 60000 59766 60114 59952
359412    60000 59489 60023 59788 60141 59971
359600    60029 59527 60054 59824 60166 60000
```

36000000 rolls with symmetrical stack height 6000000

```
1
35963950    5989089 6000000 5992747 5989736 5996921 5995457
35982370    5992188 6003068 5995814 5992755 6000000 5998545
35991453    5993774 6004634 5997332 5994229 6001484 6000000
2
35983888    5999164 6000000 5995305 5996382 5995588 5997449
35988849    6000000 6000812 5996116 5997212 5996447 5998262
```

35999460 6001809 6002586 5997833 5999022 5998210 6000000
3
35976687 5994739 6000000 5993229 5996481 5993767 5998471
35986115 5996280 6001577 5994758 5998089 5995411 6000000
35997687 5998211 6003508 5996692 6000000 5997354 6001922
4
35971659 5995570 6000000 5996716 5994747 5993314 5991312
35992074 5998939 6003402 6000000 5998139 5996790 5994804
35998498 6000000 6004426 6001073 5999266 5997855 5995878
5
35982751 5998972 5994438 6000000 5995304 5998095 5995942
35989282 6000000 5995494 6001083 5996400 5999237 5997068
35994085 6000809 5996296 6001881 5997255 6000000 5997844

There is only one stack that will *by necessity* (every time) break through the barrier of n/6. In principle, you could throw one value n times. We see that the roll at which the first stack breaks the barrier of n/6 creeps towards n as the number n grows larger. This is *not* a monotonic process: the symmetry could move lower in the meantime, but that is not visible at these intervals. In general, every time a roll raises a lower than average stack, symmetry improves (jumping ahead a bit: the calculated value, see further, drops towards 0), and every time a roll raises a higher than average stack, symmetry declines (jumping ahead a bit: the calculated symmetry value rises towards 10). The extent of the improvement or decline depends on the degree to which the relevant stack deviates from the balance value. In any case, raising a stack that's too low improves the balance more significantly than raising a value that's too high would cause the balance to decline. This is also a way to understand the trend that on average the balance keeps improving.

Just as the first stack creeps towards n, the same process also applies to the second stack, and possibly to the third and fourth and fifth and sixth stack (since they automatically occur at a *later* roll, if they occur at all). In other words, the number of possibilities for improving symmetry increases on average as n increases. The table below shows this average across the five simulations, for all stacks (if present), also expressed in percentages. The massive trend towards symmetry, towards balance, is crystal clear. The deviation from the perfect balance grows in absolute terms, but shrinks steadily in relative terms.

Number of dice rolls	*36*	*360*	*3600*	*360000*	*36000000*
1st stack	20.8 (57%)	308 (86%)	3410 (95%)	358438 (99.57%)	35975787 (99.933%)
2nd stack	25.8 (72%)	325 (90%)	3501 (97%)	359267 (99.80%)	35987738 (99.966%)
3rd stack	28.3 (79%)	336 (93%)	3564 (99%)	359553 (99.88%)	35996236 (99.990%)
4th stack	32 (89%)	351 (98%)	3600 (100%)	359692 (99.91%)	-
5th stack	-	-	-	-	-

After how many dice rolls are perfect stacks achieved on average (average in 5 identical simulations).

You could also approach this pull towards symmetry more systematically. In a sense, just as we did much earlier in this book, we are delving back into entropy: the relationship between microconfigurations and macroconfigurations. Two supplementary points of view are relevant here. The first is: which outcomes are possible? The answer determines the possibilities that can occur. The second is: how many routes are available to achieve these outcomes? The answer determines how reality is ultimately revealed to us (at least, that is how dualists perceive this). It is no coincidence that routes and outcomes are exactly the same elements of a perspective that lift you from one experience into another experience:



A different outcome is achieved by a different route

The *possible* results determine which outcomes *could* occur when rolling dice. No other outcomes than these will ever make an appearance. I already mentioned that the expected value of 3.5 can never occur when a single dice is rolled just once: this is an impossible outcome for n=1. Similarly, the ideal balance – six equally high stacks of ones, twos, all the way up to sixes – can only occur if n is a multiple of 6. The ideal balance is impossible for any other value of n.

The number of routes that lead to these possible outcomes determines the number of outcomes that will in fact actually manifest (cf. Boltzmann). Remember the balls on the table, and more and more symmetrical stacks at higher and higher values of n. Right now, you might be thinking, but I can take different routes through the city to the main square, can't I? Pragmatically speaking, that is certainly true, because the main square is more or less the same, whether you arrive a bit earlier or a bit later. But if you involve a significant

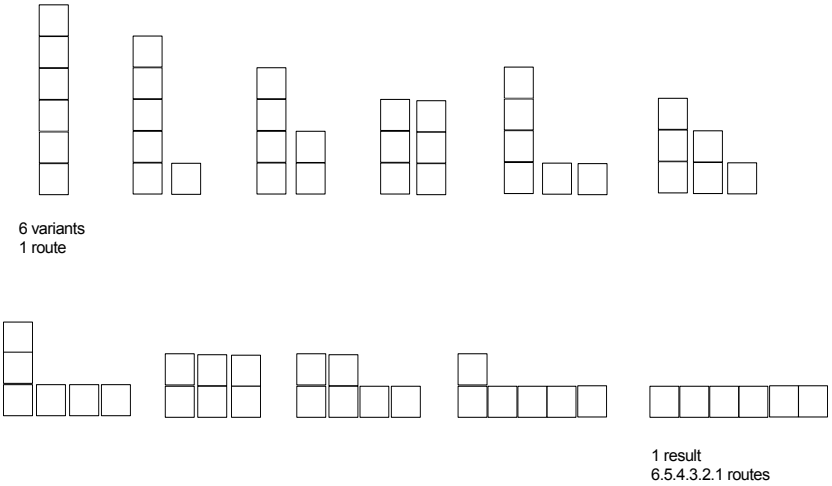
amount of additional perspective, arriving at a different entrance to the square or at a different point in time might very well mean that the square is in fact truly a bit different than it would have been otherwise. The paint on the window frames might be peeling a bit more or a bit less, and other people will be there, standing in different locations. As I said before in this book, you can visit an ice cream parlour on many occasions, and it will be the same every time from a very limited interpretation, pared down to the bare minimum in terms of perspectives, in the sense that you can always buy an ice cream cone. But if it were truly *completely* the same, you would not be able to perceive the difference between the two situations and processes. If that were the case, different microstates wouldn't exist at all; there would only be one.

It is philosophically fascinating to contemplate whether you would truly be able to distinguish between an impossible outcome and an (empirically) *extremely improbable* outcome. For instance, rolling a dice and obtaining a series of 100,000 sixes is theoretically a possible outcome, but at the same time completely impossible in practical terms. Obviously, you could calculate this outcome, but it really is a very different experience. The probability of this happening is $(1/6)^{100,000}$; that simply isn't possible in actual practice. Recursive perspectivism assumes that you will never experience extremely improbable things, events that are far more unlikely than winning the lottery. You will not experience them; they are simply not available to be experienced; they are therefore transcendental, unreal. The same applies to the distinction between an *extremely probable* outcome and an *actual* outcome. Pragmatically, this distinction simply cannot be made. Viewed in a perspectivist context, the following holds true. Reality is what we always experience, until we do not experience it once; only then do we start to have an inkling of doubt. Impossibility is what we never experience, until we experience it once; only then do we start to have an inkling of doubt. Our lives play out between these two extremes. Simply put, experience is spectral.

Three situations are particularly interesting: the number of outcomes is much higher than the number of routes, the number of routes is much higher than the number of outcomes, and the number of routes is in balance with the number of outcomes. Where the number of outcomes becomes much higher than the number of routes, the experiences that have few routes leading to them will disappear from view. We see that in the simulated dice rolls presented above, in the lack of the perfect average value of 3.5 and the lack of high asymmetries for high values of n. The same thing happens when you choose a profession: the experiential worlds of other professions then generally disappear from your visible options. Where the number of routes becomes much higher than the number of outcomes, the experiences that have many routes leading to them will become inevitable. We also see that in the repeated dice rolls: the series heads for optimal symmetry with incredible persistence. It should be noted, however, that there is no requirement to actually reach that exact point. The number of dice rolls needed to achieve the first stack of n/6 rises unchecked towards n, if n grows extremely large. The rapid pace and certain course make it completely pointless to keep rolling the dice, at least to gain this experience. And then there's the situation in which balance is achieved. The number of routes is just as high as

the number of outcomes. That is exactly the point at which it becomes relevant to consider all possibilities, the point where the perspectivist consciousness is in its element, where we experience balance. That is also the point at which the quantified inverse proportionality has reached precise diagonal balance, and where the binomial distribution and (therefore) the bell curve described by Gauss emerge in more complex situations. More on that shortly, in Part IV: Pattern laws in perspective.

When rolling a dice, the *possible* results are clearly defined. All the possible outcome structures for six dice rolls are shown in the following figure. The number of variants varies per outcome, and this comprehensive overview shows all the possible outcomes of six dice rolls. I offer a number of examples:



The possible basic structures for 6 dice rolls.

There are six variants of the structure 'stack of six': six ones, six twos, ..., six sixes.

There are 6·5 = 30 specific variants of the structure 'stack of five and stack of one': the stack of five could consist of any of the six values, and the stack of one could be any of the remaining five values. Written out in full, these are the thirty possibilities; the first position shows the number of ones, the second position shows the number of twos, and so on:

(510000)(501000)(500100)(500010)(500001)
(150000)(051000)(050100)(050010)(050001)
(105000)(015000)(005100)(005010)(005001)
(100500)(010500)(001500)(000510)(000501)
(100050)(010050)(001050)(000150)(000051)
(100005)(010005)(001005)(000105)(000015)

One stack of two and four stacks of one also occurs in 6·5 = 30 specific variants:

(201111)(210111)(211011)(211101)(211110)
(021111)(120111)(121011)(121101)(121110)
(012111)(102111)(112011)(112101)(112110)
(011211)(101211)(110211)(111201)(111210)
(011121)(101121)(110121)(111021)(111120)
(011112)(101112)(110112)(111012)(111102)

These two sets of 30 options are completely identical in terms of structure. This is because both structures consist of three elements occurring in the same ratio. The following correspondence rules provide the key: 5 ⇔ 2, 1 ⇔ 0, and 0 ⇔ 1. If we explicitly specify the stacks of 0, it immediately becomes clear:

one stack of five, one stack of one, and four stacks of zero

one stack of two, one stack of zero, and four stacks of one

There are 15 specific variants of the structure 'two stacks of three':

(330000)(303000)(300300)(300030)(300003)
(033000)(030300)(030030)(030003)
(003300)(003030)(003003)
(000330)(000303)
(000033)

That concludes the discussion on possible outcomes. I will now switch to routes. As the balance between the stacks improves, we see an increase in the number of routes, the number of possibilities for realization. That is because it matters less which specific results are rolled at a specific point in the series. In maximum asymmetry (one stack of 6), only the first roll is unrestricted (all values are fine); the five rolls after that are subject to maximum restriction, since they have to have exactly the same number of dots. The probability progression is 6/6·1/6·1/6·1/6·1/6·1/6. In maximum symmetry (six stacks of one), the first roll is also unrestricted, but all subsequent rolls are subject to far fewer restrictions. After the first dice roll, the second roll has a probability of 5/6 to yield a different number of dots than the first roll. The third is 4/6, and so on. The probability progression is therefore 6/6·5/6·4/6·3/6·2/6·1/6: the total probability is much higher. In essence, these probabilities represent a number of routes towards achieving the outcome.

Each specific deviation from the balance 1 2 3 4 5 6 ((111111) in the stack notation) always has different specific deviations that precisely neutralize this deviation: collectively, they achieve balance. They often share a certain symmetry in their structure, leading to precisely the same number of routes. As a result, individual deviations from the balance can collectively (as a set) still lead back to balance. As n increases, the neutralization options

increase, with the result that balance is promoted above imbalance. The series tends towards balance. I offer a number of examples.

The simplest example is a situation in which one value is missing and another value occurs twice. This imbalance is neutralized by the reverse of that situation: the missing value occurs twice, while the redundant value is missing. Collectively, these two sets have achieved perfect balance: two ones, two twos, and so on. Due to these and other comparable neutralizations, the probability of symmetry is much higher in two series of six rolls than in one series of six rolls. An example is provided below.

2 2 3 4 5 6
1 1 3 4 5 6

Another example is that two values are missing, and a third value occurs three times. In combination with two other options, which have exactly the same probability, the balance is also restored here. An example is provided below.

3 3 3 4 5 6
1 1 1 4 5 6
2 2 2 4 5 6

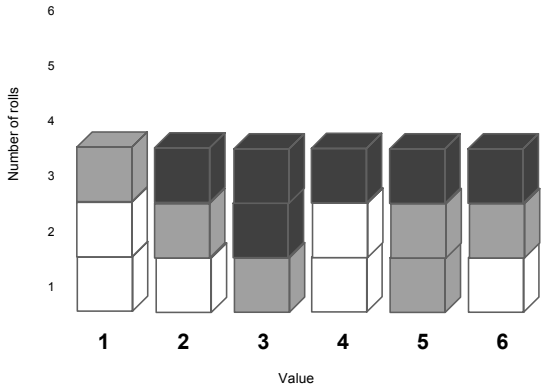
There is also an equal probability of rolling six ones, or six twos, or six threes, or six fours, or six fives, or six sixes. Six times this ultimate imbalance in six dice rolls still collectively leads to a perfect balance distributed across 36 rolls.

1 1 1 1 1 1
2 2 2 2 2 2
3 3 3 3 3 3
4 4 4 4 4 4
5 5 5 5 5 5
6 6 6 6 6 6

The same applies to a situation in which one value is missing, and the *next* value occurs twice (see the series below). There are six ones and six twos, etc.: collectively, they are perfectly balanced. This is a more specific variant of the previous example in which one value was missing and a random other value occurred twice.

2 2 3 4 5 6
1 3 3 4 5 6
1 2 4 4 5 6
1 2 3 5 5 6
1 2 3 4 6 6
1 1 2 3 4 5

The following is a final example of how *internally* asymmetrical rolls can still create a collective balance:



Three sets of six rolls, collectively balanced.

Each individual dice roll is completely random. For that reason, each stack has precisely the same probability of growth, if you look at the situation strictly on a roll-by-roll basis. If this were the only effect, we would never achieve balance, symmetry amongst the six stacks. At 36 rolls, the probability of 36 ones would be exactly the same as the probability of six ones, six twos, six threes, etc. (six equal stacks: the optimal balance). But it is not the only effect. The other effect, which does not occur until we repeatedly roll and view the outcomes as a comprehensive overview, is that combinations of sets of six rolls that are not in balance (that deviate from 1 2 3 4 5 6) still lead to the perfect balance collectively. And the higher the number of dice rolls, the stronger this effect becomes.

For that reason, looking solely at the averages, the probability of a more or less equal (relative) height of the six stacks is higher for 12 rolls than for 6, and higher for 18 rolls than for 12. The more multiples of six are rolled, the higher the probability of a better relative balance. (And the smaller, paradoxically, the probability of achieving the perfect balance.) To put it in Boltzmann's terms: there are far more microconfigurations that can realize the same macroconfiguration; entropy is much higher. And as n increases with each step, we see a less than perfect but still unmistakeable path towards increasing balance. A clear analogy can be drawn with *the path of humanity*.

Now we see the close ties between balance, probability of occurrence, stability, symmetry, objectivity, value, and effort. When rolling a dice, the degree of balance is expressed as the degree of symmetry between all six options; the higher the number of rolls, the higher the probability of relative symmetry – resulting in a more stable configuration, and a higher probability that we will experience it. It also takes the least effort to achieve this relative balance: it happens automatically. Balance means symmetry, which means stability, which means less effort. Imbalance means asymmetry, which means instability, which means more effort. You can expect to see the most stable, most symmetrical configurations most

frequently. Conversely, this means that you will have to invest a lot of effort in a situation that is not in balance. You'll only do that deliberately if this situation represents a lot of value.

We now also see why the average value of 3.5 from a dice roll is actually a suboptimal indicator for this value balance. If you roll a dice an even number of times, and only roll ones and sixes in a 50–50 ratio, the value balance is completely off, the symmetry is far less than the intended result – but the average is still 3.5. The degree to which the six stacks are equal in height is the only proper way to gauge the value balance. The perfect balance is only possible if n is a multiple of six, and does not occur in actual practice at high values of n. In fact, the probability of achieving perfect balance becomes lower as n increases. In practice, we fortunately do not need perfect balance at all: nearly balanced is more than good enough in the vast majority of cases.

As the number of rolls increases, we therefore expect a better relative balance, a higher relative symmetry. This is a stochastic narrative. It applies to many series of rolls. Individual series of rolls do more or less tend towards balance, but fluctuate far more in the process, and may deviate significantly at times.

To illustrate this, I ran simulations for n = 1 through 360000 rolls with a single dice (with intervals). In perfect balance (which only occurs in multiples of six), you get six equally high stacks. Five random results from simulations are displayed below. It is clear that the stacks (from 1 through 6) are far from symmetrical at first. As the number of rolls increases, the relative symmetry grows stronger and the balance improves (the deviation between them drops to hundredths of a percent):

1

6	(0 2 0 0 3 1)
12	(1 2 2 2 3 2)
18	(2 3 3 5 4 1)
24	(3 5 3 2 7 4)
36	(8 6 4 5 7 6)
360	(70 56 68 53 50 63)
3600	(627 559 615 620 578 601)
36000	(6030 5898 6010 6094 6067 5901)
360000	(60241 60058 59707 59867 60461 59666)

2

6 (0 1 1 1 0 3)
12 (0 0 3 4 3 2)
18 (4 2 3 2 3 4)
24 (6 1 4 4 4 5)
36 (5 5 9 6 7 4)
360 (64 55 55 61 60 65)
3600 (564 604 600 585 582 665)
36000 (5918 5962 6065 5985 6086 5984)
360000 (60123 59505 60147 60179 59985 60061)

3

6 (0 1 0 0 3 2)
12 (1 2 4 3 1 1)
18 (4 4 3 4 1 2)
24 (2 5 3 5 4 5)
36 (8 7 6 5 5 5)
360 (67 43 59 76 57 58)
3600 (551 614 611 591 632 601)
36000 (6092 5982 6015 6037 6017 5857)
360000 (59878 60078 59716 60144 60374 59810)

4

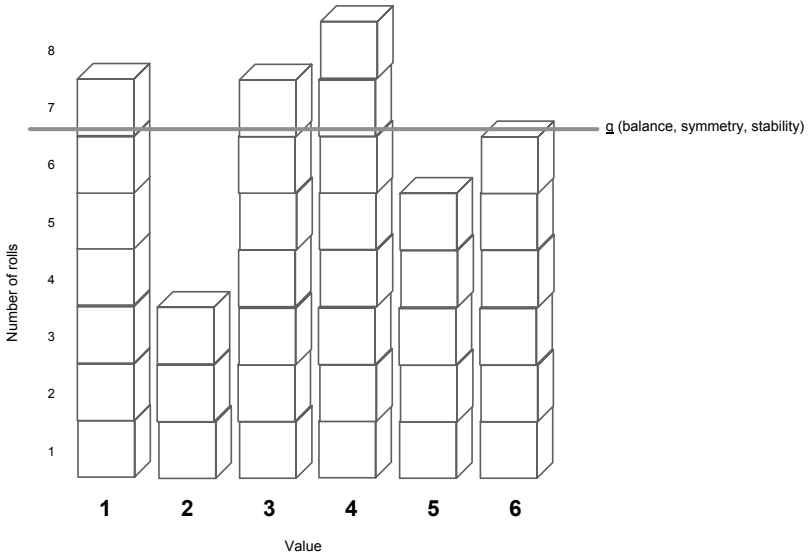
6 (1 2 1 1 0 1)
12 (1 1 6 4 0 0)
18 (5 6 1 2 1 3)
24 (5 2 4 6 4 3)
36 (3 9 0 12 9 3)
360 (44 60 62 78 55 61)
3600 (634 590 593 603 581 599)
36000 (5963 6025 6018 6108 5911 5975)
360000 (60463 59905 60161 59678 60218 59575)

5

6 (1 1 0 1 2 1)
12 (1 2 2 3 2 2)
18 (2 2 1 1 5 7)
24 (3 4 5 4 2 6)
36 (7 5 8 5 6 5)
360 (65 61 54 56 69 55)
3600 (591 558 599 650 601 601)
36000 (6020 5926 5988 6057 5964 6045)
360000 (60145 60132 60032 60215 59642 59834)

I ran the simulation again, but now the aim was to calculate the symmetry (the balance) for increasing n with intervals. At n rolls, the minimum balance (the minimum symmetry) has been achieved if n times one specific value, e.g. n times one six, has been rolled. The maximum balance (the maximum symmetry) occurs if all six values are equally frequent, and the six stacks are therefore exactly the same height. Perfect symmetry (perfect balance) is therefore only possible when rolling a dice if n is a multiple of six.

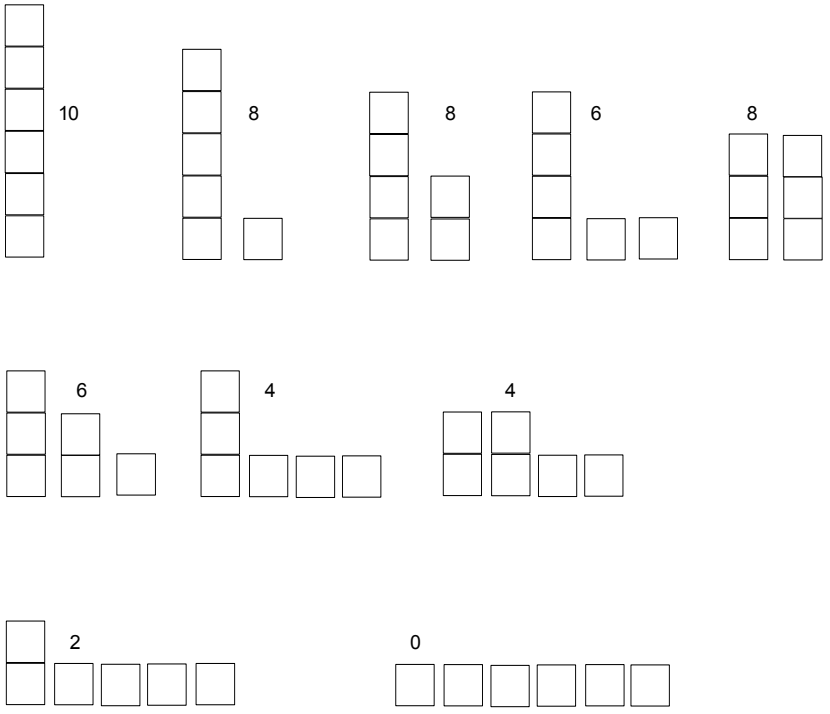
See e.g. in the following figure a random result of 36 rolls (this figure has been displayed before, without the bar). There are four blocks missing below the line, and an equal number are above the line.



Deviation from balance and symmetry in 36 dice rolls.

The perfect balance, the perfect symmetry is 0. Because it is 0, you could also see this as minimal imbalance. The maximum imbalance is equal to 10.q: one tower has a height of n, while five towers have a height of 0. The positive deviation of the high tower is 5.q, while the negative deviation of each remaining tower is q; this outcome times five is also 5.q. The sum is 10.h. If you divide this by q, you standardize the imbalance to the range of 0 (maximum balance) to 10 (minimum balance). The range of the balance factor (symmetry factor, stability factor) is now 0 (maximum balance, maximum symmetry, six equal towers with height q) to 10 (maximum imbalance, minimum symmetry, one tower with height n). You could interpret this figure as a standard for probability, the effort involved in a specific configuration.

The degree of symmetry is calculated as the sum of the deviations from the perfect stack height in each column, divided by the perfect stack height.[353] Since the only relevant factor here is the degree of deviation from perfect symmetry, and the sum of the positive deviations must be equal to the sum of the negative deviations, the *absolute value* of the deviations has been added up. The average stack height is $\underline{q} = n/6$. In this case, where $n = 36$, $\underline{q} = 36/6 = 6$. The perfect balance is achieved when all stacks are $\underline{q}$ in height (for 36 rolls, $\underline{q}$ would be 6). In the figure above, the positive deviations in $\underline{q}$ are 1, 1, and 2 (columns 1, 2, and 4). The negative deviations are 3 and 1 (columns 2 and 5). Column 6 is balanced: the deviation is 0. The sum of the deviations is now $1 + 3 + 1 + 2 + 1 + 0 = 8$. The balance is $8/\underline{q} = 8/6 = 1.33$.



Symmetry values for six dice rolls. 0 is maximum symmetry.

If you look at the *possible* outcomes, it is clear that there are many, many possibilities for 36 rolls. After all, all six values are possible for each and every roll. All structures can be achieved, from one big tower to six stacks that are equal in height; the only restriction is that it has to consist of 36 blocks.

[353] An even better measure would be to also discount the degree of deviation per stack. After all, the configurations involving 18 rolls (3 3 2 2 4 4) and (3 3 1 3 3 5) both have a total deviation of 4, but the first is more symmetrical than the second (so more routes lead to it). The simplification used here will be sufficient for the purposes of this exploratory discussion.

The minimum symmetry of 10 can occur for all values of n. This is always a *possible* outcome. However, the probability of symmetry 10 (minimum symmetry) is always lowest, since there is only one route available to roll that outcome (consistently rolling just one value), which is why 10 quickly becomes irrelevant as n increases. Once n rises beyond a certain value, we never see 10 again, for this reason.

Perfect balance (balance value 0) is only a *possible* outcome for multiples of six. However, there are many more possible outcomes, each with its own number of routes. Values closer to symmetry have a higher number of routes on average. For that reason, the balance for increasing values of n tends towards symmetry.[354]

The table below shows 180 simulations of two rolls. A 10 represents a situation in which you roll the same number of dots twice (a stack of 2). An 8 represents a situation in which you roll two different values (two stacks of 1).

	2	2	2	2	2	2
1	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
2	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	10.000000
3	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	8.0000000
4	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	8.0000000
5	8.0000000	8.0000000	10.000000	8.0000000	8.0000000	8.0000000
6	8.0000000	10.000000	10.000000	10.000000	8.0000000	8.0000000
7	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	10.000000
8	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	8.0000000
9	8.0000000	8.0000000	10.000000	8.0000000	10.000000	8.0000000
10	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
11	8.0000000	10.000000	8.0000000	10.000000	10.000000	8.0000000
12	8.0000000	8.0000000	10.000000	8.0000000	10.000000	8.0000000
13	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	8.0000000
14	8.0000000	8.0000000	8.0000000	10.000000	8.0000000	8.0000000
15	8.0000000	8.0000000	10.000000	8.0000000	10.000000	8.0000000
16	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
17	8.0000000	8.0000000	8.0000000	8.0000000	10.000000	8.0000000
18	8.0000000	8.0000000	10.000000	8.0000000	8.0000000	8.0000000
19	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
20	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
21	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
22	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
23	8.0000000	10.000000	8.0000000	8.0000000	8.0000000	10.000000
24	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
25	8.0000000	10.000000	8.0000000	8.0000000	8.0000000	8.0000000
26	8.0000000	8.0000000	10.000000	8.0000000	8.0000000	10.000000
27	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	10.000000
28	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	10.000000
29	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000	8.0000000
30	10.000000	8.0000000	10.000000	10.000000	8.0000000	8.0000000

The ratio between tens and eights in the simulations above is 33 to 180, so 1:5.46. We can derive that logically from the possible outcomes and the number of routes. The *possible* results are a stack of two (6) and two different values (15):

[354] This description suffices for my purpose in a moment, but if we take a closer look, we see that the symmetry via a random process weaves closer and closer to 0 on average. Every time a roll raises a lower than average stack, the actual symmetry improves, and every time a roll raises a higher than average stack, the actual symmetry declines. If n is a multiple of six, the 0 *could* be achieved earlier; if this happens, the symmetry of the five rolls after that is by definition lower, for example (this probability is nearly 0 for increasing values of n). A perfect balance along the way is an interesting point, since it is also literally a point of symmetry: the process continues from here as if it were starting all over again.

Symmetry ten: 11,22,33,44,55,66 (six in total)

Symmetry eight: 12,13,14,15,16,23,24,25,26,34,35,36,45,46,56 (15 in total)

Each double value has one route. Each set of two different values has two routes. You could roll a three and then a five, or a five and then a three. Now the expected ratio of 10:8 could be calculated as: 6·1:15·2 = 6:30 = 1:6. That's quite close to 1:5.46. If we increase the number of simulations, the ratio quickly draws closer to 1:6.

The following shows the results of three simulation experiments, displaying the resulting balance (symmetry). The first table (which covers two pages) shows the balance after n = 1 through 12 rolls. The second table shows the balance after n = 1, 6, 12, 18, 24, and 36 rolls. The third table shows the balance after 1, 10, 100, 1000, 10000, and 100000 rolls. I ran 50 simulations for each.

	1	2	3	4	5	6
1	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	6.0000000
2	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	4.0000000
3	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	6.0000000
4	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	0.0000000
5	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
6	10.000000	8.0000000	8.0000000	6.0000000	6.0000000	2.0000000
7	10.000000	8.0000000	6.0000000	4.0000000	4.0000000	4.0000000
8	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	4.0000000
9	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	4.0000000
10	10.000000	8.0000000	10.000000	4.0000000	4.0000000	6.0000000
11	10.000000	8.0000000	8.0000000	4.0000000	4.0000000	0.0000000
12	10.000000	8.0000000	6.0000000	4.0000000	4.0000000	2.0000000
13	10.000000	8.0000000	8.0000000	6.0000000	8.0000000	4.0000000
14	10.000000	8.0000000	6.0000000	6.0000000	2.0000000	2.0000000
15	10.000000	8.0000000	8.0000000	4.0000000	8.0000000	6.0000000
16	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
17	10.000000	8.0000000	8.0000000	4.0000000	4.0000000	6.0000000
18	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
19	10.000000	8.0000000	8.0000000	6.0000000	6.0000000	6.0000000
20	10.000000	10.000000	8.0000000	6.0000000	6.0000000	6.0000000
21	10.000000	8.0000000	8.0000000	6.0000000	8.0000000	2.0000000
22	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	6.0000000
23	10.000000	8.0000000	6.0000000	4.0000000	4.0000000	2.0000000
24	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	4.0000000
25	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	2.0000000
26	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	4.0000000
27	10.000000	10.000000	6.0000000	4.0000000	4.0000000	2.0000000
28	10.000000	8.0000000	6.0000000	6.0000000	8.0000000	4.0000000
29	10.000000	8.0000000	8.0000000	4.0000000	2.0000000	2.0000000
30	10.000000	10.000000	6.0000000	8.0000000	4.0000000	2.0000000
31	10.000000	8.0000000	8.0000000	8.0000000	6.0000000	4.0000000
32	10.000000	8.0000000	8.0000000	4.0000000	6.0000000	4.0000000
33	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	4.0000000
34	10.000000	8.0000000	8.0000000	4.0000000	4.0000000	4.0000000
35	10.000000	10.000000	8.0000000	4.0000000	6.0000000	2.0000000
36	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
37	10.000000	8.0000000	6.0000000	4.0000000	4.0000000	4.0000000
38	10.000000	8.0000000	8.0000000	6.0000000	6.0000000	4.0000000
39	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	6.0000000
40	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	6.0000000
41	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	8.0000000
42	10.000000	8.0000000	6.0000000	6.0000000	2.0000000	4.0000000
43	10.000000	8.0000000	6.0000000	4.0000000	4.0000000	6.0000000
44	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	6.0000000
45	10.000000	8.0000000	6.0000000	8.0000000	6.0000000	2.0000000
46	10.000000	10.000000	6.0000000	6.0000000	8.0000000	4.0000000
47	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
48	10.000000	8.0000000	6.0000000	6.0000000	4.0000000	2.0000000
49	10.000000	8.0000000	8.0000000	6.0000000	4.0000000	4.0000000
50	10.000000	8.0000000	6.0000000	6.0000000	6.0000000	6.0000000

	7	8	9	10	11	12
1	2.8571430	5.0000000	4.6666665	1.6000000	2.7272727	4.0000000
2	4.5714290	3.0000000	2.6666667	3.6000000	1.8181819	2.0000000
3	4.5714290	3.5000000	2.6666667	3.6000000	1.8181819	3.0000000
4	6.2857140	3.5000000	2.6666667	4.8000000	3.8181818	4.0000000
5	6.2857140	4.0000000	4.6666665	3.6000000	3.8181818	3.0000000
6	6.2857140	4.5000000	3.3333333	2.4000000	2.7272727	5.0000000
7	3.1428570	4.5000000	4.0000000	4.8000000	4.9090910	4.0000000
8	4.5714290	5.0000000	5.3333335	4.4000000	3.8181818	2.0000000
9	2.8571430	3.0000000	5.3333335	5.6000000	3.8181818	3.0000000
10	4.2857140	2.0000000	4.0000000	3.6000000	2.7272727	3.0000000
11	4.2857140	3.5000000	3.3333333	4.8000000	2.9090910	4.0000000
12	2.8571430	4.5000000	4.6666665	4.0000000	2.9090910	1.0000000
13	4.5714290	2.0000000	4.6666665	2.4000000	3.8181818	3.0000000
14	1.4285715	4.0000000	4.6666665	2.8000000	4.9090910	4.0000000
15	4.5714290	3.0000000	4.0000000	3.6000000	2.9090910	3.0000000
16	4.2857140	4.5000000	4.6666665	6.0000000	4.0000000	2.0000000
17	3.1428570	3.0000000	4.6666665	4.0000000	3.8181818	5.0000000
18	4.5714290	3.0000000	4.6666665	3.2000000	2.9090910	2.0000000
19	2.8571430	3.0000000	4.0000000	2.8000000	4.0000000	2.0000000
20	6.0000000	3.5000000	3.3333333	3.6000000	3.8181818	1.0000000
21	4.5714290	3.5000000	4.6666665	4.8000000	1.8181819	3.0000000
22	4.5714290	4.5000000	4.6666665	2.0000000	4.9090910	3.0000000
23	3.1428570	6.5000000	4.0000000	2.8000000	2.9090910	5.0000000
24	4.5714290	5.0000000	2.6666667	4.8000000	2.7272727	4.0000000
25	4.5714290	3.0000000	3.3333333	4.4000000	1.8181819	4.0000000
26	4.5714290	3.0000000	2.0000000	1.6000000	5.8181820	3.0000000
27	4.5714290	4.5000000	2.6666667	1.6000000	2.7272727	3.0000000
28	2.8571430	3.5000000	2.0000000	3.2000000	2.9090910	2.0000000
29	1.4285715	4.5000000	4.0000000	5.6000000	2.7272727	4.0000000
30	2.8571430	3.0000000	2.0000000	5.2000000	2.7272727	3.0000000
31	4.5714290	6.5000000	4.6666665	3.6000000	2.9090910	5.0000000
32	4.2857140	3.5000000	4.0000000	3.2000000	2.9090910	2.0000000
33	4.8571430	3.5000000	3.3333333	2.4000000	0.9090909	4.0000000
34	4.5714290	6.5000000	3.3333333	4.8000000	3.6363637	2.0000000
35	4.5714290	3.5000000	2.6666667	3.6000000	3.8181818	4.0000000
36	8.0000000	4.5000000	3.3333333	3.6000000	2.7272727	3.0000000
37	4.8571430	8.0000000	3.3333333	6.0000000	3.8181818	3.0000000
38	2.8571430	3.5000000	6.0000000	4.0000000	4.0000000	3.0000000
39	2.8571430	3.5000000	3.3333333	2.8000000	2.9090910	4.0000000
40	4.2857140	5.0000000	2.6666667	3.2000000	2.7272727	3.0000000
41	4.5714290	4.5000000	2.6666667	5.6000000	2.9090910	3.0000000
42	4.5714290	4.5000000	4.0000000	4.8000000	2.7272727	4.0000000
43	4.5714290	3.0000000	3.3333333	2.4000000	4.7272725	2.0000000
44	4.2857140	3.0000000	4.6666665	3.6000000	2.7272727	4.0000000
45	2.8571430	2.5000000	2.0000000	1.6000000	4.0000000	3.0000000
46	6.0000000	6.5000000	4.0000000	3.6000000	4.9090910	3.0000000
47	2.8571430	5.0000000	4.6666665	2.4000000	2.7272727	3.0000000
48	4.2857140	3.0000000	4.6666665	3.6000000	2.9090910	1.0000000
49	2.8571430	4.5000000	2.6666667	2.4000000	2.9090910	3.0000000
50	6.2857140	4.0000000	3.3333333	3.6000000	3.8181818	4.0000000

Symmetry in repeated rolls of a single dice (10 is minimum, 0 is maximum) for an increasing number of rolls (see top row). Repeated 50 times.

	1	6	12	18	24	36
1	10.000000	6.0000000	3.0000000	2.0000000	2.5000000	2.0000000
2	10.000000	4.0000000	2.0000000	1.3333334	1.5000000	2.6666667
3	10.000000	2.0000000	5.0000000	2.0000000	1.5000000	2.0000000
4	10.000000	4.0000000	3.0000000	1.3333334	2.5000000	2.0000000
5	10.000000	4.0000000	4.0000000	1.3333334	1.5000000	1.6666666
6	10.000000	0.0000000	3.0000000	2.6666667	2.5000000	2.3333333
7	10.000000	2.0000000	3.0000000	2.0000000	2.5000000	1.0000000
8	10.000000	4.0000000	4.0000000	4.0000000	4.5000000	2.0000000
9	10.000000	6.0000000	4.0000000	2.0000000	2.5000000	2.3333333
10	10.000000	4.0000000	2.0000000	2.0000000	1.5000000	1.3333334
11	10.000000	2.0000000	4.0000000	3.3333333	2.0000000	3.3333333
12	10.000000	4.0000000	3.0000000	1.3333334	2.5000000	0.3333333
13	10.000000	4.0000000	2.0000000	3.3333333	2.5000000	2.6666667
14	10.000000	2.0000000	2.0000000	4.0000000	3.0000000	1.3333334
15	10.000000	4.0000000	4.0000000	2.0000000	2.0000000	2.0000000
16	10.000000	4.0000000	3.0000000	2.6666667	1.5000000	1.0000000
17	10.000000	4.0000000	3.0000000	1.3333334	2.5000000	2.0000000
18	10.000000	4.0000000	3.0000000	3.3333333	3.5000000	2.3333333
19	10.000000	4.0000000	3.0000000	2.6666667	1.5000000	2.0000000
20	10.000000	6.0000000	4.0000000	2.0000000	2.0000000	2.0000000
21	10.000000	2.0000000	5.0000000	3.3333333	2.5000000	1.6666666
22	10.000000	6.0000000	4.0000000	2.0000000	2.5000000	2.3333333
23	10.000000	8.0000000	3.0000000	1.3333334	4.0000000	1.6666666
24	10.000000	2.0000000	2.0000000	2.0000000	2.5000000	2.0000000
25	10.000000	4.0000000	5.0000000	2.0000000	3.0000000	1.6666666
26	10.000000	4.0000000	5.0000000	2.6666667	1.5000000	2.3333333
27	10.000000	4.0000000	3.0000000	2.6666667	3.0000000	2.0000000
28	10.000000	6.0000000	3.0000000	3.3333333	2.0000000	0.6666667
29	10.000000	2.0000000	2.0000000	1.3333334	2.0000000	1.6666666
30	10.000000	2.0000000	5.0000000	3.3333333	2.0000000	1.3333334
31	10.000000	4.0000000	2.0000000	3.3333333	2.5000000	1.0000000
32	10.000000	2.0000000	3.0000000	2.0000000	2.0000000	1.3333334
33	10.000000	4.0000000	3.0000000	0.0000000	1.5000000	2.0000000
34	10.000000	6.0000000	5.0000000	4.0000000	1.5000000	2.3333333
35	10.000000	2.0000000	2.0000000	2.6666667	1.5000000	2.3333333
36	10.000000	2.0000000	3.0000000	2.0000000	2.0000000	1.3333334
37	10.000000	2.0000000	2.0000000	2.6666667	2.0000000	1.6666666
38	10.000000	2.0000000	3.0000000	2.6666667	2.0000000	2.0000000
39	10.000000	6.0000000	3.0000000	2.0000000	2.0000000	1.3333334
40	10.000000	6.0000000	3.0000000	2.6666667	2.5000000	2.0000000
41	10.000000	8.0000000	2.0000000	2.0000000	2.0000000	1.3333334
42	10.000000	4.0000000	2.0000000	3.3333333	2.5000000	1.6666666
43	10.000000	6.0000000	3.0000000	1.3333334	2.0000000	2.0000000
44	10.000000	2.0000000	1.0000000	0.6666667	2.5000000	2.3333333
45	10.000000	4.0000000	3.0000000	2.0000000	1.5000000	1.0000000
46	10.000000	4.0000000	3.0000000	2.0000000	0.5000000	2.3333333
47	10.000000	4.0000000	3.0000000	2.6666667	2.0000000	2.0000000
48	10.000000	6.0000000	2.0000000	2.6666667	2.0000000	2.0000000
49	10.000000	4.0000000	3.0000000	2.0000000	3.0000000	1.6666666
50	10.000000	4.0000000	1.0000000	3.3333333	2.5000000	1.0000000

Symmetry in repeated rolls of a single dice (10 is minimum, 0 is maximum) for an increasing number of rolls (see top row). Repeated 50 times.

	1	10	100	1000	10000	100000
1	10.000000	2.4000000	1.6000000	0.4600000	0.0568000	0.0323600
2	10.000000	2.4000000	1.0800000	0.2360000	0.0928000	0.0310400
3	10.000000	2.8000000	1.2000000	0.5280000	0.0584000	0.0277200
4	10.000000	3.6000000	1.0400000	0.4440000	0.0864000	0.0410400
5	10.000000	3.2000000	1.1600000	0.3280000	0.0900000	0.0266400
6	10.000000	3.6000000	0.3600000	0.3480000	0.0704000	0.0279200
7	10.000000	3.6000000	1.2400000	0.3960000	0.0716000	0.0116400
8	10.000000	2.8000000	1.6800000	0.3040000	0.1212000	0.0328000
9	10.000000	3.6000000	0.9600000	0.2360000	0.0612000	0.0455600
10	10.000000	4.8000000	1.0400000	0.3960000	0.1776000	0.0379200
11	10.000000	2.4000000	0.9600000	0.3240000	0.0740000	0.0426000
12	10.000000	4.8000000	1.2000000	0.3000000	0.0764000	0.0519200
13	10.000000	3.6000000	0.9600000	0.2760000	0.0940000	0.0252800
14	10.000000	3.6000000	1.0400000	0.2280000	0.0492000	0.0260400
15	10.000000	4.4000000	0.6000000	0.3480000	0.1656000	0.0395200
16	10.000000	3.6000000	0.4400000	0.2800000	0.1256000	0.0464400
17	10.000000	3.6000000	1.2000000	0.3480000	0.1572000	0.0167600
18	10.000000	5.6000000	1.1600000	0.3960000	0.1308000	0.0368400
19	10.000000	3.6000000	0.8400000	0.4520000	0.0592000	0.0111600
20	10.000000	4.4000000	1.0800000	0.2200000	0.1260000	0.0149200
21	10.000000	3.2000000	1.9200000	0.1560000	0.1392000	0.0342000
22	10.000000	2.4000000	0.5200000	0.3600000	0.1508000	0.0519600
23	10.000000	2.4000000	1.2000000	0.1920000	0.0912000	0.0249200
24	10.000000	3.6000000	0.6400000	0.1320000	0.1848000	0.0454000
25	10.000000	4.8000000	1.3200000	0.3720000	0.1164000	0.0446800
26	10.000000	2.8000000	1.2800000	0.1800000	0.1480000	0.0340800
27	10.000000	4.8000000	0.8400000	0.2520000	0.1104000	0.0501600
28	10.000000	2.4000000	1.5600000	0.5040000	0.0836000	0.0264800
29	10.000000	3.2000000	1.3200000	0.2920000	0.0576000	0.0404800
30	10.000000	4.0000000	1.0400000	0.2800000	0.1236000	0.0181200
31	10.000000	3.6000000	1.2000000	0.2440000	0.1884000	0.0614000
32	10.000000	4.8000000	1.3200000	0.3120000	0.0924000	0.0359600
33	10.000000	4.8000000	1.2800000	0.2760000	0.1108000	0.0453200
34	10.000000	3.6000000	0.7200000	0.1640000	0.1300000	0.0318000
35	10.000000	4.8000000	0.7600000	0.2400000	0.1884000	0.0255600
36	10.000000	2.4000000	0.8400000	0.4640000	0.0648000	0.0438000
37	10.000000	4.8000000	1.2000000	0.2880000	0.0720000	0.0594000
38	10.000000	3.2000000	1.2000000	0.3600000	0.0624000	0.0217600
39	10.000000	3.6000000	0.6800000	0.3000000	0.1060000	0.0577200
40	10.000000	3.6000000	1.3200000	0.2600000	0.0824000	0.0310000
41	10.000000	4.4000000	1.6800000	0.1560000	0.1232000	0.0389600
42	10.000000	3.6000000	2.1600000	0.3000000	0.1800000	0.0453600
43	10.000000	2.4000000	0.3600000	0.1800000	0.1104000	0.0452400
44	10.000000	5.6000000	0.7200000	0.1680000	0.1132000	0.0473600
45	10.000000	2.4000000	0.7600000	0.3360000	0.1204000	0.0289200
46	10.000000	3.2000000	1.0800000	0.3680000	0.0772000	0.0310800
47	10.000000	2.4000000	0.8800000	0.2640000	0.0544000	0.0405600
48	10.000000	3.6000000	0.8800000	0.1480000	0.1268000	0.0450400
49	10.000000	3.6000000	0.9200000	0.3560000	0.1252000	0.0354000
50	10.000000	2.8000000	0.7200000	0.2040000	0.1356000	0.0332800

Symmetry in repeated rolls of a single dice (10 is minimum, 0 is maximum) for an increasing number of rolls (see top row). Repeated 50 times.

The simulations show that for increasing values of n, starting from maximum imbalance (10, a completely random first roll always yields a stack of 1), the series move towards maximum balance (0, six equal stacks).

n = 1 yields one stack (of one block), which inevitably leads to 10. n = 2 can only produce 10 and 8, since there are only two possible outcomes: 1 stack (of two) or two stacks (of one). We expect more eights than tens (due to the number of routes times the number of outcomes). n = 3 also adds 6, and we expect more sixes than eights or tens. And our expectation is correct: the 10 only occurs once in column 3. n = 4 also adds the balance value of 4, and again we expect more fours than sixes or eights or tens. The tens are still possible, but

they're out of the picture from this point on, for all practical intents and purposes. We still see three eights. n = 5 also adds 2.

We see values emerging and disappearing again. The eight seems to replace the ten, and that impression is correct. The same fate awaits the 8 a bit later. The eights grow steadily sparser; one more appears in column 7 of experiment 36 and column 8 of experiment 37. The sixfold symmetry shows up two more times at 10 rolls (row 16 and row 37). n = 1 only shows tens; n = 2 produces eights as well.

Moving from left to right, the subjectivity and uniqueness illusion inevitable transition into the objectivity and continuity illusion (and vice versa): as the number of rolls increases, it becomes increasingly difficult to avoid the impression that there is an attempt to build six equal stacks, and that the implementer is increasingly successful (the dice is learning?). That isn't because the perfect balance occurs frequently enough, as the matrix for *two* rolls seems to suggest. The perfect balance is never achieved for lots and lots of rolls; in terms of frequency, it's not much different than a single tower of identical rolls, for instance sixes. The trend towards balance occurs because more and more rolls means that the number of possibilities for creating more symmetrical stacks of blocks increases much faster than the number of possibilities for creating more asymmetrical blocks. It is sheer coincidence if they are *exactly* the same height, and in fact occurs extremely rarely. The 0 does not occur even once in the simulations for 10,000 and 100,000, and should not be expected to occur. It cannot occur at all, since these are not multiples of six. For that reason, the experiment was repeated again, but now for high multiples of six: 36, 360, 3600, 36000, 360000, and 3600000 (see following page). The 0 is strikingly absent here as well, as expected, but its absence here is not because it is impossible, but because it is improbable. In practical terms, that does not really matter.

	36	360	3600	36000	360000	3600000
1	2.0000000	0.8666667	0.1333333	0.0753333	0.0239000	0.0063133
2	1.6666666	0.5333333	0.2000000	0.0260000	0.0177666	0.0077366
3	1.6666666	0.6000000	0.1066666	0.0600000	0.0214000	0.0067666
4	2.0000000	0.5666666	0.1866666	0.0713333	0.0175666	0.0067266
5	2.0000000	0.6333333	0.1866666	0.0430000	0.0190666	0.0036533
6	2.6666667	0.8666667	0.0733333	0.0773333	0.0207666	0.0055766
7	2.0000000	0.5000000	0.2666666	0.0500000	0.0186666	0.0068500
8	3.0000000	0.3666666	0.2066666	0.0373333	0.0241000	0.0059500
9	1.3333334	0.8333333	0.2100000	0.0596666	0.0153000	0.0031933
10	2.3333333	0.6333333	0.2600000	0.0513333	0.0335666	0.0078600
11	1.6666666	0.7000000	0.0766666	0.0303333	0.0082333	0.0047600
12	2.0000000	0.4666666	0.1533333	0.0753333	0.0146333	0.0055666
13	1.6666666	0.4333333	0.1833333	0.0520000	0.0241000	0.0086666
14	2.0000000	0.4666666	0.2100000	0.0553333	0.0178000	0.0054166
15	1.0000000	0.8333333	0.0966666	0.0750000	0.0206000	0.0054033
16	0.6666667	0.3000000	0.1566666	0.0543333	0.0111000	0.0023500
17	1.3333334	0.6333333	0.2133333	0.0420000	0.0152333	0.0051733
18	1.3333334	0.5000000	0.2166666	0.0700000	0.0152333	0.0075166
19	0.6666667	0.6333333	0.1533333	0.1156666	0.0160000	0.0038566
20	1.6666666	0.4666666	0.2200000	0.0730000	0.0097333	0.0047300
21	2.3333333	0.6000000	0.1333333	0.0553333	0.0132000	0.0110233
22	2.0000000	0.5333333	0.2233333	0.0516666	0.0168333	0.0060600
23	2.3333333	0.6333333	0.1100000	0.0890000	0.0156333	0.0040333
24	2.6666667	0.8333333	0.1066666	0.0650000	0.0162000	0.0053066
25	1.3333334	0.6000000	0.2166666	0.0496666	0.0228333	0.0072166
26	1.3333334	0.5666666	0.1233333	0.0336666	0.0214333	0.0104733
27	2.3333333	0.6333333	0.2000000	0.0556666	0.0088666	0.0027300
28	2.0000000	0.5000000	0.2433333	0.0366666	0.0088666	0.0044266
29	2.6666667	0.4666666	0.2133333	0.0396666	0.0135333	0.0063000
30	1.3333334	0.2000000	0.1466666	0.0430000	0.0306666	0.0038933
31	1.3333334	0.9666666	0.2500000	0.0760000	0.0157666	0.0043633
32	1.0000000	0.4666666	0.1633333	0.0626666	0.0317333	0.0081266
33	1.3333334	0.5666666	0.1533333	0.0503333	0.0121666	0.0044233
34	2.6666667	0.4666666	0.1566666	0.0576666	0.0312333	0.0066400
35	2.0000000	0.8333333	0.1166666	0.0563333	0.0129000	0.0079833
36	2.0000000	0.6333333	0.1500000	0.0773333	0.0234666	0.0089466
37	2.3333333	0.7000000	0.1600000	0.0353333	0.0243000	0.0087300
38	2.0000000	0.7666666	0.1566666	0.0763333	0.0167666	0.0047400
39	1.3333334	0.7000000	0.1866666	0.0473333	0.0098000	0.0062833
40	2.3333333	0.4666666	0.1200000	0.0303333	0.0180666	0.0050166
41	2.6666667	0.4666666	0.1533333	0.0520000	0.0127000	0.0045600
42	1.6666666	0.6666667	0.1933333	0.0666666	0.0249666	0.0047500
43	1.0000000	0.5666666	0.0866666	0.0420000	0.0153666	0.0038000
44	1.0000000	0.5333333	0.1366666	0.0333333	0.0214666	0.0079000
45	1.3333334	0.5666666	0.0766666	0.0723333	0.0137000	0.0040133
46	1.0000000	0.5666666	0.2000000	0.0310000	0.0204666	0.0050466
47	0.6666667	0.4333333	0.1700000	0.0540000	0.0205666	0.0065700
48	2.0000000	0.4000000	0.1700000	0.0593333	0.0192333	0.0083366
49	2.3333333	0.7000000	0.2400000	0.0730000	0.0159000	0.0074000
50	1.6666666	0.7000000	0.1800000	0.0553333	0.0188000	0.0037766

Statistical, thermodynamic, and ergodic relationships

> *The probability of the occurrence of a system in a specific macroscale (from outside) is proportional to the number of ways in which this system can be composed on a microscale (from within).*
> Boltzmann's hypothesis, 1877 (paraphrased in my own words)

Rolling a dice is an example of a repeatable process with a known[355] number of possible outcomes per repetition.[356] So we're talking about situations (results) and processes. Of those outcomes per repetition, six for a dice, the probability should be known (a dice offers even odds). A single dice roll is a simple example; the experience of a stream of perspectives by a multi-actor consciousness (by now known more accurately as a *society*) is a complex example.

The workings of this type of repeatable process can now be described concisely. The concept of balance is key. Balance is a characteristic of the total outcome of repetitions. In this context, balance has the specific meaning of a high interchangeability of smaller series of repetitions, without any consequences for the total outcome (see examples below). It's always about a statistical approach; it's about averages. The description connects outcome and process through a reversal. It's about an expectation hypothesis based on balance. It goes as follows.

Suppose you have a repeatable process with a known number of outcomes s per repetition, with a known probability.

> *When the outcome achieves a higher degree of balance, the number of routes for achieving this outcome increases.*
>
> *And that's exactly why, as the number of repetitions increases, this process is expected to progress towards an ever-increasing degree of balance in the outcome.*

Relating this to dice: as the heights of the stacks of ones, twos, threes, fours, fives, and sixes become relatively more equal,[357] the balance becomes higher as well, so there are more routes, and more possibilities to realize this total outcome (this total configuration). And this is exactly why the *process* of rolling a dice more and more often progresses – not monotonously, but certainly unstoppably – towards the highest balance. Deviations do occur, but the tide will always turn eventually.

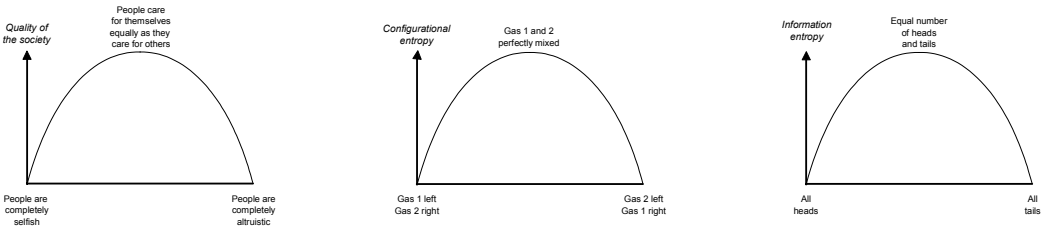
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[355] A known number is something different than a fixed number.

[356] This is a *finite state machine* (in any case, a variant thereof).

[357] The strictest definition of symmetry applies here, which also reduces the degree of deviation within each stack. After all, the configurations involving 18 rolls (3 3 2 2 4 4) and (3 3 1 3 3 5) both have a total deviation of 4 from the previous simulations according to the general symmetry formula, but the first is more symmetrical than the second (so more routes lead to it).

The figure below shows the three examples that I mentioned earlier in this book while discussing (societal) entropy (Part I): the societal balance model, the chemical balance model, and the information theory balance model.



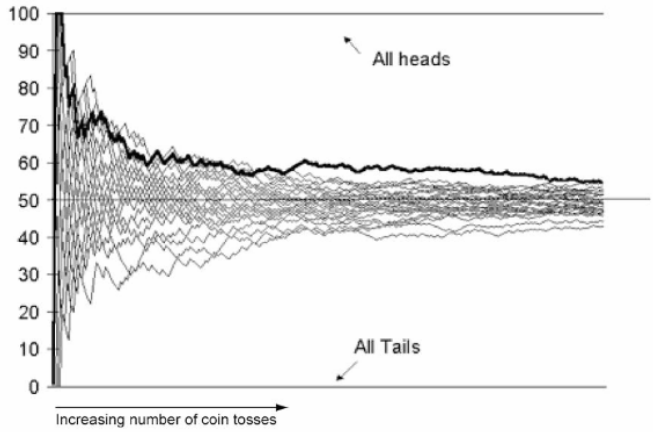
The societal balance model presented in this book (left), the chemical balance model of the mixing of two gases (middle), and the information theory balance model of tossing heads or tails (right, Shannon).

They show the end result of three widely divergent dual systems. It's all about entropy. If there is no other preference, then the following applies: the more possibilities there are to arrive at a specific configuration, the higher the probability of achieving this configuration. Or: the more microconfigurations there are to achieve a certain macrostate, the more likely it is to occur. All three seek the balance, each according to its own particular notion of balance.

On a dice, all six values converge towards each other. The coin toss (the balance model on the right) is most closely related to the dice roll. The most extreme balance, in this case, is if heads is tossed just as often as tails: 50% for both (this is of course only possible with an even number of tosses). The most extreme imbalance is if you'd only toss heads or only tails. The two figures below offer intriguing insights into this.[358]

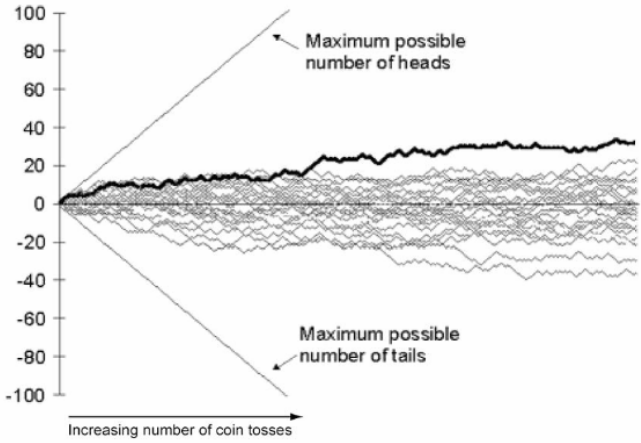
[358] Courtesy of Dr Nigel Turner, Centre for Addiction and Mental Health, the Institute of Ontario, dedicated to the solution of Problem Gambling (see www.problemgambling.ca). The Swiss mathematician and physicist Jacob Bernoulli (1654-1705), the first in a dynasty of mathematicians, did a lot of the groundwork for these kinds of processes, and provided a mathematical description of the underlying nature of these kinds of figures.

Figure 1. Percentage of heads and tails over an increasing number of coin tosses.



The percentage of heads and tails converges towards the mean.

Figure 2. The balance of heads and tails over an increasing number of coin tosses.



The actual number of heads and tails does not converge towards the mean; rather, it diverges away from the mean.

Absolute and relative. The more often you toss a coin, the more the heads–tails ratio converges towards 50% (figure at top). The absolute difference deviates more and more in the long term (figure at bottom). Courtesy of Dr. Nigel Turner, Centre for Addiction and Mental Health, the Institute of Ontario.

The figure at the top shows how the heads–tails ratio continues to rise towards 50% through various series, as the series grow longer, even though this happens in an exceptionally unstructured progression. The figure at the bottom shows how the absolute difference

diverges increasingly in the longer term, but continues to draw relatively closer to the balance axis.[359]

The path of humanity is related to the thick black line in the top figure, but then *reversed*, from right to left (right has just one improvement perspective, while left has more and more). The improvement in societal quality accelerates, and there is evidence of significant ups and downs (such as the rise and fall of the Roman Empire). That's logical, of course: there is a comparable mechanism behind it. Just like a coin that has two sides, heads and tails, an abstract perspective has three possibilities: improvement, deterioration, or neither.[360] Keeping in mind that a person encounters improvement perspectives and uses them, and also encounters deterioration perspectives and avoids them, it's only logical that a progression which systematically promotes one of the two sides, i.e. the improvement perspectives, is similar to *the path of humanity*. In short, people as improvers (the intentionality of the human being) is what ensures that one of the more extreme curves wins. In other words, we use our intelligence to defeat chaos. The fact that we have to reverse it is because people started out with little improvement potential, and are constantly trying to improve it (improvement potential is more or less cumulative).

The lower of the two figures shows that this doesn't mean that the absolute surplus of heads or tails decreases. In summary: relatively speaking, the balance tends towards 50% (see the top figure). However, in absolute terms, the surplus actually tends towards increasingly high values (progressing by √n, as Bernoulli showed, shown in the bottom figure). This concludes the discussion of repeated coin tosses. The balance point in mixing two gases (middle) is when the two gases are completely mixed. The most extreme imbalance here is that the one type of gas is neatly kept on the left, and the other type of gas is neatly kept on the right side of the space, or the other way around (so there are also two options here).

The societal balance model, as presented in this book, has as its ultimate balance point that people (actors) are well aware of the distinguishing qualities and potential of others, utilize them in collective entities, and experience their value, without neglecting their own unique identity. The ultimate imbalance here is that people (actors) only focus on their own potential, or only on the potential of other actors.

In the discussion above, I stated that balance could be specifically defined as high exchangeability between smaller series of repetitions, without having consequences for the total outcome. That is exactly what balance is: imperturbability in the face of variable progressions. In all three examples, this is very much the case. When tossing a coin, you can

[359] This is analogous to how the ratio between prime factorizations with even and uneven lengths pull towards to the balance axis in the longer term (see also the Denjoy interpretation of the Riemann hypothesis, in Theme IV: Pattern laws in perspective, just after this. However, the line of numbers also exhibits interleaving).

[360] Of course there are gradations of better and worse, but those average out eventually. Fixed improvement and deterioration perspectives are a reasonable assumption.

switch large segments of very long series of tosses without any problems; the ratio will only change significantly in very rare circumstances. When mixing gases, you can reverse segments of the volume of gas, or add gas in the same ratio, in such a way that it hardly influences the mixture, if at all. And in a balanced society, segments can stop working without causing big problems; society as a whole won't fall apart completely, because people understand one another and can easily deal with new challenges together, pitching in for each another if that becomes necessary or preferable. When that happens, the opportunities for societal innovation are optimal.

In the discussion above, I offered a description that united outcome and process via a reversal. You can now also reverse this integral description:

> *When the outcome is less balanced, the number of routes to achieve this outcome is lower.*
>
> *And that is exactly why the process displays an increasingly unbalanced result as the number of repetitions drops, leading to a more random outcome. If there are fewer repetitions, the expected outcome shifts towards an unstable (i.e. random) process.*

A single dice roll corresponds to a completely random process. The lowest balance is associated with one type of dots on the dice, for example sixes or threes. Whether it's about a stack of one one, three twos, or twelve thousand sixes, there is only one route available to roll this stack of the same number of dots: keep rolling that value over and over without any exceptions.

Instability and stability thus represent the alpha and omega of experience. If the dice is rolled only a few times, the subjectivity and uniqueness illusion takes hold, and we interpret the outcome as random. When just a few more rolls are added, we start to calculate probability. And when the dice is rolled a lot more times, the objectivity and continuity illusion takes hold and we interpret the result as real, and objective.

This applies to trends in societal development as well. The process that is repeated here is experiencing perspective. When interacting with a good friend, or a societal partner, you build up a lot of experience. You get to know them better and better over time, because you share more and more perspectives with each other. At a certain point, you may even think you have a fairly objective view of the friend or societal partner (even though you can never know for certain). The friendship or partnership therefore produces a new multi-actor; if the collective experiences continue to grow, a new actor on a larger scale may even emerge (such as a good marriage, a strong team, or a culturally conscious nation, or the global community of Team World). If you lose touch with your good friend or partner, this shared experience gradually diminishes, relatively speaking. Your expectation shifts away from a fairly objective expectation, moving more towards a random process. When you meet someone new, you can expect pretty much anything, since you have no previous experience with them. That is a random process within the possibilities, just as with a new first roll of a dice, or a goalie that has to deflect a penalty kick.

The summary above immediately recalls the second law of thermodynamics,[361] which states, loosely paraphrased, that a random process[362] tends to move towards a higher probability (a higher degree of entropy). The description above agrees with that – and that's a good thing, too, because you are very unlikely to win a battle *against* the laws of thermodynamics.

The summary is also significantly inspired by Boltzmann, a great theoretical physicist of the 19th century. He stated that the chaotic collisions between molecules were the cause of e.g. mixing and diffusion of gases. Critics often cited the escape of perfume vapours as an example of why his theory was wrong: perfume molecules may escape the bottle spontaneously, but never spontaneously go back into the bottle *en masse*, which seemed to be what Boltzmann's ideas were implying. To clarify, this discussion was conducted at a time when the suppositions about the existence of atoms and molecules were still a disturbing novelty to many, including some prominent physicists. Boltzmann was intensely criticized for his unprecedented ideas. So why do we never see perfume vapours returning to the bottle, anyway?

Boltzmann had an explanation for this that was as simple as it was brilliant. He suggested that the *probability* of a specific state of a system (he primarily referred to physical systems, while recursive perspectivism is about societal multi-actor systems) is proportional to *the number of possible ways* in which this system can be configured internally, without it making any difference on the outside. That's exactly why tossing a coin, mixing gases, and developing a societal practice in the perspectivist space are exactly the same. If heads or tails appear equally frequently, if two gases are almost perfectly mixed, or if the three perspectivist dimensions of pluriformity, similarity, and unity are beautifully balanced, most possible microconfigurations would work to assemble this macro-occurrence. And that's why all these systems unavoidably tend towards this balance, as we've just experienced with the dice. *Perspective gives us the recursive building block at the microlevel that helps us better understand our societal practices as macrophenomena.*

In conclusion, the summary above reminds me of the *ergodic hypothesis*. The ergodic hypothesis connects outcome and process via a reversal. A result is static; a process is dynamic. A result occupies a point in space, while a process takes place over time. This is precisely why that the summary above is, in my opinion, similar to the ergodic hypothesis, which comes from the field of physical and chemical thermodynamics. The hypothesis equates two averages: one of a total system over time, the other of different subsystems of that entire system in a single moment. This equation was and is the subject of in-depth debate amongst extremely knowledgeable scientists, so I will not venture to make further statements on this matter.[363] But the ergodic hypothesis relates a process in time to a

[361] The first law of thermodynamics is the law of conservation of energy.
[362] Thermodynamics do not generally refer to random processes, but to 'processes in which no work is added to the system' – but that seems to me to be exactly the same as a random process.
[363] See for example P.W. Atkins (1982), *Physical Chemistry*, Chapter 20, Statistical Thermodynamics, Oxford University Press (second edition).

situation in space, and the description above also plays with space and time, in terms of perspective.[364] Recursive perspective precedes time and space, matter and knowledge (it is pre-ontological and pre-epistemological, see also the section on moving panels in Theme II, and more specifically the discussion of space and time). It is therefore not all that strange that the perspectivist space offers a framework for a better understanding of where the ergodic hypothesis fits in. I suspect that the ergodic hypothesis simply describes a perspectivist balance.

Exploring dice in perspective

I've reached the end of my exploration of how dice work. I used dice as a simple model for gaining a better understanding of how a random and discreet process at one of the smallest scales develops into an anchor of continuity and predictability by simple repetition (and vice versa). In doing so, I wanted to get a better grip on the ways in which consciousnesses and societal practices develop, resulting in *the path of humanity*.

Human beings are born as surprised and curious babies in an environment of stimuli that are incomprehensibly chaotic and discrete from their perspective. Over the course of a human lifetime, a person learns by experiencing and exploring, failing and trying again, getting to know the world as an objective, material foundation to build on, and as a context within which unexpected events take place. Perspectivism pours this process into a recursive stream of perspective. There is an unmistakable similarity between repeatedly rolling dice and experiencing a stream of perspective. Both move from random chance at the microscale to expectations at the macroscale. We all have personal experience with the wondrous mixture of predictability and coincidence, anticipation and confrontation that life entails. The same applies to dice, even if the dice are not aware of it.

This concludes the intermezzo on dice. I began with the observation that the probability of every value is the same with each dice roll; that's why increasing repetition means you will eventually roll every value just as often on average. We rarely stop to think about that. It goes without saying.

By now, I believe the opposite must also be true. Since we roll every value just as often on average, the probability of each value must stay the same even when the number of repetitions diminishes. At that point, we are no longer talking about causal reasoning, but about correspondence. Dice: they really are peculiar little things.

[364] I've summarized this in *A Philosophy of Societal Practice* as the formula Process = Identity.

8

Theme IV: Pattern laws in perspective

8.1 Perspectivist basis of pattern laws

'This isn't right, it is not even wrong!'
Wolfgang Pauli, German quantum theoreticist (1900-1958)

'If we take in our hand any volume; of divinity or school metaphysics, for instance; let us ask, does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matters of fact and existence? No. Commit it then to the flames: For it can contain nothing but sophistry and illusion.'
David Hume, Scottish philosopher (1711-1776)

Right and wrong
I am starting this theme with a quote from Wolfgang Pauli, a great German quantum theorist (1900-1958), who's famous for his Pauli principle,[365] among other things. His statements can sometimes require a moment of thought – he was an exceptionally intelligent man – and they stay with you for a long time. With his razor-sharp comment *'This isn't right, it is not even wrong!'*, Pauli claimed that there is something far worse than making mistakes (*'being not right'*) and that is something that cannot be tested for 'right' or 'wrong' *at all*. *'Being not even wrong!'* should therefore be regarded as a very ominous phrase.

In the process of writing this book, I am often bordering on the limits of my abilities, sometimes even crossing them, and I am likely to make mistakes here and there. You may think *'this isn't right'*. I think that making mistakes is inherent to the development of a unifying societal philosophy like recursive perspectivism. I am not competent, experienced, or even well read in every topic I broach. I will therefore be the last person who dares to swear that I am presenting a 100% factually correct piece of work – on the contrary. Nevertheless, this is as far as I can take it at *this* moment. I hope that others will correct me when I make grave errors, and I hope they will take further steps and leaps by my side. Cautious thinking alone is not going to help us along, and the main ideas in this book are too relevant to ignore: they concern the improvement of our future societies. That concludes *'This isn't right'*.

But then the second part of the quote: *'it is not even wrong!'* That is where the devil is. According to Pauli, something that cannot be assessed for its correctness – even after

[365] The Pauli principle, also known as the exclusion principle, states that two identities cannot occupy the exact same quantum state simultaneously. I believe that this fully applies to the structure of societal practices as well. For example, it explains why societies naturally develop from small and intimate to large and distant, and why small scales become large.

careful deliberation, studying, and evaluation – is worth even less than something that contains errors. As a reflective pragmatist, I agree with him. Naturally, as a reflective pragmatist, I do not have high regard for concepts such as absolutely true and absolutely untrue, but you should be able to assess the value of something, its relative correctness. How else can you choose it over something else or improve upon it?

That puts an extra requirement on this book and this series. If you try to develop a societal philosophy like recursive perspectivism, you are at serious risk of writing something that cannot be falsified or exposed as false.[366] If you cannot assess it as (more[367]) *right* or (more) *wrong*, you cannot improve it either. A pragmatist should therefore always ask the questions: Does it hold up? Does it work? Does it create value? Does it hold up better, does it work better, does it create more value than an alternative?

Section III offers methods and procedures for societal innovation. They already contain recognizable and tested elements, which can and must be tested further in practice. But is there *already* a burden of proof for recursive perspectivism as a unifying methodology? Can we *already* experience the practical effects in our surroundings? Or are we dealing with an untestable concept? A rambling that is '*not even wrong*' and therefore at risk of making Pauli roll over in his grave?

As for me, I think that the effect of recursive perspectivism is observable all around us, for those who know how to look. In this Theme IV, I will illustrate how recursive perspectivism already reveals its effects to us as *pattern laws*, which rest on a perspectivist balance. The largest perspectivist pattern is the eponym of this book: *the path of humanity* itself.

Pattern laws

Recursive perspectivism appears to offer a particularly philosophical starting point to better understand and even explain the workings of *pattern laws*. Conversely, if we see pattern laws, we can see recursive perspectivism at work.

By pattern laws, I mean the impressive and equally surprising and unexplainable regularities and arrangements on several scales in our experiences and observations. I think that perspective is at the foundation of pattern laws that are central to the human experience. Examples of pattern laws are Zipf's law and Benford's law, and *the path of humanity* itself. I also think that scientific, sociological, and psychological laws and experiences qualify as pattern laws. The *Pareto principle* (named after the Italian Vilfredo Pareto, but generalized by Joseph Juran) is an example of a pattern law. According to the Pareto principle, 80% of effects are caused by 20% of causes (other variants do exist). I also think, for example, of the bell-shaped distribution of orange sizes, or of the length of people in a population (also known as 'a normal Gaussian distribution'), the ideal gas law,

[366] See the concept 'falsification' as well, by philosopher Karl Popper

[367] I believe that right and wrong as absolute categories are unattainable limits. I therefore prefer to call them 'more right' and 'more wrong', as in better and worse. After all, humans are incorrigible improvers.

Coulomb's law, Newton's second law, Einstein's $E=mc^2$, the economic law of diminishing returns, or the perception of sensory stimuli. I even think that the experience of species in general (as a philosophical principle) rests on pattern laws and perspective.

As I see it, central to these pattern laws is discrete inverse proportionality, which in turn is based on the harmonic series and the quantum theoretical nature of the perspectivist space. Zipf's law immediately shows off its discrete inversely proportional nature. In this theme, I will illustrate how discrete inverse proportionalities in the perspectivist space function as a basis for patterns such as Benford's law, the bell-shaped normal patterns (Gaussian patterns), S-shaped societal transition curves, and intriguing wave patterns that share a resemblance with the Schrödinger equation from quantum mechanics. I think that the enigmatic and intermittent jumps in our experiences are also based on a quantum theoretical interpretation of the perspectivist space, whether this relates to societal developments along *the path of humanity*, the stock market, or the electrons of the Hydrogen atom. It is all a matter of perspectivist balance.

Theme IV attempts to provide a deeper understanding of these pattern laws and even takes the first steps towards *explaining* their occurrences. The so-called perspectivist analysis is at the centre: the unravelling of configurational possibilities of specific and defined amounts of perspective, partially based on the perspectivist space. And indeed, configurations of perspective correspond to larger, composite experiences. Pattern laws will turn out to be based on perspectivist configurations, and these perspectivist configurations are based on prime numbers. So in the end, pattern laws are explained by prime numbers. Pattern laws tell a story, or rather they present the results, so far, of the workings of a perspectivist consciousness.

This theme carves the first paths through a largely unexplored perspectivist jungle. It juggles with prime numbers, various types of symmetry, and improvement potentials. It is partly based on mathematics, but I wrote it as an amateur mathematician. I combine concepts and principles from various fields of academics. There is a connection to quantum mechanics, but I am not a quantum physicist, not by a long shot. That is why this theme may not be the easiest and most accessible theme of this book (for number theorist, mathematicians, quantum physicists, for everyone really), and I am aware of this. A *practical* understanding of Societal Innovation (Section III of this book, below) does not require a read through or a study, let alone a full understanding of this Theme IV. If the above has put you off, then simply lightly leaf through this theme, pick up anything that does interest you, and get back on the societal path at Section III of this book: Societal Innovation.

This Theme IV is thus not an easy read, and it carries the marks of my own journey of discovery and incompetencies. But it does lead to something special. This theme digs for the deepest explanations as to why and how we, as conscious human beings, specifically and recognizably experience our world and our society, and how to develop our understanding of it and manipulate its nature. It touches the foundation of natural laws

and experienced regularities. The fact that recursive perspectivism manages to shine a light on one of the most enigmatic phenomena, the occurrence of pattern laws, is the most exceptional fruit of this book, if I may say so myself. Recursive perspectivism offers us a glance at the structural side of substantive understanding, the structural workings of our substantive consciousness, the structural backbone of how we substantively experience the world of our perception, so that we may play our roles as improvers.

I will first elaborate on Zipf's and Benford's intriguing laws, which were introduced earlier in this book (Theme I). I will substantiate and explain both Benford's law and Zipf's law in terms of perspective. I will then explain the relations between the harmonic series, discrete inverse proportionality, and the pattern laws that occur. The binomial coefficients of Newton and – in sufficiently complex situations – the highly similar Gaussian curve (widely known as the 'normal curve' as well, or the bell curve) will play a central part in this. Pascal's Triangle also makes a prominent appearance. With these ingredients – mathematics dating back centuries and even millennia –and others, I will then describe the intriguing relationship between perspectivist configurations and improvement potentials. Prime numbers will turn out to play a leading role. If you study perspectivist configurations, you will inevitably find yourself in the midst of number theory: the mathematical study of integers. As a non-mathematician, I am treading on thin ice here. Recursive perspectivism is based on prime numbers, which automatically adds Riemann and his hypothesis to the discussion, a name that will doubtlessly make many mathematicians perk up. The famous and infamous Riemann hypothesis involves higher maths. That did not put me at ease, but I still ventured on and have given a reasoned explanation as to why I think the Riemann hypothesis to be true.

I will conclude this theme with a special result, which is based on all the preceding discussions: a ***societal quantum theory*** that has close family ties with the Bohr model of atoms. This theory explains why our society organizes itself in actors and layers, it predicts that specific configurations are more obvious than others, and it shows that certain societal patterns are more probable than others, purely based on perspectivist structure and improvement potential. It comes down to a perspectivist structural explanation of why and how a society will develop, and why and how *the path of humanity* naturally assumes its typical form that fluctuates about a diagonal in a roughly upwards trend and the inevitable jumps in this process. As I wrote previously: the incrementalist is irrevocably wrong.

The fact that a path appears and we follow it, and on it there are recognizable societal plateaus (hunter-gatherers, sedentary societies, city-states, and so on, but this is on a very rough scale), is an inherent consequence of a societal consciousness wandering around, searching for improvements in a perspectivist space, which to this day is an invisible perspectivist landscape. The driving force is the constant valorization of (an) improvement perspective.

That path applies to all experiences with sufficient perspectivist complexity, on all scales, but it becomes the most obvious at more complex scales. Whether it concerns the smallest

subatomic particles or the configurations of entire societies, it comes down to the experience of recursive perspective, the recursive search, and experience of value, in any form. That is why I call recursive perspectivism a unification methodology: it provides a foundation for a wide variety of experiences.

Is recursive perspectivism absolutely and eternally valid? Recursive perspectivism rejects those terms. If I sometimes give the impression that something is absolutely true, it is probably due to my enthusiasm in that moment. (Nothing wrong with enthusiasm!) But I would rather leave the truth discussion to the fundamentalists. I will gladly let them keep their certainties, but at the same time, I fear that their rigidity will prevent them from experiencing any meaningful improvements in the long term. I simply regard the development of recursive perspectivism as part of our overall development, a methodological step on the *path of humanity*. Let us find out where recursive perspectivism will lead us. Let us find out whether it works pragmatically. We should always keep things in perspective.

With Theme IV, we will dive deep into the depths of recursive perspectivism. While writing this theme in particular, I often felt limited, illiterate, and incapable. But I went back to my preface and reread the quote from Schrödinger, and I kept at it. I envisioned a clear improvement perspective: a better understanding of *the path of humanity*, with the purpose of utilizing this path together towards a brighter future.

We create the patterns ourselves

The pattern laws of Benford and Zipf that were introduced in the prelude occur truly everywhere in our objective, material surroundings. That is a big mystery to us.

Why do the census figures of American states, the quarterly returns of many corporations over the past decades, and the lengths of rivers all adhere to Benford's law? Why do words in books and the sizes of cities follow Zipf's law? Why does the ideal gas law (PV=nRT) apply? Why do biological species arise, and why do we not see the intermediate forms between, say, an elephant and a giraffe? How is it possible for these patterns to occur everywhere and in many different forms? The patterns are not rock solid and 100% pure; there are stochastic deviations – measurement errors, according to naive dualist diehards. I am of the opinion that the dualist view is far too simplistic.

The *path of humanity*, highlighted in Section I and then filled in with perspective in Section II, is also nothing more than a pattern law, but it is a pattern law on the largest human scale. It is because of that similarity that understanding smaller pattern laws like Zipf's law and Benford's law will help us to better understand *the path of humanity*.

I will get straight to the point in explaining why Zipf's law, Benford's law, and *the path of humanity* are omnipresent. Recursive perspectivism, with its spectral, antidualist basis, offers an intriguing explanation for this. The crucial point is the following: I believe that these laws are based on the workings of our perspectivist consciousness. In short: the patterns are not directly accessible and visible in a pre-existing, *a priori* objective

substantive environment, but a perspectivist consciousness will search for and create (select, configure) these patterns on its own.[368]

According to recursive perspectivism, not everything that is objective and subjective, material and mental, is allotted *a priori*. These notions arise, they emerge, and they develop as we lead our lives as pragmatic improvers, experiencing perspectives, focused on generating more value while minimally exerting ourselves. An objective perspective can be experienced repeatedly and by everyone, and it proves itself. The subjective perspective is private; it is distinctive to the individual observer.[369]

Discrete inverse proportionality plays a key role in this perspectivist object–subject balance (see the object–subject discussion in the prelude). That same discrete inverse proportionality is also at the basis of pattern laws. Patterns that are based on this inversely proportional relationship can be found in our 'objective' surroundings. We do not perceive these pattern laws because the patterns pre-exist in our independent, *a priori* objective surroundings. No, it is our perspectivist consciousness that develops them, and it has no choice but to do so.[370] Pattern laws, whether they concern *the path of humanity*, Benford's law, or Zipf's law, or any other repeatedly occurring or regular pattern, are the result of the workings of our perspectivist consciousness and our survival as humankind. I will further address (perhaps investigate is a better term) this relationship in this theme.

8.2 Zipf's law

In the 1930s, the linguist George Kingsley Zipf discovered that the *frequency* and the *rank* of words in a book share a *special relationship*. The frequency of a word (f) represents the number of occurrences of that word in a book. The rank of a word (r) is its position in a list from most frequent occurrences to least frequent occurrences. The most frequent word in a book has rank 1, the second most frequent word has rank 2, and so on.

That special relationship should be all too familiar to you as a reader of this book: we are dealing with the discrete inversely proportional relationship. For example, Zipf found that in the book *Ulysses* (by James Joyce, published in 1922), 'I' has a rank of 10 and a frequency of 2653. The word 'say' has a rank of 100 and a frequency of 265. Zipf noticed that the rank and

[368] It would be more accurate to state that a perspectivist consciousness creates these patterns. It is both the awareness of ourselves and the awareness of our surroundings that play a part in this, and they are interlinked.

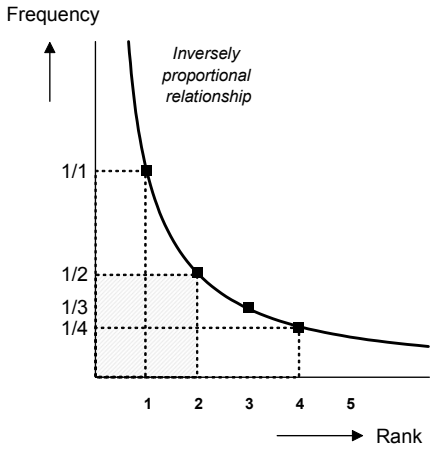
[369] See Volume 1 of this Society in Perspective series as well, published in Dutch as *Een filosofie van de maatschappelijke praktijk* (English translation *A Philosophy of Societal Practice* in preparation).

[370] This vision is strongly co-inspired by the German philosopher Immanuel Kant (1724-1804), particularly his *Critique of Pure Reason*.

frequency were virtually *inversely proportional*, with a high accuracy: 10 x 2653 ~ 26500, and 100 x 265 = 26500. The formula is:

$$r \cdot f = c$$

For the book *Ulysses*, this formula becomes: $r \cdot f = 26500$.[371] The word with rank 1 (the most frequent word) occurs twice as often as the word with rank 2 (the second most frequent word), and three times as often as the word with rank 3 (the third most frequent word). On a larger scale: a word with rank 10 occurs ten times as often as a word with rank 100, and hundred times as often as a word with rank 1000.



Zipf's law for the frequency of words in a book.

Such patterns and jumps are very mysterious and intriguing. This law spontaneously applies to all books. Authors are usually not even aware of this, and of course, they are not doing this intentionally. It would not even be possible to write legible literature if you were to intentionally follow this pattern.

But why do the words in a book adhere to this pattern on their own?

The figure below shows an example of Zipf's law for a piece of text. If you take the logarithm of both axes, in this case the rank and frequency, for an inverse proportionality (we can clearly identify the harmonic series for the curve in the graph shown above), you will more or less[372] find the straight line depicted below. No author would pay attention to

[371] See the book *Alex Through the Looking Glass: How Life Reflects Numbers, and Numbers Reflect Life*, by Alex Bellos, for an accessible description.

[372] I will go into details regarding this imperfection later. I think Zipf's law is based on the harmonic series instead of logarithms. This harmonic series can be approximated with a logarithm, as Euler already worked

this, and yet the pattern occurs every single time! Zipf himself suspected that his law had something to do with exertion: he believed that this pattern, one way or another, would offer some kind of unconscious benefit to the author in terms of effort. A neoliberal could say that he is steered by an invisible hand.

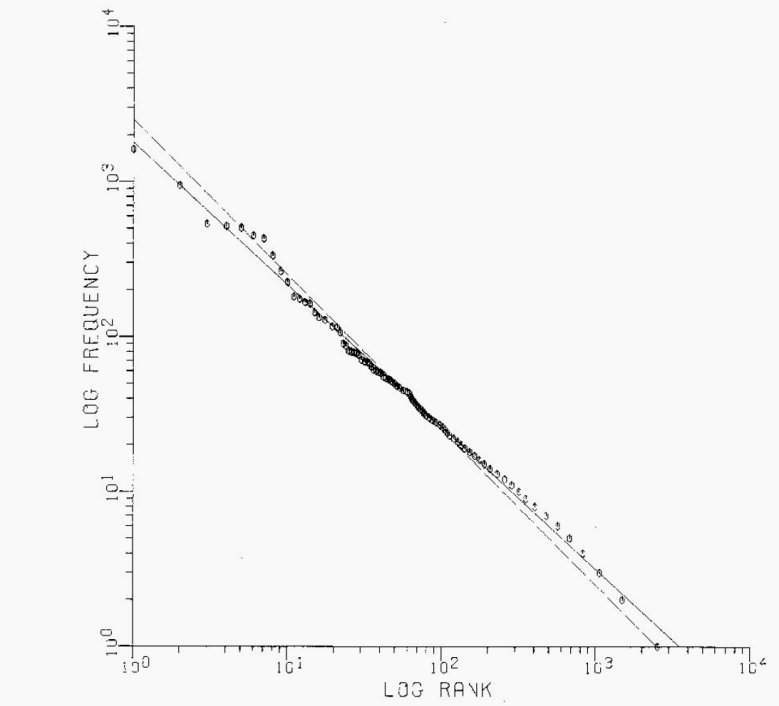


Figure 1. Observed Rank-Frequency Pairs for a Corpus of 21,354 Words
The solid line is the regression line for the data and has slope -0.92; the dashed line has slope -1.0.
Source: Wyllys, Ronald E. *The Measurement of Jargon Standardization in Scientific Writing Using Rank-Frequency ('Zipf') Curves*. Ph.D. dissertation, University of Wisconsin—Madison, 1974.

A log-log plot of rank versus frequency of words in a book transforms the inversely proportional curve in a (more or less[373]) straight line.[374]

Zipf's law is not limited to words in books: it appears truly everywhere. I already mentioned the size of cities in France (see graph in the prelude, theme I of this book). Similar patterns show up in many countries. The exact same discrete inversely proportional relationship applies to the ranks of biological species and the numbers of individuals of each of those species.

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out, but an approximation only describes and comes close to the pattern; it is not what Zipf's law is based on. I believe it is based on the harmonic series instead.

[373] More or less, because Zipf's law is based on the multidimensional harmonic series instead of the logarithm, as I will explain later.

[374] Source: R.E.Wyllys, 'Empirical and Theoretical Bases of Zipf's Law', *Library Trends* 30 (1), summer 1981, p. 53-64. Original source: Zipf.

One day the newspaper displayed a graph of top salaries paid by Dutch corporations: the salaries of top male executives (or female, but they are greatly outnumbered) were depicted in decreasing order (a ranking). The pattern is unmistakable: an inverse proportionality, even though it is not as prominent as the ranking in *Ulysses*. Few earn a lot, many earn rather little. Only one individual is top dog. I suddenly understood why top salaries in the Netherlands used to be much lower but then grew with the process of globalization. Whether this is always fair is not up to me, but it is basically a scale effect: when the scale grows larger, this is simply what can be expected if we do not decide otherwise. With more perspective, the spread increases and you will see discrete points of a higher discrete inversely proportional line: a higher isoline. The same goes for salaries of professional soccer players: here too we find an inverse proportionality (and the jump in scale with the internationalization of the soccer world).

Our adaptive consciousness causes object and subject

Previously, we observed how Zipf's law presents a discrete inverse proportionality in the objective world around us. The perspectivist explanation of pattern laws is that we subconsciously create this inversely proportional pattern with our perspectivist consciousness. The early analyses of Zipf underline this statement: an author creates a book, and in the process, he subconsciously causes this pattern with his conscious mind. As I am writing this, I can feel Immanuel Kant cast a shadow over me. Kant already described how the requirements for the understanding of our surroundings are not present in those surroundings beforehand, but (partly) rest on our cognitive abilities.[375]

A conscious mind is purposeful, and it therefore creates networks and coherent clusters of perspectives with more or less average values (per perspective) for crucial properties. Recursive perspectivism assumes that there exists an average perspective. I am thinking of, for instance, the exertion they require and the value they yield, which goes without saying in the eyes (or experiences, in terms of perspective) of the carrier of this conscious mind, an actor or multi-actor.

When we generate a lot of value for little effort, we call that a windfall. Conversely, if we generate little value for a lot of effort, it is a setback. These averages are definitely subject to variations. The variations are often small, but sometimes they take on severe forms: every now and then, we experience extreme windfalls or startling bad luck. But we can only experience these windfalls and setbacks in the larger scheme of a long term average experience of exertion and value.

[375] In his second critique, the *Critique of Pure Reason* (1781), Immanuel Kant explained that the basic conditions for understanding our surroundings are not inherent to those surroundings but can instead be found in ourselves. The arrangements are not outside of ourselves *a priori*. If there were arrangements outside of ourselves, we would not be able to understand or experience them; those are Kant's well-known 'things in themselves' (*Dinge an sich*). But the arrangements are in ourselves; we create them with our cognitive faculties. Our knowledge is limited to the modelling capabilities of our minds. According to recursive perspectivism, that is what we do based on perspective.

Add to this the fact that we would gladly exchange our bad perspectives (with lots of exertion for little value) for better ones (with little exertion for lots of value). We use the averages that apply in that short term, but by doing so, we shift the averages in the long term. A perspectivist consciousness is an excellent adaptive improvement system. Wherever possible, it will improve its perspectives, and even when it cannot achieve this improvement, it is still aware of that.

We make these adaptations in a spatial (material) sense by consciously moving through our surroundings and consciously modifying our surroundings. We move to the living room to settle down in a comfortable chair. Those surroundings naturally change as well, and we follow that too. Take the weather, for example. When the sky gets dark, rain will often follow, so we know that we should bring a raincoat or an umbrella when the sky is dark. Mentally we change, for example, our views and ideas: we learn. That learning process too is partly a conscious effort and partly happens automatically.

Dualists will state that the mental and material domains are there already (*a priori*). We can tackle our material surroundings by thinking. The recursive perspectivist rejects these two notions of mind and matter as absolute, *a priori* realms. The recursive perspectivist can see that there are many gradations between objective and subjective. Something subjective can become objective, and vice versa (think of Galileo and his run-ins with the church). That is what history teaches us time and time again. We ourselves give rise to everything that we regard as material and mental, while we live our lives as pragmatic improvers, as searchers for and creators of value.

We can understand this perfectly in terms of the object–subject tension discussion on which recursive perspectivism is based (see the 'Methodological foundation' section at the beginning of this book). When the adaptation is mainly on the subjective side, we call this *learning*. When the adaptation mainly takes place on the objective side, we call it *empirical experience and action*. When the adaptation takes place on both sides, it is sometimes the objective side that takes the lead, and sometimes the subjective side, but most of the time we find ourselves in between these two extremes. This ferocious totality of experience, where object and subject play leapfrog, is what we call *living*.

The net result is an adaptive consciousness that is always working with and looking for perspectives that require minimum effort and yield maximum value. That is how a consciousness develops and focuses itself in terms of perspective. But that is also how a consciousness (a conscious being) creates workable – not *a priori* and absolute, but pragmatic – notions of objective and subjective. Just as we can learn and forget things in a mental sense, so too can we regard things as true in a material sense and, conversely, stop experiencing them as true. Eventually, we perceive certain things objectively, and no longer perceive other things at all. It is the ultimate reversal: we continuously train ourselves (or we are trained, from an evolutionary perspective as well) to perceive certain valuable phenomena, and *if* we eventually perceive them (practically) all the time, we call these

phenomena objective, true, and real. The very long term and the very short term are carelessly toying with us.

Maybe you are an inveterate dualist and this does not line up with your idea of objectivity. Dualists claim that the material, objective world is there already, *a priori*, as a given. You need to 'open and read the book of nature', as stated by the king of the – at the time – brand new natural sciences, Sir Isaac Newton (1643-1747). But I think that this conception, revolutionary and innovative for its time, is only a part of the pragmatic truth. Mind and matter exist by each other's grace, and they overlap whenever it is convenient or required. The first Westerner to come home with a story about kangaroos and their pouches is sure to have attracted some strange looks. The same thing happened to Max Planck, when he stated that energy is transferred in temperature-dependent packages, which explains the colour of a hearth fire, thus building a foundation for the quantum theory of the smallest particles (kangaroos were already there, naturally, as larger particles). Classical physicists of a more conservative nature thought that Planck was a weird one (while on the subject, he himself was not always happy with his unusual insights either). Still, he was awarded the Nobel Prize, and deservedly so.

As a chemist, during my work as a knowledge analyst in the 1980's and 90's, about 25-30 years ago,[376] I had to face *the relativity of objectivity*. It was my job to assess and describe how top specialists performed their knowledge-intensive activities. The goal was to create knowledge-based computer systems (expert systems), which could help laypersons and beginners perform the same tasks as top experts. Think, for instance, of selecting analysis methods (HPLC columns) for chemical analyses, diagnosing and solving indoor environment problems (sick buildings and damp residences), or estimating the polluting emissions of installations such as industrial ovens and furnaces (based on emission factors, so without performing any measurements). The programmers in those days were literally itching to get to work, kindly requesting us knowledge analysts to record the knowledge and hand it over to them – asking us to extract those nuggets of knowledge from that physical cranium.

That was an incredible underestimation of the wealth and broadness of human expertise! Ever since, I have become increasingly awed by the depth of human expertise, the historical roots of contemporary perception, the interconnectedness and relativity of thought, surroundings, and experience on which human activities and perceptions are built.[377] Every day, I saw how top experts, even amongst themselves, could see, perceive, and conclude *entirely* different things when looking at the *exact same* thing as their colleagues and I. These were not meaningless experiences; no, I am talking about valuable, action-oriented experiences. My conclusion? We largely create our own surroundings, our interpretation of

[376] Back in those days, surrounded by all sorts of specialists, I had a self-formulated slogan above my desk: Knowledge is bias.

[377] I already mentioned developmental psychologist Piaget, who formulated theories around this and added a couple of astute comments.

it is largely based on theories, and we can rarely perceive it as objectively true, if that is even possible. The best we can hope for in this area is to find common ground (on the other hand, too much similarity in a societal sense is highly undesirable, as shown by the interaction between p, s, and u; see section 6.5 in Chapter 6).

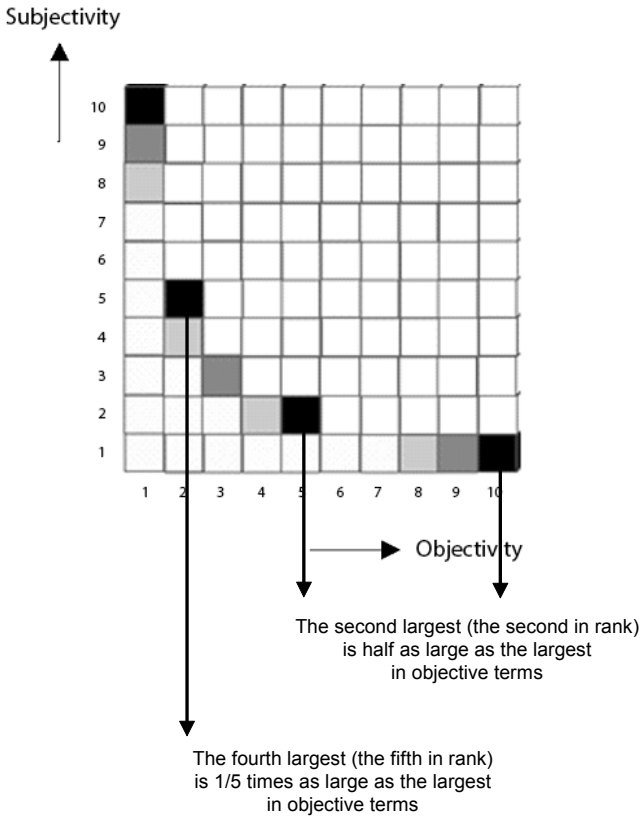
As long as we all find ourselves in a culturally related and familiar shared environment, we can still keep the objectivity illusion intact. This description, however, is nothing short of a tautology. Visit the hunter-gatherers as a post-modern human, and nothing is the same (I experienced this during my visit to the Hadza people). A comparable but much lighter experience can be found during our vacations: you experience your own culture best when comparing it to another. As international people, our perception is much more intertwined with our ideas and our surroundings than we realize.

8.2.1 A perspectivist explanation of Zipf's law

Perspectives are quantized. The founder of the quantum theory, physicist Max Planck, showed us that multiples of defined packets of energy, energy quanta, correspond to a certain temperature. This explains the colour irradiated by the fire in our hearths. The flame will only attune to the colour of the current temperature, *the other colours do not fit.*

By analogy, the quantizing process of objective and subjective perspectives shows us that there are only certain quantized combination packets of objectivity and subjectivity that correspond to a specific number of perspectives n. These combination packets satisfy the discrete inverse proportionality. The only combinations that appear are those that satisfy this discrete inverse proportionality, which is unique and specific for every scale of n; every number of perspectives n.

Every specific number of available perspectives n precisely determines a well-defined number of *possible* positions on the object–subject surface (see the pitch-black squares for n=10 in the figure below). These possible discrete positions are strictly related through their inverse proportionality. For example, take the positions (10, 1) and (5, 2), they are neatly lined up on the discrete positions of the inversely proportional curve for n=10. The objective shares are 10 and 5 (see the arrows in the figure below).



A perspectivist consciousness that is limited to n perspectives and two dimensions, objective and subjective, will naturally assume the possible positions of discrete inverse proportionality. Objectivity and subjectivity will battle to stay ahead; there are considerations of efficiency, as the perspectivist capacity of consciousness is limited. A position must be found (quite literally, in this case), one way or another.

Assuming a certain perspectivist capacity, if something consists of twice as many objective perspectivist building blocks, we only give that half as much subjective attention in terms of perspectivist building blocks, on average. And something that consists of only a third of objective building blocks can be given three times as much subjective attention, given a certain amount of perspective. (Naturally, we would have to regard it as three times as valuable, otherwise, we would not give it that attention, and our consciousness would focus itself elsewhere).

The rationale is fully symmetric. Given a certain amount of perspective n (given a certain perspectivist capacity): if the share of objectivity increases, the share of subjectivity decreases, and if the share of objectivity decreases, the share of subjectivity increases.

For 10 perspectives you will find a multiple of two (2, 5) and a multiple of five (5, 2), but no multiples of three or four. The integer positions between n and 1/2n (i.e. integers 9, 8, 7 and 6), between 1/2n and 1/3n (i.e. 4), between 1/3n and 1/4n (i.e. 3), etc., are inherently unavailable. That is why we see the discrete inverse proportionality. For n=10, only the black positions shown in the figure above are allowed. We can see the discrete inverse proportionality automatically arise here, based on considerations of capacity (n is defined) of quantized perspective.

For small n, the number of positions on the object–subject surface is limited. We miss certain steps of the discrete inverse proportionality. For n=10 we can find the multiples of one and two (the largest and the second largest), but we miss the multiples of three and four. The multiple of five is present again, and indeed, the objective value of the 'ideal' fifth in rank is one-fifth of the largest value.

There are multiples of three and four that come near the product of 10. Take 3·3=9 and 4·2=8. An inverse proportionality on a discrete surface can be approximated quite accurately in a pragmatic manner, and I will elaborate on this when I discuss Benford's pattern later on.[378] These reasonable approximations are the cause of the fact that patterns of Zipf (and Benford) reasonably apply to our surroundings, but never apply exactly. When the positions for an exact fit are unavailable, nearby positions will more than suffice in many cases. Give a stochastic process with a perspectivist capacity of n sufficient time, and repeat it (or run it in parallel), and the results will increasingly line up with complete discrete inverse proportionality. But alas, perfect discrete inverse proportionality does not exist for all ranks from 1 to n. The best you can do in those highly complex cases, after many repetitions, is to get very close. (The deviations are then called measurement errors).

In more complex and uncontrolled situations and processes (where Benford and Zipf usually apply), a lot more perspectives are utilized than the 10 that I am working with in this example: the capacity n would be much larger. For large values of n, there will always be a position that comes *close* to satisfying discrete inverse proportionality.[379] And the amount of perspectives processed by a consciousness is enormous.

When we encounter *objectively experienced* phenomena in our surroundings, these are often related as predicted by inverse proportionality. The largest will be twice as large as the second largest, three times as large as the third largest, four times as large as the fourth largest, etc. Just like Zipf's law. Just like the inverse proportionality in the object–subject surface emerges on the objective axis of a subjective observer.

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[378] The reason why inverse proportionalities are so distinct in the natural sciences, and much less so in, for example, census figures, has everything to do with the scale n. Especially in the classic natural sciences, the number of particles is often much, much larger, resulting in better-fitting, more accurate inverse proportionalities. So accurate, in fact, that they can be interpreted as continuous.

[379] I say *close*, because in cases where n is a prime number, there will not be any divisors. We will only have (n, 1) and (1, n) at our disposal. But if we slightly change n, a world of possibilities opens up.

8.2.2 A mathematical explanation of Zipf's law

I will now address the discrete inversely proportional pattern of Zipf's law in a mathematical manner and derive it from the perspectivist network structure. Central to this mathematical explanation is the concept of *improvement potential*: This is the average value-generating potential available to a defined number of perspectives. When you deploy these perspectives, on average this value will be realized and experienced (in that case it is known as relativistic value, the experiential value, see chapter 6). What is defined as *improvement potential* prior to deploying the perspectives involved becomes *experiential value* the moment these perspectives are deployed.

Let the number of constituent, composite perspectives gradually increase by 1, starting at 1. In other words, n (the number of perspectives) will go from 1 to 2, 3, 4, 5, etc., continuously upwards. According to the main theorem of number theory (also known as the fundamental theorem of arithmetic), every whole number larger than 1 can be written as a unique product of prime numbers. A prime number is only divisible by itself and the number 1. Below you will find an example of *prime factorizations* (breaking a number down into prime numbers) of the integers from 2 up to and including 12 (the product of the prime factors always equals n; 1 and n are trivial):

n	prime factorizations
2	(2)
3	(3)
4	(2 2)
5	(5)
6	(2 3)
7	(7)
8	(2 2 2)
9	(3 3)
10	(2 5)
11	(11)
12	(2 2 3)

The prime factorization can be positioned as a point in a space with as many dimensions as there are prime factors. For example, 12 factorizes into (4 3) or (2 6), because their products are 12, but 12 factorizes furthest into prime numbers, namely (2 2 3). This point can be positioned in a three-dimensional space at the point (2, 2, 3). The number 12 therefore has three prime factors.

Prime numbers need (and have) only one dimension. However, I can add 1s to shorter factorizations. The product of both (7) and (7 1 1) is equal to 7. The product of both (3 3) and (3 3 1) is 9. This way, I can place all factorizations of the numbers from 2 to 12 in a random dimensional space, as long as the lower limit is three, because 8 and 12 require three dimensions (see the list

of prime factors for n to 12 above). I will call prime factorizations that include 1s trivial (the ones do not add anything). Prime factorizations without 1s are non-trivial.

As n increases, the likelihood of a non-trivial factorization with more dimensions increases. The longest non-trivial factorization (longest as in the most dimensions) is always a product of twos, because 2 is the lowest possible non-trivial factor.[380] This also means that below a value of n with factorization 2^d, you will not find any other number with a factorization that consists of d or more dimensions. Some examples:

8 = (2 2 2) = 2^3, so there are no factorizations with 3 or more factors *below* n=8 (you can check this in the list above).

16 = (2 2 2 2) = 2^3, so there are no factorizations with 4 or more factors *below* n=16.

The harmonic assumption

I apply the exact same harmonic assumption as I did earlier (see the prelude, but mainly chapter 6 for a clarification of the experiential value): the average added improvement potential per *added* perspective to a *composite* perspective in one dimension decreases according to the harmonic series. The harmonic series is 1/1, 1/2, 1/3, 1/4, etc.

When the number of improvement perspectives increases from 1 to 4 in a single dimension, the total improvement potential, according to the harmonic series, becomes: [381]

1: (1/1) = 1

2: (1/1 + 1/2) = 1.5

3: (1/1 + 1/2 + 1/3) = 1.833

4: (1/1 + 1/2 + 1/3 + 1/4) = 2.083

However, should we choose to position the number 4 in two dimensions instead of one, or to factorize it as 2·2, then we follow the harmonic series up to and including 2, and then (at that position) we change dimensions, we go in the other direction, and we start a new series based on the result of the first series. In terms of a formula, the improvement potential of (2 2) boils down to (1/1 + 1/2)(1/1 + 1/2) = 2.25.

We can see that a configuration of four perspectives in one dimension gives an improvement potential of 2.083, but a configuration of four perspectives in 2 times 2 perspectives across two dimensions gives an improvement potential of 2.25. There is a configuration bonus for including more dimensions.

[380] You can add an infinite number of 1s, which is why they do not count. The convenience here is that you can equalize the number of dimensions by adding 1s up to the factorization with the most dimensions.
[381] Decimal sums are often rounded.

Again it applies that the improvement potentials are valid statistically, and probabilistically (which is a property of all quantum-theoretical methods). Later in this theme, you will find more example calculations. The section *Relativistic value in a one-dimensional consciousness* in chapter 6 has already substantiated these calculations and generalized this substantiation to multiple dimensions.

A good balance in multiple dimensions is worth the effort

Because of the harmonic assumption, any integer amount of perspective n with a balance position (a position on or close to the diagonal balance axis) will have a higher improvement potential than similar amounts that are further away from this balance axis. In addition, configurations of n with a position closer to the origin (with low factors) have a higher improvement potential *per perspective* compared to configurations with a position further away from the origin. These two effects are intertwined in an intriguing tango. Below you will find the prime factorizations and the corresponding improvement potentials (these are the highest possible improvement potentials) of numbers from composite perspectives that consist of 1 to 64 perspectives:

n	prime factors	improvement pot	improvement pot
1	(1)	1.0	xxxxxxxxxx
2	(2)	1.5	xxxxxxxxxxxxxx
3	(3)	1.8333334	xxxxxxxxxxxxxxxxxx
4	(2 2)	2.25	xxxxxxxxxxxxxxxxxxxxx
5	(5)	2.2833333	xxxxxxxxxxxxxxxxxxxxxx
6	(2 3)	2.75	xxxxxxxxxxxxxxxxxxxxxxxxx
7	(7)	2.5928571	xxxxxxxxxxxxxxxxxxxxxxxx
8	(2 2 2)	3.375	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9	(3 3)	3.3611112	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
10	(2 5)	3.425	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
11	(11)	3.0198774	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
12	(2 2 3)	4.125	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
13	(13)	3.1801338	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
14	(2 7)	3.8892858	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
15	(3 5)	4.186111	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
16	(2 2 2 2)	5.0625	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
17	(17)	3.4095525	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
18	(2 3 3)	5.0416665	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
19	(19)	3.5477397	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
20	(2 2 5)	5.1375	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
21	(3 7)	4.7535715	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
22	(2 11)	4.529816	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
23	(23)	3.7342916	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
24	(2 2 2 3)	6.1875	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
25	(5 5)	5.213611	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
26	(2 13)	4.7702007	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
27	(3 3 3)	6.162037	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
28	(2 2 7)	5.8339286	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
29	(29)	3.9616537	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
30	(2 3 5)	6.2791667	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
31	(31)	4.027245	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
32	(2 2 2 2 2)	7.59375	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
33	(3 11)	5.536442	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
34	(2 17)	5.159329	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
35	(5 7)	5.928857	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
36	(2 2 3 3)	7.5625	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
37	(37)	4.2015862	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
38	(2 19)	5.3216095	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
39	(3 13)	5.830245	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
40	(2 2 2 5)	7.70625	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
41	(41)	4.302933	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
42	(2 3 7)	7.1303573	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
43	(43)	4.3499985	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
44	(2 2 11)	6.794724	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
45	(3 3 5)	7.6714537	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
46	(2 23)	5.681437	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
47	(47)	4.437964	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
48	(2 2 2 2 3)	9.28125	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
49	(7 7)	6.722908	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
50	(2 5 5)	7.8204165	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
51	(3 17)	6.305846	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
52	(2 2 13)	7.155301	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
53	(53)	4.556912	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
54	(2 3 3 3)	9.240855	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
55	(5 11)	6.8953867	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
56	(2 2 2 7)	8.750893	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
57	(3 19)	6.5041895	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
58	(2 29)	5.9424806	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
59	(59)	4.6632037	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
60	(2 2 3 5)	9.41875	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
61	(61)	4.696264	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
62	(2 31)	6.040868	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
63	(3 3 7)	8.714881	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
64	(2 2 2 2 2 2)	11.390625	xxxxxxxxxxxxxxxxxxxx

This view is similar to the two-dimensional variant shown in Theme I (the prelude, prior to Section I). There are differences, and these will be discussed in a moment. Globally, we can clearly see the improvement potential increase with the number of perspectives, but at a smaller scale, we can see obvious peaks and drops in the curve. It appears the Thracian maid was wrong again; conservatism does not pay off, you need to go the extra mile. But that also applies to poor Thales, who is increasingly likely to break his neck – that is, if he remains unaware of the enormous peaks and drops.

When you look at the improvement potentials of the prime numbers 1, 2, 3, 5, 7 and 11 (see list below, printed in bold), you will see that they neatly line up with the (diverging) harmonic series: the total value will increase continuously.

1:	**1.0**	
2:	**1.5**	
3:	**1.833**	
4:	*2.25*	(2·2)
5:	**2.283**	
6:	*2.74*	(2·3)
7:	**2.593**	
8:	*3.375*	(2·2·2)
9:	*3.361*	(3·3)
10:	*3.425*	(2·5)
11:	**3.020**	

The first two non-prime numbers, 4 and 6 (printed in italics) jump out as we count upwards. That is because their prime factorizations more accurately represent the diagonal position (a better symmetry), and this gives these numbers a configurational advantage, which leads to a higher improvement potential, statistically.

The improvement potential for the non-prime numbers 8, 9, and 10 steadily decreases, *per perspective* as well (you divide the corresponding improvement potential by 8, 9, and 10, respectively, see the table later on). This makes sense, as the diagonal position gets worse and worse. The number 8 has the highest symmetry (it is the first number with three factors) and the lowest diagonal position: 2·2·2, which is not only a local maximum, but an absolute maximum, not including 1. For 9, we have 3·3, which is not bad, but slightly worse. For 10, we have 2·5, slightly worse again. For 11, the improvement potential is abysmal, because it is a prime number, minimally symmetric, at a maximum distance from the diagonal and the origin, and it naturally adheres to the harmonic series.

'My doctor told me to stop having intimate dinners for four. Unless there are three other people.'
Orson Welles

Balance in the lifeboat: does less equal more?

The highest peaks are the balance positions with as many dimensions as possible, whereas the deepest pits are one-dimensional prime numbers. Look at the values 61 and 64, for example. They are practically the same, but in terms of improvement potential, they are far apart with 4.70 and 11.40. As a prime number, the improvement potential of 61 can only be achieved in one way: $1 + 1/2 + 1/3 + \ldots + 1/61 = 4.696$. Conversely, we have 64, which is a product of 6 twos: 2^6=(2 2 2 2 2 2), with a composite harmonic series that has many redirections, leading to an improvement potential of 11.40 (as $(1 + ½)^6 = 11.40$).

You can look at this from a strictly entropic perspective (bearing Boltzmann in mind, the founder of statistical thermodynamics). Only one direct path leads to 61, precisely along a single axis (it is a prime number), so there is only one possible factorized configuration, which is why the likelihood of this occurring, the potential, is low. However, there are numerous ways to get to 64 by multiplying (prime) numbers. You can factorize 64 further and further, until you get to the prime factorization of 2·2·2·2·2·2, and all the results in between (the non-prime factorizations) are legitimate factorizations. Consequently, the entropy (see the discussion on entropy in Section I as well), and therefore the improvement potential of a structure with 64 improvement perspectives is much higher than that of a structure with 61 improvement perspectives.

You can see that a maximal factorization (which occurs when there are as many small terms as possible – optimally they are all twos, as is the case for 64 = 2·2·2·2·2·2) corresponds with a maximum availability, which equals a maximum improvement potential.

Should you have 61 perspectives at your disposal, a prime number, it would be wise to give one up, or throw it away, because 60 perspectives allow you to create a configuration of (2 2 3 5), which yields an improvement potential of 9.419, instead of 4.696 that you get from 61. An alternative is to *add* three perspectives to create a new configuration with 64 (2 2 2 2 2 2), yielding an improvement potential of 11.40. Notice that both cases require drastic reconfigurations and substitutions due to the increase in dimensions. (Schumpeter would shy away again from all this *creative destruction*).

At first glance, at a macro scale, it appears that we are dealing with a somewhat boring 'more is more' and 'less is less'. For specific cases, however, at a micro scale, you will find an unexpectedly large 'more is more' and 'less is less' as well. And, contrary to the intuition of continuity, that same microscale also features a sudden 'more is less' and a sudden 'less is more', the last of which is a saying from the nineteenth century, often used as a Leitmotiv by modernist-minimalist architects such as German-American Ludwig Mies van der Rohe (1886 – 1969). From a perspectivist point of view, they are definitely on to something, at least at very specific positions.

We prefer 60 and 64 perspectives over 61 perspectives because they possess a lot more improvement potential from a statistical and a configurational point of view (alternatively, entropically speaking, from a related entropic interpretation) and will therefore yield a lot

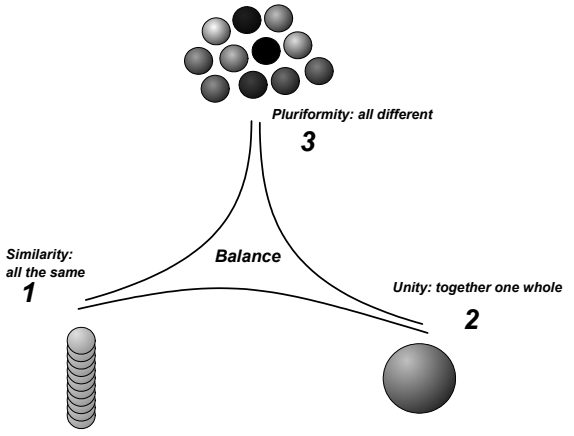
more experiential value. There are a lot more configurations available, which equals a better balance position. There are many more ways to get to the isolines/surfaces/hypersurfaces 60 and 64.

This is an abstract representation of the principle that there exist perspectivist quantum-theoretical preferred positions in our experience. But this can also be explained with real-life examples, which include enormous numbers of perspectives. I will give a few examples below.

You have all heard the saying 'two is a company, three is a crowd'. This is as short of an explanation as there is.

Say you are stranded on an uninhabited island, facing unknown dangers, and you have a wrecked ship. What would you prefer: a ship with only one type of cargo, or a ship with a large variety of cargo? Would a ship with a huge variety of cargo still have your preference if there was only one of everything?

Or take the well-known ethical dilemma in which you find yourself in a lifeboat with three others, and the boat is taking on water due to its heavy load. One person less would allow the others to survive, otherwise, you all drown. What do you do? Here we find the exact three perspectivist basic principles of pluriformity, similarity, and unity (see figure below). The dilemma arises exactly *because* of the impossibility of a perspectivist balance. It has to be one of the three. If everyone on board regards the others as different (pluriformity dominates), there could be a discussion or deliberation and possibly a consensus, but probably a fight regarding who has to leave the boat. If everyone regards the others as equal (similarity dominates), you would pick straws, and the loser has to leave (this could still end in a fight if the loser has second thoughts). And if you all consider yourselves as part of one whole (unity dominates), you could choose to go down together as a whole instead of having to decide who has to sacrifice him- or herself or be thrown out of the boat. The image of the orchestra that keeps playing while the Titanic sinks pops into my head.



And what about the behaviour of bullies? Such behaviour excludes people from groups. It could be that certain intrinsic behavioural characteristics are more likely to make you a victim of bullying, but apparently it also often occurs for no apparent reason. Could it be the perspectivist structure? It is an intriguing thought. Smaller classes experience less bullying, and suddenly a perspectivist structural explanation for that fact presents itself.

Take for example the phenomena of boomtowns and quiet provincial towns. A boomtown races towards … well, towards what exactly? In the short term, it is definitely aiming for a future at a much larger perspectivist scale, and that goes hand in hand with all kinds of growing pains, which we now understand are a combination of jumps and reconfigurations. At the same time, provincial towns often experience decades (sometimes even centuries) of stability regarding population numbers. Configurationally speaking, they are deeply at rest.

The most significant examples can be found, of course, at the large differences in height along *the path of humanity* (the vertical axis displays the societal experiential value). The Roman Empire can be regarded as an early-modern society, but it crumbled all the way down to the level of city-states and sedentary villages. As for Europe's short-term destination of, say, a century from now, who knows?

These are merely examples, but they do show that a perspectivist structure, aside from the intrinsic quality (the substance, the content) of perspectives, has an enormous influence on our experiential processes, from psychological phenomena like writing a book (Zipf), to the overall societal path of development of humanity.

The average improvement potential per perspective

Below you can find the exact same graph as the one displayed above, but now we calculate the best *average improvement potential per perspective* (regarding the prime factorization) and plot it in the graph. For every value of n in the graph below, it can be said that multiplying the improvement potential/n by n will give you the total improvement potential shown in the graph above. We can clearly see the improvement potential decrease per perspective if we look at it from a larger scale, but at a micro scale, we can see large peaks and pits due to the configurational symmetry advantages. The following holds true: the lower the prime factors and the closer to a diagonal, the better.

n	prime factors	improvement pot/n	improvement pot/n
1	(1)	1.0	xxxx

The main difference with that earlier two-dimensional graph (for n up to and including 70, see the prelude), is that the highest peaks of improvement potential are now achieved through balance positions (symmetric positions) with as many dimensions as possible and necessary, keeping them close to the origin. Take for example the first relative peaks of the mountain ridge, starting at 1:

6	(2 3)	2.75
8	(2 2 2)	3.375
12	(2 2 3)	4.125
16	(2 2 2 2)	5.0625
18	(2 3 3)	5.0417
20	(2 2 5)	5.1375
24	(2 2 2 3)	6.1875
27	(3 3 3)	6.1620
30	(2 3 5)	6.2792
32	(2 2 2 2 2)	7.5938

Even for low values of n we can already see that 8 (2 2 2), 16 (2 2 2 2), 32 (2 2 2 2 2) and 64 (2 2 2 2 2 2) achieve excellent improvement potentials. They all have a factorization that consists solely of twos. This is a scale-independent *doubling series*; it keeps on going. The value 4 (2 2) is excellent as well, but this is not a relative maximum, because this phenomenon is more striking for higher values of n (4 is too low to see a pronounced effect). The harmonic deterioration in numerous directions employs a mechanism that favours increasingly large symmetric factorizations that consist of low factors. In the table of up to 64 perspectives, $64 = 2^6 = (2\ 2\ 2\ 2\ 2\ 2)$ is the strongest example.

However, factorizations that consist of twos and one three also constitute strong peaks. Take the pair of 24 (2 2 2 3) and 16 (2 2 2 2), or the pair 48 (2 2 2 2 3) and 32 (2 2 2 2 2). We can see a scale-independent ratio of 3 : 2 that happens again and again, and it can easily be explained.

The same applies to the ratio between 16 (2 2 2 2) and 12 (2 2 3), which is 4 : 3. Another clear example is 48 (2 2 2 2 3), which is exactly three-fourths of 64 (2 2 2 2 2 2), as underlined by the factorization. There exists a scale-independent pattern of peaks (.. .. 2 2 3) and (.. .. 2 2 2 2) that precisely matches the ratio 3 : 4.

As n increases, these patterns become more pronounced. Later on in this theme, I will have to cross some hurdles when I deal with the alleged good positions of so-called *symmetric* prime factorizations (like 16 = 2 2 2 2), because they lack flexibility, but the image I have sketched in this first approach is quite substantial.

In short, we can see the favourability of ratio patterns that adhere to Zipf's law. The statistics are unrelenting regarding complex contexts: Zipf's law emerges on the high side of improvement potentials before our very eyes.

A balance position such as 121 (11 11) performs better than, for instance, 122 (2 61), even though 122 is higher than 121. Still, 121 suffers a crushing defeat when compared to, for example, 96 and 64, which feature much fewer perspectives. This is because there are two principles at work together, collectively deciding how well a composite number of perspectives –in a strictly probabilistic sense – performs in terms of improvement potential:

> Principle 1: Find a balance. For *an equal number of dimensions* – for similar n – a position with more balance will win when compared to a position with less balance. This is why 121 (11 11) performs much better than 122 (2 61), even though 122 is slightly higher. There is an attraction toward balance. Symmetry wins.
>
> Principle 2: Find a high dimensionality. A reasonable balance position with many dimensions and therefore low values on the axes will perform much better than a perfect balance position with few dimensions and therefore high values on the axes. That is why, for example, 48 (2 2 2 2 3) scores much higher than 49 (7 7), even though they are practically equal and 49 is perfectly located on a two-dimensional balance axis, and 48 is not perfectly located on a five-dimensional balance axis. Dimensionality, in this specific case, defeats symmetry with flying colours.

Both principles are entwined together in a single intriguing systematic perspectivist balance process. I say 'systematic', because balance positions can act together to form larger balance positions, which introduces a third principle, the principle of recursivity. Principles such as these are the cause of pattern laws and the multiscalarity of *the path of humanity*, through the notion of improvement potential. We should therefore regard them as important principles within our societal paths of development (and within our human experience in general).

The incrementalist disarmed once again

It is relevant for us to revisit the incrementalist, who believes that societal structures can only be improved with small and steady steps. In terms of perspective, the smallest step constitutes the addition of a single perspective. It seems so obvious, appealing even, and controllable – making small steps only will never result in overstretching.

But the incrementalist is thoroughly incorrect. Practically speaking, it is very difficult, foolish even, to follow the incremental path of singly-added perspectives. This appears to be a very appealing path, but it is inadvisable, because it is accompanied by a truly devastating waste of effort and consequently an enormous destruction of value. The figures above clearly indicate this.

For example, look at the steps from 59 (a prime number, so on a single axis), to 60 (2 2 3 5, four axes), to 61 (a prime number, again on a single axis): we first have to add three dimensions, then get rid of them again. That can hardly be called a path; it is downright chaos, because it goes hand in hand with a huge accumulation and annihilation of improvement perspectives. The Austrian economist Schumpeter (1883-1950) regarded

creative destruction as a process inherent to innovation. According to him, we progress on the ruins left by the losers, but I suspect that even he would shy away from destruction at *this* scale. Configuration 60 (2 2 3 5) will not be eager to accommodate perspective 61. It would be better to choose a path that is more or less along the diagonal (as we already do, unconsciously). This requires sizable leaps in terms of numbers of perspectives. However, this does allow us to consciously and carefully attempt the leap together, searching for a landing spot on the other side. As long as we are unable to do that, we would rather remain where we are.

The incrementalist, who thinks that many small steps constitute one large step, is therefore definitively disarmed. He is wrong. In harsher words: he will never see anything but the top of the Holterberg hill, and he does not even know it, because he is unaware of the larger surroundings. Perhaps that is why an incrementalist is generally nothing more than an inveterate conservative, clothed in camouflage. The same applies to the daredevil who recklessly attempts to jump a long distance: he will often end up in a pit, miserably breaking his neck. His example does not deserve imitation either.

In this respect, notions of quantized perspective and perspectivist improvement potential offer a brand new, clarifying glimpse into Zipf's law, and they substantiate our deepest human intuitions. Life requires us to continuously expand our horizon, but we should be smart about it – Thales and the Thracian maid working together, and the lame leading the blind. Unification, not isolation, makes us more complete and defines our competencies even more. This way, we can achieve higher peaks and avoid the pits, to the best of our abilities.

8.3 Benford's law

Another impressive pattern law besides that of Zipf is Benford's law. We have known about the existence of Benford's law since 1881 because Simon Newcomb (the original discoverer of the law) noticed a recurring pattern in the wear of the logarithm books around him. The pages with logarithm tables that started with 1 appeared to deteriorate much faster than the pages of numbers starting with 9. Engineers apparently use the number 1 as leading digit more often than the number 2, and the number 2 more often than the number 3, etc. Newcomb regarded it as a curiosity, but after a while, he paid it no further mind. Benford rediscovered this pattern in 1936, again with logarithm books, and he gave it a much broader foundation by looking at completely different datasets as well. Think of the numbers that occur in newspapers, invoices, tax letters, US census figures, mountain heights, river lengths, house numbers, physical and mathematical constants (like the atomic weights of elements), river surface areas, sports statistics, prime numbers, and

many, many other examples.[382] In all of these datasets, and therefore in all of these underlying phenomena, the digit 1 occurred more often as a leading digit than the digit 9, and thus the pattern was identified. This pattern law was named after Benford for his tedious investigative work.

In short, the pattern of Benford's law shows that in all sorts of datasets the digits 1 to 9 appear in approximately the same proportions to each other when they are the leading digit of numbers.[383] (The same applies to the second, third, fourth, etc. digits, but in other, less distinctive proportions). This even applies to utterly incoherent datasets. You can check this for yourself. Take enough randomly chosen numbers from the front pages of numerous international newspapers, and you will find that they adhere to Benford's law.

The reason for this is, once again, shrouded in mystery. All those journalists from all those newspapers have not engaged in a secret numerical pact. It is a complete conundrum. I will state that Benford's law is rooted in the functioning of a perspectivist consciousness, as I previously explained for Zipf's law as well. The numerical proportions in Benford's law are as follows (this table was shown earlier in Theme I, the prelude):

first digit	1	2	3	4	5	6	7	8	9
%	30.1	17.6	12.5	9.7	7.9	6.7	5.8	5.1	4.6

Benford's law: the proportion of integers below 10 as leading digits from both specific datasets and unstructured sources (repeated).

Zipf's law, which was previously discussed, expresses a discrete inverse proportionality. But Benford's law is completely founded on inverse proportionality as well. In Benford's law, however, this relation is hidden much better.

In 1961, the mathematician Roger Pinkham expressed the intuition that Benford's law has to do with scale invariance. Benford's law is the *only* pattern that shows that the proportion of leading digits remains the same after a scale change (hence the term scale invariance). This was proven by Ted Hill in 1995. If there is a scale invariance, you will find Benford's law.

At first glance, this seems weird. You multiply a list of numbers, of which the leading digits comply with Benford, by a *random* other number. The leading digits of the resulting series

[382] Prime numbers are included in this list, but it is actually number theory that forms the foundation of the patterns.

[383] The 0 is not a usual leading digit for datasets such as census figures and mountain heights. That is because numbers express amounts and repetitions in our daily lives: they usually express a macro structure in multiple smaller micro structures. You start with 1 and climb your way up.

of numbers will still adhere to the pattern of Benford. You can get a sense of how scale invariance works by multiplying a list of numbers from 1 to 10 by the number 2:

Numbers between 1.0 and 1.5 multiplied by 2 lead to a 2 as the first digit.
Numbers between 1.5 and 2.0 multiplied by 2 lead to a 3 as the first digit.
Numbers between 2.0 and 2.5 multiplied by 2 lead to a 4 as the first digit.
Numbers between 2.5 and 3.0 multiplied by 2 lead to a 5 as the first digit.
Numbers between 3.0 and 3.5 multiplied by 2 lead to a 6 as the first digit.
Numbers between 3.5 and 4.0 multiplied by 2 lead to a 7 as the first digit.
Numbers between 4.0 and 4.5 multiplied by 2 lead to an 8 as the first digit.
Numbers between 4.5 and 5.0 multiplied by 2 lead to a 9 as the first digit.

Numbers between 5.0 and 5.5 multiplied by 2 lead to a 1 as the first digit.
Numbers between 5.5 and 6.0 multiplied by 2 lead to a 1 as the first digit.
Numbers between 6.0 and 6.5 multiplied by 2 lead to a 1 as the first digit.
Numbers between 6.5 and 7.0 multiplied by 2 lead to a 1 as the first digit.
Numbers between 7.0 and 7.5 multiplied by 2 lead to a 1 as the first digit.
Numbers between 7.5 and 8.0 multiplied by 2 lead to a 1 as the first digit.
Numbers between 8.0 and 8.5 multiplied by 2 lead to a 1 as the first digit.
Numbers between 8.5 and 9.0 multiplied by 2 lead to a 1 as the first digit.
Numbers between 9.0 and 9.5 multiplied by 2 lead to a 1 as the first digit.
Numbers between 9.5 and 10.0 multiplied by 2 lead to a 1 as the first digit.

When you are done multiplying by two, all the *originally existing* leading ones are lost (see the first two lines of the above table). But you get something in return: *all* leading digits 5, 6, 7, 8, and 9 (the last 10 rows of the table) result in *new* numbers with leading digit 1 after you multiply them by 2. And the summation of the Benford percentages of these numbers 5 to 9: 7.9, 6.7, 5.8, 5.1, and 4.6 neatly adds up to, you guessed it, 30.1. This is precisely the Benford percentage for the leading digit 1. Any Benford distribution that is multiplied by a random number will result in Benford distribution again.

The scale invariance of the percentages of Benford's law can be understood with a specific function. By now, you can probably guess what the nature of this function is: it is the *continuous* perfect inverse proportionality function. If we draw the line $n = x \cdot y$ for a specific n (or, in other words, $f(x) = n/y$, x and y being continuous) we find a single continuous perfect inversely proportional curve. The figure below (from my dissertation) shows the perfect continuous inverse proportionalities for different values of n with equal intervals. We can see the uniformity (the scale invariance) of these curves increase with increasing values of n. We can also see that this approximates scale invariance; it is not exact. I call this *practical scale invariance*: for all practical goals at a macro scale, we can pretend that the scale invariance improves with increasing values of n, but at a micro scale, the curves tell a different story.

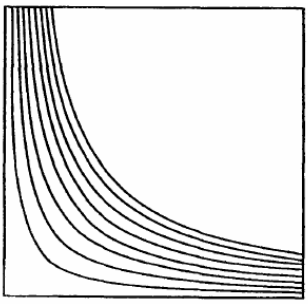


Figure 3b: A cross-section of a sequence of iso-planes.

Continuous inverse proportionalities for different values of n. Source: Henk Diepenmaat (1997), 'Trinity, model-based support for multi-actor problem solving', page 60, PhD dissertation, University of Amsterdam.

I have previously illustrated the principle of practical scale invariance during the discussion of this principle from a third perspectivist balance (see the section *The practical scale invariance of the perspectivist space* in chapter 6). I could have placed this figure as an example there as well: as the isoline increases, it becomes increasingly scale invariant.

The theoretical percentages of Benford are based on the above graph of the inverse proportionality as follows. If we divide the x axis (or the y axis, the graph is diagonally symmetric) of the *continuous* inverse proportionality for a random but specific value of n into 10 equal segments, and we number them starting from 0, the surfaces *below* this continuous line of segments 1 to 9 (0 is not included) will be proportional to the percentages of Benford.[384] So:

Segment	*Segment x axis*	*Area*
0	from 0 to 10%:	irrelevant (< 1)
1	from 10 to 20%:	30.1%
2	from 20 to 30%:	17.6%
3	from 30 to 40%:	12.5%
4	from 40 to 50%:	9.7%
5	from 50 to 60%:	7.9%
6	from 60 to 70%:	6.7%
7	from 70 to 80%:	5.8%
8	from 80 to 90%:	5.1%
9	from 90 to 100%:	4.6%

Segment 0 is not included. At first glance, that seems like an odd and random choice – even more so due to the fact that there is a huge area below segment 0, with an included limit.

[384] For a mathematical clarification, see Wikipedia, 'Benford's law'.

However, especially from a quantum-theoretical perspective, this prior condition will become crystal clear. I will return to this specifically during the discussion of the relationship between the harmonic series and inverse proportionality.

Pseudo-derivation of Benford's law

Frank Benford assumes ten intervals on the x axis (the objectivity axis), the first of which is ignored. The remaining nine segments correspond to the numbers 1 to 9. Mathematicians determined that the 'actual' likelihood for a number x to be located between the integers a and b in the interval from 1 to 10 is a continuous inverse proportionality defined as $\log_{10}(b/a)$. Indeed, $\log_{10}(3/2) = 0.17609$, and $\log_{10}(9/8) = 0.05115$, which are Benford numbers. The likelihood for a number to have a for a leading digit is $p(a) = \log_{10}(1 + 1/a)$. And indeed, $\log_{10}(1 + 1/4) = 0.09691$, and $\log_{10}(1 + 1/6) = 0.06695$.

However, for a recursive perspectivist, this is a misrepresentation that puts things upside down. Naturally, the continuity illusion becomes stronger and practically inevitable as the number of perspectives increases astronomically. The logarithmic functions then provide useful approximations. But recursive perspectivism is based on the assumption of a *discrete* world, consisting of perspectivist experiences, instead of a *continuous* world. There is no such thing as a 'real surface area' under a 'continuous curve' for a perspectivist. There are merely perspectivist configurations – discrete elements of recursive perspective.

Calculation of Benford's law

You can determine Benford's ratios through other means as well. The figure on the next page depicts one of these methods. The figure assumes n=20 along the x axis. The ten intervals are segmented as 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, 12-14, 14-16, 16-18, and 18-20. The first segment, 0-2, is excluded.[385] The surface areas under the segmented 'curve' have been calculated as the sum of the surface of a rectangle (the straight section of every surface of segments 1-9) and half a rectangle (the angled section of every surface of segments 1-9)

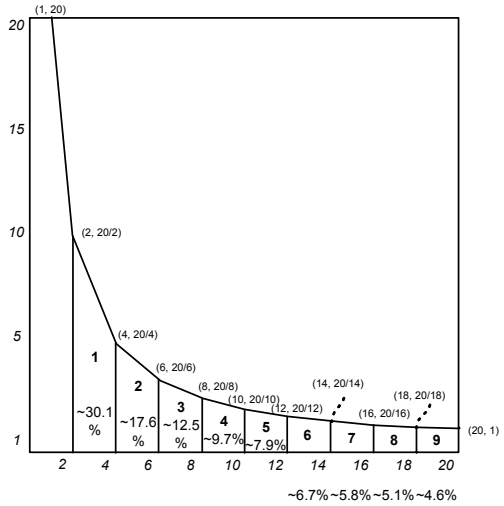
[385] Benford's law predicts numbers based on the presence of leading (and subsequent) digits. The first digit is in the domains of occurrence, and, assuming a decimal number system, is either a 1, 2, 3, 4, 5, 6, 7, 8, or 9, but not a 0. The fact that the 0 is excluded can be explained as follows. Benford's law applies to situations where we express large phenomena in small units. Mountains are hundreds and thousands of meters high, rivers are dozens to thousands of kilometres long, and villages and cities have hundreds to millions of inhabitants. The number of micro units and macro phenomena is large. The small units practically act as quanta . We do not call them units for no reason. And in this discrete world, there is nothing smaller than one micro phenomenon. We thus express macro phenomena as units of a micro phenomenon (we express this macro scale on a micro scale). We do not encounter mountain top heights or river lengths smaller than 1 micro unit. In this age of computers, the 0 appears much more often, but that is a matter of notation, simply resolved by shifting the decimal point to the right, geometrically changing the scale. It is all about the first actual number.

across a width of 2.[386] Even for a value of n=20, the calculated ratios of the surfaces (see the left figure on the next page) approach the theoretical values of the law quite well.

Area 1: 20/4x2 + ((20/2 - 20/4)x2)/2 = 15.00
Area 2: 20/6x2 + ((20/4 -20/6)x2)/2 = 8.33
Area 3: 20/8x2 + ((20/6 - 20/8)x2)/2 = 5.83
Area 4: 20/10x2 + ((20/8 - 20/10)x2)/2 = 4.50
Area 5: 20/12x2 + ((20/10 - 20/12)x2)/2 = 3.66
Area 6: 20/14x2 + ((20/12 - 20/14)x2)/2 = 3.10
Area 7: 20/16x2 + ((20/14 - 20/16)x2)/2 = 2.68
Area 8: 20/18x2 + ((20/16 - 20/18)x2)/2 = 2.36
Area 9: 20/20x2 + ((20/18 - 20/20)x2)/2 = 2.11

Total area 1-9: 47.57

	(approximate)	(theoretical)
Percentage area 1: 15.00/47.57x100 =	31.5	30.1
Percentage area 2: 8.33/47.57x100 =	17.5	17.6
Percentage area 3: 5.83/47.57x100 =	12.3	12.5
Percentage area 4: 4.50/47.57x100 =	9.46	9.7
Percentage area 5: 3.66/47.57x100 =	7.70	7.9
Percentage area 6: 3.10/47.57x100 =	6.52	6.7
Percentage area 7: 2.68/47.57x100 =	5.63	5.8
Percentage area 8: 2.36/47.57x100 =	4.96	5.1
Percentage area 9: 2.11/47.57x100 =	4.44	4.6



Calculation of Benford's law based on inverse proportionality for n =20. The inverse proportionality is approximated with linear calculations in steps of 2 along the x axis.

That extra half rectangle (the triangle above every rectangle) is actually a superfluous addition. As n increases, the 'approximation' of the 'real surface' under the 'continuous inverse proportionality' for the segments 1 to 9 of the x axis increases as well. [387] This is known as the lower Riemann sum.[388] The discrete calculations based on merely the rectangles approximate the 'real' values increasingly well,[389] if the rectangles become small

[386] The most accurate calculation for n=20 with this procedure would assume a value of 1 for the width, which would introduce more knee points in the curve.

[387] Here we touch upon the infinitesimal calculation, a development by Newton and Gottfried Wilheim Leibniz in the second half of the 1600s.

[388] Riemann, that name was bound to be mentioned. The German mathematician and physicist Bernhard Riemann (1826-1866) drafted the majestic *Riemann hypothesis*, for which I will propose a proposal for a proof later on.

[389] For the sake of completeness, it would be wrong to state that the discrete calculation with rectangles and triangles above approximates the theoretical value increasingly well. Within recursive perspectivism, those theoretical values are based on continuous inverse proportionality, and thus are not real. That is because experience occurs in terms of perspectives, which are not continuous but discrete. As n and the number of intervals increase, their approximation might come close, but you will never really achieve them. The reason for this is that within recursive perspectivism, perspectives and values are quantized. A continuous inverse proportionality does not exist in practice. A good example of this is the ideal gas law PV=nRT: the number of gas particles might be enormous, and from a practical point of view, the continuous law works excellently, but we are still dealing with particles (quanta). The n is not included in the formula for no reason, and it is therefore the continuous law that is actually the approximation. Experience on a micro scale will never really be continuous and smooth. Eventually, you will run into the discrete nature of perspective, or 'tiny stairs'

enough, but I prefer to refer to these as the theoretical values of Benford's law based on the continuous inverse proportionality.

The inverse proportionality is based on the harmonic series

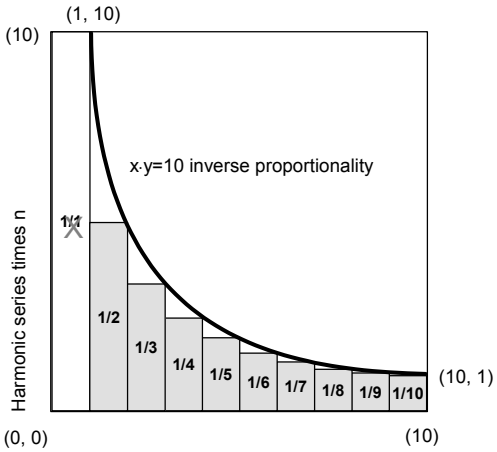
For every number n, we can draw the inverse proportionality on a two-dimensional surface. The following then applies: $x \cdot y=n$. You can rewrite this formula as $y = n/x$, or $x = n/y$.

If we have a *continuous* inverse proportionality with n=10, then $x \cdot y=10$ for all number pairs x and y. Just to clarify: a few *natural* points are (1, 10), (2, 5), (5, 2), and (10, 1). But ($\sqrt{10}$, $\sqrt{10}$) is also included.

Now I want to determine the surface area under this curve, from x=1 to x=10. I will exclude the part from 0 to 1 (there is no whole perspective in this area yet). The 'exact' surface area is found by increasing the number of rectangles to ∞, making them smaller and smaller, and then summing their surface areas. In a perspectivist world, however, there is no ∞ with n=10 along the x axis. There is also no such thing as one-third of a perspective, or 100/3 perspectives, or 33.333 perspectives. None of that is quantized.

That is why I set the maximum number of rectangles equal to n. This specific *lower Riemann sum* is equal to the harmonic series *from* 1 (so starting with 2) to n – the series that appears throughout this book, which is at the foundation of improvement potential and experiential value. (The harmonic series is the *summation* of the harmonic row). The figure below depicts an example where n=10:

with varying step heights. However, experiences can be approximated for large value of n to an excellent degree. As n increases, that approximation improves. For a large value of n, the continuity illusion starts to kick in, after which we refer to our experiences as a continuous reality. From a pragmatic point of view, that often works like a charm. But not always. In reality, the theory approximates the practice increasingly well. (As it should, I would say as a strong reflective pragmatist).



The harmonic series of 2 up to n (10, in this case) forms a lower Riemann sum of the inverse proportionality n from 1 to n.

Now we see why Benford applies especially to complex situations with many perspectives. As n increases, the number of rectangles increases as well (decreasing their width), and the grey pillars then approximate the continuous inversely proportional curve increasingly well. The calculation of the surface area becomes progressively more 'accurate' (although I rather say more 'specific').

The table below shows how the lower Riemann sum from 1 to n approximates the continuous calculated surface area ln (n) better and better as n increases. The continuous calculated surface area from 0 to n is equal to ln (n), because the antiderivative of $y = 1/x$ is equal to ln (x).

n	ln (n) (continuous)	$\Sigma_{2\text{-}n}$ 1/n (harmonic lower Riemann sum)	Δ (delta) ln (n) – $\Sigma_{2\text{-}n}$ 1/n	harmonic / continuous (1.000 ≈ equal)
2	0.6931472	0.5	0.19314718	0.721
3	1.0986123	0.833333	0.26527894	0.759
4	1.3862944	1.083333	0.3029611	0.781
5	1.609438	1.2833	0.32610464	0.797
10	2.3025851	1.9289682	0.37361693	0.838
20	2.9957323	2.5977397	0.3979926	0.867
30	3.4011974	2.9949872	0.40621018	0.881
40	3.6888795	3.278543	0.4103365	0.889
50	3.912023	3.499205	0.41281796	0.894
100	4.6051702	4.1873775	0.4177928	0.909
200	5.2983174	4.878031	0.42028666	0.921
300	5.7037826	5.282664	0.42111874	0.926
400	5.9914646	5.5699296	0.42153502	0.930
500	6.214608	5.7928233	0.42178488	0.932
1000	6.9077554	6.485471	0.4222846	0.939
2000	7.6009026	7.1783686	0.422534	0.944
3000	8.006368	7.58375	0.4226179	0.947
4000	8.29405	7.8713903	0.42265987	0.949
5000	8.517194	8.094509	0.42268467	0.950
10000	9.2103405	8.787606	0.42273426	0.954
20000	9.903488	9.480728	0.42276	0.957
30000	10.308953	9.886185	0.4227686	0.959
40000	10.596635	10.173862	0.4227724	0.960
50000	10.819778	10.397004	0.4227743	0.961
100000	11.512925	11.090146	0.42278004	0.963

The harmonic lower sum approaches the continuous calculated surface as n increases.

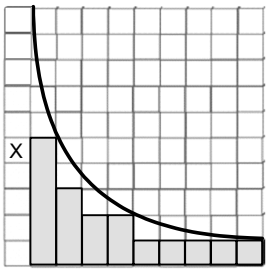
In the fourth column, we see the difference (delta) between the harmonic lower Riemann sum *from* 2 (including 2) and the actual value of ln (n). As n increases, this difference appears to converge: ln (n) – $\Sigma_{2\text{->}n}$ 1/n approaches 0.42278 as n –> ∞.

The Swiss mathematician and physicist Leonhard Euler (Basel 1707 – St. Petersburg 1783) already determined that $\Sigma_{1->n} 1/n - \ln(n)$, so the lower Riemann sum from *1* (including 1), approaches 0.5772156… for n -> ∞. This number is called γ (the lowercase Greek letter gamma) and is referred to as the *Euler–Mascheroni constant.* And indeed, 0.5772156… + 0.42278 approaches 1.

The discrete inverse proportionality is quantized

I still owe you an explanation for the exclusion of the first of the ten segments (the one belonging to n=1) in the determination of the surface area in Benford's law. I stated that this is crystal clear, especially from a quantum-theoretical point of view, and here I return to this specifically, as promised. The figure of the harmonic lower Riemann sum (the previous figure) already shows this, actually. We have divided the area into *quanta*. For Benford's law in a decimal number system, this implies 10 equal parts (n=10). In other words, it is not until you get to 10% that you will have 'collected' your first quantum. Up until that point, you have nothing, because partial perspectives are not recognized by quantum-theoretical approaches like recursive perspectivism! When counting cows, or electrons, you do not get to 1 until n=1, and the same applies to perspectives. If n were 100, the first segment would go from 0 to 1 on a scale of 100.

If you consistently work in a quantum-theoretical framework, you should not just quantize the x axis, but the y axis as well. Recursive perspectivism assumes meaningful average values of perspectives, and perspectives search for balance, so n is a maximum for both the x axis and the y axis. In the figure below, n=10. For every value of x, you take the highest value of y that still fits under the curve. This also applies to isosurfaces (hypersurfaces) that have more than two dimensions. The quantized values will approximate the theoretical value increasingly well as n increases, on average, but you will run into quantum leaps, because the surface area jumps with integer multiples of the surface of a single square. The figure below shows which Riemann summation applies to a two-dimensional approach that is strictly quantum-theoretical. As n increases, the relative area of one square decreases, but the accumulations become more complex. This leads to exceptional quantum leaps, with squares in two dimensions, cubes in three dimensions, and hypercubes in more dimensions, but more on that later. First a number of simulations regarding Benford's law.



A two-dimensional quantum-theoretical lower Riemann sum. This is fully quantized and approximates the theoretical surface area under the continuous curve increasingly well as n increases,

but it is slower, because some rectangles do not touch the continuous curve. Stacking the bars higher for increasing values of n only happens in terms of multiples of whole squares, and the increase in surface area is therefore quantized: there are quantum leaps.

Simulations regarding Benford's law

Benford's law applies best to complex situations with a sizeable random component. There can be no central steering, planning, or planner that is able to draw the numbers into a certain direction, away from the probabilistic distribution. Examples of such disruptions are large tax scales for salaries, or fraudulent (made up) numbers in financial statements. (The absence of Benford patterns in financial numbers has already exposed cases of fraud!)

To investigate how generating random x values through the continuous inverse proportionality leads to Benford's pattern in the y values, I have conducted three simulations. I will address them below and present the results.

Simulation 1: How stochastics leads to Benford. In the first simulation, I have drawn (stochastically, so purely by chance) increasing numbers of random integers between x=1 and x=n=1000 (inclusive). I worked with 100, 1000, 10000, and 100000 draws. The continuous inversely proportional function y = n/x is used with n=1000 (so x·y=1000) to calculate the corresponding values of y.[390] Then I examined the share of y values in the 10% x intervals from 2 to 10 (this is in line with Benford's 1 to 9). It is expected that the summation of the y values per 10% x interval will be inaccurate for small samples, but conform to Benford's law increasingly well as the sample size increases. I want to see whether this actually happens, and I want to get some sense of how fast this occurs. The results of the simulations are depicted in the table below, for different sample sizes, in the *left* half (columns 2 to 4, as I repeated every simulation three times).
The results in the columns 2 to 4 clearly show the convergence of the stochastic processes towards the ideal Benford distribution with increasing sample sizes in steps of 10 (100, 1000, 10000, and 100000). Contrarily, as the number of samples decreases, an image is painted that seems increasingly random. Benford is a stochastic pattern that searches for balance and requires a certain size.

100 draws of x

%	n = 1000 (3 simulations)			n also random between 0 and 100000		
10-20	35.80	39.24	14.11	38.33	31.30	30.85
20-30	14.37	14.48	16.29	11.96	17.94	11.73
30-40	8.21	17.54	15.68	15.69	7.80	8.43
40-50	11.95	7.79	15.19	9.56	6.94	16.25
50-60	6.67	4.28	9.88	4.38	8.73	8.13
60-70	4.99	6.62	10.48	8.87	7.69	8.14

[390] Had I used the discrete inverse relationship, it would not have made much of a difference for the global picture I am trying to paint here.

70-80	7.80	4.09	7.17	3.50	8.52	7.88
80-90	5.41	3.16	4.39	4.45	7.82	4.01
90-100	4.80	2.79	6.82	3.25	3.28	4.59

1000 draws of x

%	n = 1000 (3 simulations)			n also random between 0 and 100000		
10-20	30.79	31.19	31.51	23.83	30.28	32.77
20-30	15.40	15.83	16.59	20.73	15.85	21.71
30-40	11.22	12.83	12.93	13.68	13.79	12.20
40-50	11.09	9.84	10.32	10.01	9.49	8.40
50-60	8.82	8.78	8.09	8.29	7.80	6.58
60-70	6.30	6.83	4.68	7.42	6.36	5.36
70-80	5.75	5.79	5.61	6.61	5.99	4.67
80-90	5.10	5.19	4.93	4.68	4.97	4.37
90-100	5.54	3.72	5.35	4.74	5.47	3.95

10000 draws of x

%	n = 1000 (3 simulations)			n also random between 0 and 100000		
10-20	29.90	30.68	30.05	30.55	30.25	30.08
20-30	18.21	18.01	17.07	16.48	17.41	17.37
30-40	12.52	12.36	12.82	12.67	12.88	12.77
40-50	9.61	9.52	10.19	10.05	9.47	9.82
50-60	7.76	7.72	7.99	7.70	7.99	7.89
60-70	7.03	6.73	6.36	6.81	6.48	6.93
70-80	5.47	5.49	5.75	5.87	5.81	5.56
80-90	5.04	4.92	5.24	5.13	5.12	5.12
90-100	4.48	4.57	4.54	4.74	4.60	4.47

100000 draws of x

%	n = 1000 (3 simulations)			n also random between 0 and 100000		
10-20	29.76	30.63	30.42	30.09	30.01	29.90
20-30	17.79	17.48	17.58	17.64	17.59	17.57
30-40	12.52	12.43	12.42	12.44	12.48	12.71
40-50	9.79	9.66	9.62	9.63	9.56	9.85
50-60	7.99	7.69	7.85	7.91	8.07	7.80
60-70	6.77	6.61	6.72	6.67	6.78	6.72
70-80	5.75	5.87	5.79	5.85	5.80	5.80
80-90	5.10	5.10	5.12	5.16	5.18	5.02
90-100	4.53	4.52	4.49	4.60	4.54	4.63

The second, third, and fourth column of the table above respectively show (in three independent simulations) the pattern in the y values of 100, 1000, 10000, and 100000 random x values of the relationship n=x·y, divided into segments of 10% on the x axis. Here n is set at 1000.

Simulation 2: How stochastics in multiple datasets leads to Benford. The above simulation shows how a stochastic process leads to Benford patterns for a single inversely proportional relationship. Ted Hill determined in the 1990s that when you take random samples from randomly picked datasets that adhere to Benford's law, this law still applies to the result of these samples. The law applies increasingly well as the number of datasets increases and the number of samples increases.

I have therefore conducted a second simulation to investigate the effect of combining different datasets, *each with its own inverse proportionality*. Every draw of x is then based on its own n, and therefore its own inverse proportionality. I repeated the experiments above, but this time, for every draw, I *first* drew a random integer value of n between 1 and 100000, and *then* I drew an equally random integer value of x on the resulting segment of 1 to n (the n that was just drawn). The y values are then determined with the function y = n/x for these specific values of n and x. The resulting scales are now a random and jumbled mess. Again, the y values per 10% segment are summed, now over the entire area of 1 to 100000, and the mutual ratios of these summations are determined.

The results of this simulation with randomly drawn and varying values of n are listed in columns 5 to 7 of the above tables (the right half). Benford's pattern appears again, and it is increasingly well defined as the stochastic process becomes larger. The results of the above two simulations are in line with Ted Hill's results. Hill observed that when you take random samples from randomly picked datasets that adhere to Benford's law, Benford's law will apply increasingly well as the number of datasets increases and the number of samples increases. The simulations show that when you draw random values of x and calculate the corresponding values of y with the inversely proportional pattern, Benford's law applies increasingly well as the number of samples increases, even when you draw every sample from its own inversely proportional relationship (its own n in n=x·y).

Simulation 3: How stochastics leads to the harmonic series. For a third simulation, I examined the *average* y value of a random sample of 500000 integer x values between 1 and n (inclusive) for a specific value of n. I have repeated this for n=10, n=100, n=1000, n=10000, n=100000, and n=1000000. This allows me to investigate the connections between the inversely proportional relationship and the harmonic series. The sample size is large, 500000, because n is increased to a large value (1000000) as well.

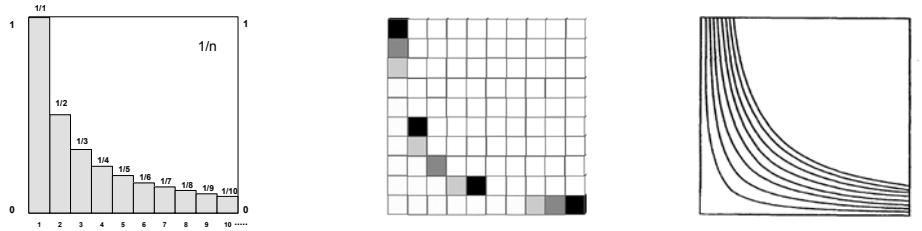
For every random value of x, y=n/x applies. What is then the average of the y values generated? The results are listed in the table below. The simulations are repeated 30 times to get a sense of the variation in the results. This also allows me to determine proper average values for the larger values of n ([1-100000] and [1-1000000]).

Run	[1-10]	[1-100]	[1-1000]	[1-10000]	[1-100000]	[1-1000000]
1	2.820915	5.172921	7.495371	9.977143	11.754852	13.436769
2	2.8350387	5.192069	7.366431	10.091122	11.914243	15.800744
3	2.825438	5.167555	7.551248	9.522476	12.127086	14.95653
4	2.8277194	5.161293	7.3881984	9.848412	11.505151	14.574149
5	2.82831	5.183273	7.393528	9.819738	12.667835	14.715172
6	2.8323872	5.186689	7.4267273	10.117863	12.607053	15.071616
7	2.8309147	5.177937	7.5164084	9.650394	12.056781	13.65333
8	2.8280895	5.160725	7.5937505	10.075152	12.504028	15.53605
9	2.8258715	5.168421	7.5679245	9.7448	11.637748	13.633389
10	2.8333237	5.1625285	7.43561	9.848354	11.626225	11.803477
11	2.8328817	5.2033963	7.5458603	9.719665	12.409117	16.146484
12	2.8336034	5.1775165	7.392273	9.75029	12.485771	12.280086
13	2.8295486	5.181681	7.438072	10.053047	12.499079	14.503494
14	2.828502	5.190998	7.5042076	9.538144	11.842828	12.770968
15	2.830317	5.165118	7.50376	9.666662	11.846335	18.925568
16	2.8290732	5.2012525	7.4276347	10.125554	12.105681	14.306798
17	2.827011	5.197101	7.5673723	10.069655	11.673217	14.810577
18	2.8331194	5.171814	7.50197	9.904004	12.64972	12.355571
19	2.8201942	5.1778574	7.499413	9.749615	11.776774	15.860482
20	2.8274949	5.175601	7.3999085	9.830585	11.976509	12.807056
21	2.8279524	5.18337	7.518857	9.865521	12.450871	12.747414
22	2.840723	5.171612	7.48927	10.021301	11.989178	13.474811
23	2.8220842	5.167306	7.49377	9.980624	12.030733	14.34081
24	2.828652	5.2017617	7.448649	9.911747	11.785691	13.524009
25	2.8239253	5.170489	7.575548	9.629418	13.103757	13.226744
26	2.8357449	5.2169633	7.290105	9.617899	10.813663	14.564939
27	2.828394	5.1791825	7.4267554	9.944005	12.892521	14.622495
28	2.8227668	5.1653123	7.5258565	9.954264	12.328321	20.083447
29	2.8338287	5.162151	7.4337006	9.999978	11.990867	14.171261
30	2.828941	5.186107	7.528937	9.802183	12.169468	17.904406
Avg:	**2.8290927**	**5.1793337**	**7.474905**	**9.860987**	**12.10737**	**14.553622**

The average experiential value y according to n=x·y when drawing 500000 random integer x values, on the x segments 1-10, 1-1000, 1-10000, and 1-100000 (inclusive).

The average of the 30 simulations is shown in the bottom row of the table (the row starting with Avg:). The values contained in this last row therefore represent the average of 30 simulations of 500000 random integers of x, thus 15 million values of x in total. According to the central limit theorem of probability theory, there should be a Gaussian distribution around the average, and the accuracy increases as the number of random draws increases. When we look through the columns, we see that the accuracy depends on the number of samples in relation to the number of possible values of x. In column [1-10], the average is 2.829 with a spread of 2.821 to 2.841. In column [1-1000000], the average is 14.554 with a spread of 11.803 to 18.926. The spread increases from left to right for every column, in accordance with the fact that the sampling of the x axis becomes thinner.

Again, we see the close relationship between the harmonically calculated improvement potential of recursive perspectivism and Benford's stochastic law. This relationship is inversely proportional. During the discussion of the experiential value, we already saw how closely related the harmonic progression and inverse proportionality are. If we have a horizontal harmonic progression up to n and multiply the vertical axis with n, we get a quantized and diagonally symmetric figure. That is the exact figure that was used in Theme I (Chapter 2, the prelude) to understand the connection between objectivity and subjectivity.



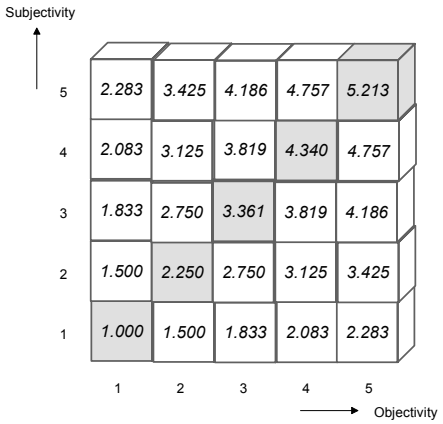
The harmonic row up to n (left) is changed by the rescaling of the vertical axis in n equal parts to a discrete inverse proportionality (centre). For increasing values of n, this approximates the continuous inverse proportionality increasingly well.391

Statistically, so strictly from an average point of view, recursive perspectivism states that the total improvement potential, and therefore the average experiential value as well – for increasing numbers of perspectives n in a single dimension – is based on the harmonic series (the summation of the harmonic progression). This can be expressed in a formula (I repeat) as follows:

$$\text{improvement potential (n)} = \Sigma_{1->n}\ 1/n.$$

For example: improvement potential (3) = 1/1 + 1/2 + 1/3 ≈ 1.833. I used this exact formula in the prelude to calculate the average improvement potential. When there are more dimensions, you reinitiate the harmonic progression, starting at the result of the previous dimension(s), so that it is fully quantized. For the object–subject surface, that resulted in the following figure (repeated):

[391] Actually, this also depends on the number of prime factors of n. Most of the positions can be found at $n=2^h$, the least at n = prime number. But as n increases, the number of available discrete positions to approximate the continuous inverse proportionality improves. This will be explained in further detail below.



Improvement potential per compounded perspective (biharmonic development)

Below you will find some results of this formula for the one-dimensional improvement potentials for n=10, n=100, n=1000, n=10000, n=100000, and n=1000000 perspectives.

improvement potential (10) = 2.9289682
improvement potential (100) = 5.1873775
improvement potential (1000) = 7.485471
improvement potential (10000) = 9.787606
improvement potential (100000) = 12.090146
improvement potential (1000000) = 14.392727

We now see that these results coincide with the stochastic simulation experiment 3 from earlier, as long as the number of simulations is large enough. The average y value of a large number of stochastically derived values of x for which 1 <= x <= n will approximate the calculated result of the harmonic formula improvement potential (n) = $\Sigma_{1\text{-}n}$ 1/n better and better when entered into the continuous inverse distribution n=x·y.

The table below compares the average improvement potential of the bottom row of the table from the above simulation 3, with the calculated average improvement potential according to the formula: improvement potential (n) = $\Sigma_{1\text{-}n}$ 1/n for various n. Here we can see that both the perspectivist experiential value (the improvement potential) and Benford's law are based on the exact same relationship: the inverse proportionality. Both are based on the harmonic series, or rather the fully quantum-theoretical inversely proportional lower Riemann sum.

	Simulated average experiential value	Calculated average improvement potential	Calculated/simulated
n = 10	2.829	2.929	1.035
n = 100	5.179	5.187	1.002
n = 1000	7.475	7.485	1.001
n = 10000	9.861	9.788	0.993
n = 100000	12.107	12.090	0.999
n = 1000000	14.553622	14.392727	0.989

The average stochastically simulated experiential value of simulation experiment 3 and the calculated average experiential value according to the formula improvement potential (n) = $\Sigma_{1\text{-}n}$ 1/n are practically the same, as long as n is large enough and the sample size is large enough in relation to n.

The calculated experiential values are *identical* to the average results of the third simulation, barring small variations.[392] If the x axis grows larger while the sample size stays the same, the similarity fades away. If the sample size increases while the number of perspectives n stays the same, the similarity improves on average. Again, Benford is perspectivist stochastics in the long term.

When taking a good look at the table above, we see that the calculated average improvement potential increases with ~2.303 for every increase of n by a factor 10 (the simulated experiential value does the same). This suggests a logarithmic connection. The Swiss mathematician Euler (1707-1783) discovered an approximation formula for the harmonic series that works increasingly well for increasing values of n, and it does indeed contain a natural logarithmic element:

$$\mathbf{\Sigma}_n 1/n = 1/1 + 1/2 + 1/3 + \ldots + 1/n \approx \ln(n) + \gamma + 1/2n + 1/12n^2$$

Where γ (gamma) represents the Euler–Mascheroni constant mentioned earlier:

$$\gamma = \mathbf{\Sigma}_{n->\infty} 1/n - \ln(n) = 0.5772156\ldots \text{ for } n -> \infty.$$

[392] For the quick observer, those small variations may seem stochastic. But a keen observer will notice that the variance *within* the first column with 30 simulated values for n=1 to 10 is *smaller* than the difference compared to the calculated harmonic value. *All* 30 simulated values fall in the interval of 2.821 to 2.841. The calculated value is 2.929. This structural effect is caused by the lower sum effect (missing 'pieces'): the calculated values overestimate the integral relative to the simulation. This effect is relatively the strongest for low values of n, and it is only visible in the stochastics for large sample sizes (that is why it is not visible for n=10000 and higher). The overestimation for the calculation of n=1 to 100 might also be caused by this effect, and the same might be true for n=1000. In a purely quantized setting of this simulation experiment, I could have worked with the 'harmonic series', quantized in two dimensions. For larger values of n, this does not play such a large role.

As n -> ∞, 1/2n and $1/12n^2$ become smaller. The stochastic result, the calculated result, and the approximated result become more similar. The natural logarithm approximates, but *it is based* on the harmonic series.

	Simulated average experiential value	Calculated average improvement potential	Approximation formula ln (n) + γ
n = 10	2.829	2.929	2.880
n = 100	5.179	5.187	5.182
n = 1000	7.475	7.485	7.485
n = 10000	9.861	9.788	9.788
n = 100000	12.107	12.090	12.090
n = 1000000	14.553622	14.392727	14.392721

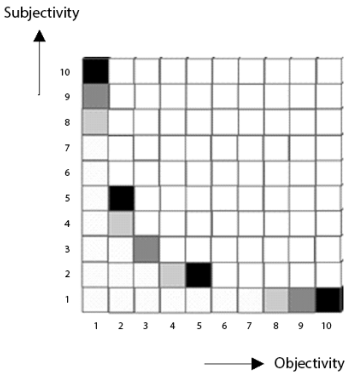
A discrete explanation of Benford's law

We now know that Benford's law applies to situations that involve random draws from (pseudo-)continuous inverse proportionalities, and we know how it works. *Continuous* perfect inverse proportionality leads to Benford's law in the world around us. A perspectivist consciousness creates this exact inverse proportionality between subjectivity and objectivity, but for many other pairs as well, and triplets, and …

The perspectivist explanation of Benford's law is now *almost* complete. There is one last hurdle in our way. Recursive perspectivism does not result in a continuous, but in a *discrete* perfect inverse proportionality of objectivity and subjectivity. After all, perspectives are – within statistical degrees of freedom – quanta. That applies to all perspectivist dimensions.

Quantized inverse proportionalities are always based on natural integers. They deliver specific blocks (stepping stones, the black blocks in the following figures) to the object–subject surface, instead of continuous inversely proportional lines. When the number of available perspectives is a prime number, we even have to conclude that there are no stepping stones in between, but merely the 'embankment stones' (n, 1) and (1, n). This is true for two dimensions, but also any other random number of dimensions, take for instance (n, 1, 1), (1, n, 1), and (1, 1, n) for the three-dimensional perspectivist space.

The core of the matter is this. If I can reduce the discrete inverse proportionality (the fully quantized inverse proportionality) of the object–subject surface to a (pseudo)continuous inverse proportionality, I will have made the final step in the perspectivist explanation of the occurrence of Benford's law. There will be a direct link between recursive perspectivism and our many Benford experiences in what we call the 'real world', our daily world, as seen from the continuity illusion. But can I do that? How does the continuous inversely proportional line relate to the discrete inversely proportional collection of loose blocks, loose stepping stones? (See figure on the next page.)



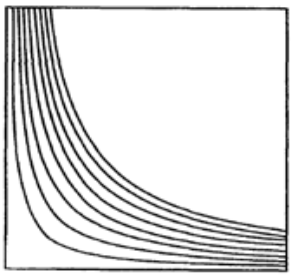


Figure 3b: A cross-section of a sequence of iso-planes.

How do you turn a discrete inversely proportional collection of stepping stones (the pitch black blocks on the left) into a continuous inversely proportional line (a line from the figure on the right taken from my dissertation)? The grey blocks provide us with a hint already.

Stepping stones

By quantizing, I have strictly limited myself above to enumerable natural integers. That coincides with the concrete, situated perspectivist experience, which, after all, is discrete and not continuous. There are *five* apples in the fruit bowl on the table, and there are *eight* chairs around the table.

This quantization results in various findings. First, for every n_{max}, the block pattern is completely unique on a micro scale. Second, I can build the wall of blocks (or the cube, or the hypercube) without gaps and without any placement conflicts.[393] And third, the relationship is perfectly discrete inversely proportional.

At first glance, I pay an enormous price for this: the quantized inverse proportionality only uses very specific blocks to fill the perspectivist space for every n_{max}, and this seems to be miles away from the curve of the continuous inversely proportional function on which Benford's law appears to be based. A determined but limited set of points does not form an inversely proportional line, let alone when they are far apart. If you wish to follow an inversely proportional path, you will have to jump from stone to stone, like crossing a river, but here we have proportional *stepping stones*. If n_{max} is a prime number, there are no stepping stones at all, there are only two embankment stones (if we are dealing with two perspectivist dimensions). What if I still want to follow a *continuous inversely proportional path* through this space, for example in two dimensions, starting at position (12, 1)? Should I jump to the nearest block with a product of 12? Those are big leaps. For prime numbers,

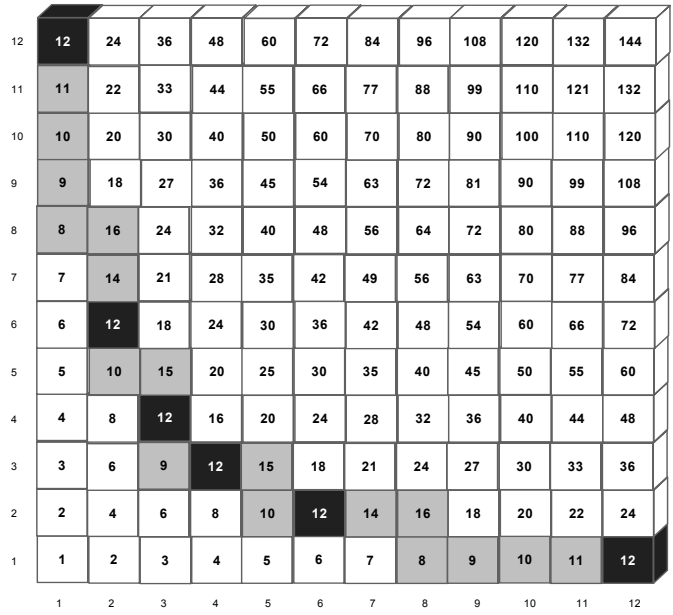
[393] The answer to the age-old philosophical question: 'Why is there something rather than nothing?', posed in this form by Leibniz is: it is because of the quantized relationship between perspective and value, and the subsequent perfect stacking of the wall/cube/hypercube.

these are enormous digital leaps (Euclides proved that there are infinitely many prime numbers, so there are huge prime numbers as well, and there will be no blocks in between).

However, from a general point of view, a discrete inverse proportionality will show a development pattern for a steadily increasing n_{max}, where the continuous inverse proportionality is approximated increasingly well based on loose blocks. A continuing discrete accumulation arises, or from a practical point of view, a *continuous* inverse proportionality.[394] It is *not* continuous, but it does behave like it in practice. The continuity (the continuity illusion) arises from the continuous stacking of quantized perspectives. In previous figures, I used shades of grey to keep track of earlier generations in the stacking process. Then you will see that the continuing discrete development represents an increasingly accurate continuous inverse proportionality when you include more generations. Almost to perfection, if you go on long enough. Almost, because the world in perspective will always remain discrete. There is a continuity illusion, but it will never be truly continuous.

We can also take a pragmatic approach towards the stepping stones problem. We no longer strive for absolute perfection, we are not hunting ghosts, but close to perfect is more than good enough. For example, I will start at position (12, 1). Surrounding that are blocks with the product values 11, 22, and 24. The value 12 is nowhere to be found in its surroundings (see figure on the next page in the bottom-right corner).

[394] I think this process explains the relationship between the discrete experience of situated daily items such as chairs, houses, and freeways, and the continuous experience of units of distance and time: that last category is much larger in terms of compounded perspectives (n_{max} is much larger).



The sum of the path is 267,
the average value is 267/23 = 11.61

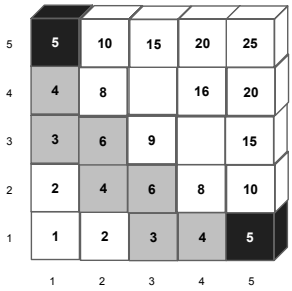
From a practical point of view, the inversely proportional path can be approximated even for low values of n. As n_{max} increases, the perfect inversely proportional curve is approximated increasingly well (in other words, the resolution increases).

I should therefore be practical if I want to make any progress. I look at the value that is closest to 12. I can choose to allow only smaller deviations, larger deviations, or both. I will choose both, as that will provide me with the most options. The position (11, 1) with a value of 11 is closest to 12. I will now search for the next position for which the product is closest to 12, preferably a 12 (a dark *stepping stone*). The most pragmatic path is then (see the figure above):

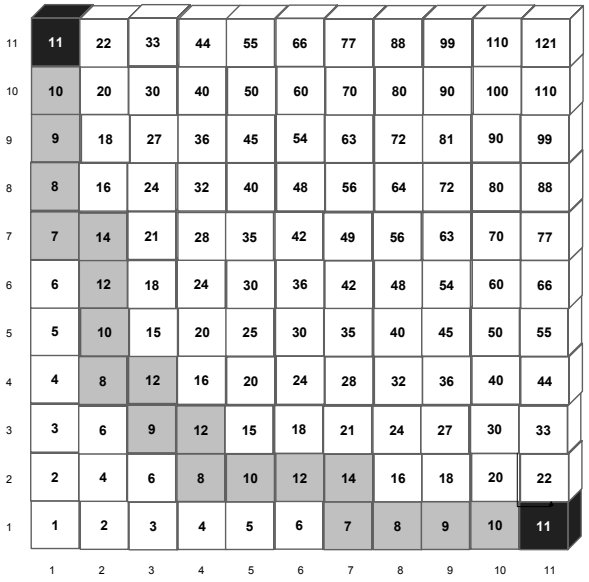
12, 11, 10, 9, 8, 16, 14, **12**, 10, 15, **12**, 9, **12**, 15, 10, **12**, 14, 16, 8, 9, 10, 11, and **12**.

From a perspectivist point of view, I am getting rid of some perspectives and adding others. On a corporate scale, this is Joseph Schumpeter in action; in a single individual human consciousness, you are deliberating and exploring; and on a large societal scale, cultures are clashing with either carrots or sticks. This path is symmetric with respect to the diagonal x=y.

The two figures on the following page show the paths for n=5 and n=11, two prime numbers. They have no *stepping stones*, there are only two embankment stones. You will have to take an even more pragmatic approach and walk the path without any reference points in between. But that should be no problem as long as you are practical.



The sum of the path is 40;
the average value is 40/9 = 4.44



The sum of the path is 211;
the average value is 211/21 = 10.05

A pragmatic disposition allows you to follow a path from (12, 1) to (1, 12) that strongly resembles a perfect inversely proportional path (see the two previous figures). It is as if you were to draw a continuous inversely proportional line on a screen with a very low resolution. Or as if the line has to be created with large, coloured cube-shaped blocks, both white and grey. As n increases, the unmistakable image of an increasingly accurate approximation of the continuous perfect inverse proportionality appears. The resolution increases, the blocks become relatively smaller (or the field becomes larger, whichever way you look at it), and the line becomes thinner and curvier relative to the screen. A clearer picture is painted (think of how Rembrandt's paintings arise from the brush strokes, the description that I opened this book with). As the number of possible positions on the x axis increases, and therefore those on the y axis as well (they are equal, after all), the approximation of the inverse proportionality and the practical scale invariance improves as well.

On a macro scale, the practical scale invariance is ever increasing, even when on a micro scale, the path of every n is unique and thus not perfectly scaled with another path. This explains how the structures on a micro scale are demonstrably unique and discrete, while on a macro scale you find pragmatic continuity and scale invariance. Continuity emerges from quanta. Generality emerges from uniqueness.[395]

[395] These statements can be reversed as well. Quanta emerge when you zoom in. Uniqueness arises from continuity. They are eternally interchangeable. The motto here is: Seek and you will find.

On a macro scale, it remains a unique and somewhat messy affair. That is also the case for more than two dimensions, by the way. We see tiny stairs appear with all kinds of step sizes, but we know where to expect which step size. In a balanced situation, at the diagonal, movement comes easiest by far. The road to perfection is non-monotonic, and perfection will never be achieved, that is an illusion. That is why the patterns of Zipf and Benford are never exact. But the development is unmistakable. As n increases, the illusion of a continuous inversely proportional line becomes increasingly inevitable (a continuity illusion arises). The block stackers become more and more content with their continuous illusions; they might even start believing in them. For all practical purposes, the continuous interpretation of $n=x\cdot y$ as a macrostructure of the discrete underlying unique microstructure of the path suffices, as long as the number of perspectives is large enough.

The discrete inverse proportionality can thus be pragmatically converted into a continuous inverse proportionality. The costs are uncertainty, inaccuracy, and noise. Measurements errors, the inveterate dualist would say. 'To measure is to know' they will write on a tile on the wall. But too SMART quickly becomes kind of dumb, I say in return.[396] When the number of perspectives grows, this approximation improves, but we will never get rid of a certain perspectivist inaccuracy and unsuspected surprises. That is as certain as the fact that there will always be a larger prime number.

In any case, based on a discrete inverse proportionality, one can clearly create a practically continuous inverse proportionality. That is an important precondition for the perspectivist application of Benford's law.

8.4 Perspectivist analysis

This section introduces what I have started to call the perspectivist analysis. With perspectivist analysis, I mean the analyzing of structural and substantive characteristics of numbers of perspectives n, with their possible configurations and developments as a central concept.

I will start the perspectivist analysis slowly, with the stacking of blocks into an inversely proportional structure. Structures of blocks are very illustrative when imagining perspectivist configurations up to three dimensions. The fact that we move in three spatial dimensions and experience (live) in three perspectivist configurations p, s, and u (see section 6.5 of Chapter 6) are strong indicators of this.

[396] SMART: Specific, Measurable, Acceptable, Realistic, and Time-bound: the world of the conservative. Einstein would stare in amazement at the sight of such an incomplete view of the world.

Then the relationship between the number of blocks to be stacked in the block stacking process (the structure) and the numerical position of configurations in the perspectivist space (the content) will be explained.

This then serves as a foundation for the elaboration and clarification of numerous aspects of the perspectivist analysis. There are many, and they are diverse: the perspectivist analysis is the beating numerical heart of recursive perspectivism and with it the perspectivist process of experience. It is therefore no surprise that a lot of aspects will pass the revue, from binomial and Gauss curves, the central limit theorem and uncertainty relations, via Pascal's triangle and symmetries, to the Riemann hypothesis and intriguing wave characteristics that show a connection to wave functions and string theory. Again I operate outside of (at times far from) my domain of competence, but that is quite inevitable at this point.

8.4.1 The determined block stacker (2D)

I start by reviewing how a discrete inverse proportionality relates to a continuous inverse proportionality. I will illustrate this further by stacking a wall of blocks in two dimensions with a block stacker. A wall has two dimensions (as opposed to, for example, a stack or tower of blocks with one dimension, or a cube of blocks with three dimensions). The block stacker would like to realize an inversely proportional effect with his wall. The stacking process, or the stacking procedure, can be described in a variety of ways (the result is exactly the same):

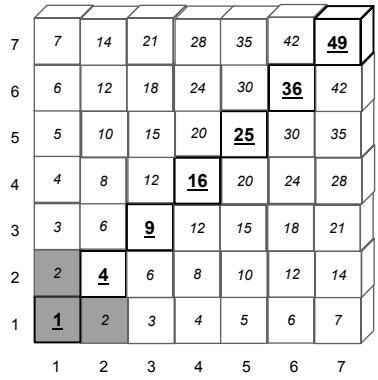
Stacking method 1. We let n start at 1, then increase it by 1 with every step. In every step (every generation, every subsequent n), only *those* blocks are added that perfectly adhere to the discrete quantized inversely proportional relationship that corresponds to that number of n, in two dimensions. So:

1=x·y => (1 1)	1 block
2=x·y => (1 2) and (2 1)	2 blocks
3=x·y => (3 1) and (1 3)	2 blocks
4=x·y => (1 4)(2 2)(4 1)	3 blocks
5=x·y => (5 1) and (1 5)	2 blocks
6=x·y => (6 1)(3 2)(2 3)(1 6)	4 blocks
etc.	

Here we find the *first* perspectivist balance again (see Chapter 6). This procedure looks straightforward, but do not be mistaken. If you wish to follow this procedure to the letter, you will have to know every factor of a generation n. (Factors are whole divisors of an integer. Prime factors are a subset of factors that cannot be divided any further into integers). For *really* large numbers of n, it is extremely challenging to calculate the factors.

Stacking method 2. We can also describe this stacking process with *recursive stacking rules*. Working recursively implies that you repeat a similar working method (a similar

procedure), and on different scales as well. That makes a process recognizable and organized (in principle[397]): it is divided into related parts at different scales. When explaining this method, the figure below can help. The white 'blocks' are empty spaces (vacancies), the grey spaces are filled with blocks. I will use the term *step* as a synonym for *generation*.

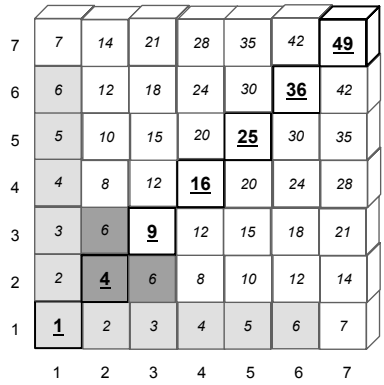


Recursion in cornerstones and stacks (1).

In step 1, you place a cornerstone (see the 1 on the bottom left). In step 2, you will place a second stone in two directions, up and to the right (both numbers 2, you have now created the situation of the figure above). In step 3, you add both third stones (both numbers 3). In step 4, both fourth stones (both numbers 4 along the edges). But generation 4 is also represented by position 4=(2 2). That is a diagonal position, a symmetry. This is therefore regarded as a *second* cornerstone, but more inwards, creating two new stacks. This 'inner cornerstone' can also act as a foundation for stacks in two dimensions, both up and to the right. However, this occurs twice as slowly, thus every second step instead of every step.

You keep stacking. In step 5, you add both fifth blocks of the outer cornerstone (the inner cornerstone skips every second step). In step 6, you add four blocks on both cornerstones. We have now created the situation of the figure below. The inner cornerstone now has the exact same pattern that the outer cornerstone had one figure and three generations earlier (compare the figure on the next page with the figure above, you will see the recursion). The second recursive pattern starts later and develops more slowly.

[397] It is fair to say that a rational understanding of recursion, for many people, is quite a cognitive challenge; it is easy to lose track. However, our consciousness operates recursively to a large degree, and that happens intuitively, or automatically. Recursion is easy to apply intuitively, but much harder to implement explicitly.



Recursion in cornerstones and stacks (2).

Together, the figures illustrate the phenomenon of recursion quite splendidly. As we stack blocks upwards and to the right from the cornerstone (1 1), so too do we stack blocks from the inner cornerstone (2 2), only twice as slowly (we always skip one step). And indeed, when we look up from position (2 2), we see the numbers 4, 6, 8, 10, … – one step is being skipped, and we see the same when we look to the right.

But that means that the diagonal position (3 3) with number 9 should also be an inner cornerstone, the third. From here, we stack three times as slowly upwards and to the right, always with one block (we skip two steps). Indeed, looking upwards and to the right from (3 3) we see the numbers 12, 15, 18, 21, … – two steps are being skipped, and a block is stacked for every *third* step (so three times more slowly than the outer cornerstone).

Looking back, we now see that position (1 1) was just another diagonal position, the first, the starting condition, the ultimate cornerstone.

The recursive stacking rule is therefore as follows. We start a new (inner) corner block for every $n=h^2$ with h=1, 2, 3, …, so 1=(1 1), 4=(2 2), 9=(3 3), 16=(4 4), 25=(5 5). The first is the cornerstone of the entire wall, the next ones are inner cornerstones on the diagonal. Then it is given that the two stacks of the first cornerstones are stacked with two blocks for every step (every stack 1), the second cornerstone for every second step, the third cornerstone for every third step. This is how the wall is created.

Now you need to know when to add a new cornerstone, and how many and which ones there are. This therefore involves a symmetric row. That diagonal simplifies things greatly, as this offers the possibility for a recursive process. Then it is just a matter of counting attentively.

Stacking method 3. In two dimensions, we can use a much simpler stacking rule. This stacking rule does not require any multiplication; you only need to count. The rule is as follows. We add a block to the first stack *every* step. To the second stack, we add one every *second* (every even) step. To the third stack, we add one every *third* (every triple) step, etc.

That is all. We never add more than one block to a stack per generation. This third method does not require any computation of inverse proportionalities (method 1) or any recursive methods and knowledge of diagonals (method 2). All we need to be able to do is count.

The advantage of this third method relative to the mathematical first method and recursive second method is the simplicity. The disadvantage is that you are only adding blocks blindly: you live in the moment, you cannot abstract or reflect.

We then fill the vertical from the horizontal dimension (or the reverse, that does not matter). In the sixth generation, for example, the first stack, the second stack (6=2·3), the third stack (6=3·2) and the sixth stack all receive one block. The first stack receives its sixth block, the second its third, the third its second, and the sixth its first block (see the black blocks in the figure for the step from n=5 to n=6). The fourth and fifth stack get nothing, they do not move in the sixth generation. Four blocks in total for the sixth generation, exactly in line with the step function.

Those were the three stacking methods. All three methods give the exact same diagonally symmetric wall. In the figure below, we see how the block stacker creates a perfect wall of blocks in two dimensions, and how it thereby *discretely* approximates the *continuous inverse proportionality* increasingly well, with blocks (quanta). You can tilt the wall, switch the axes, it does not matter, the result is the same.

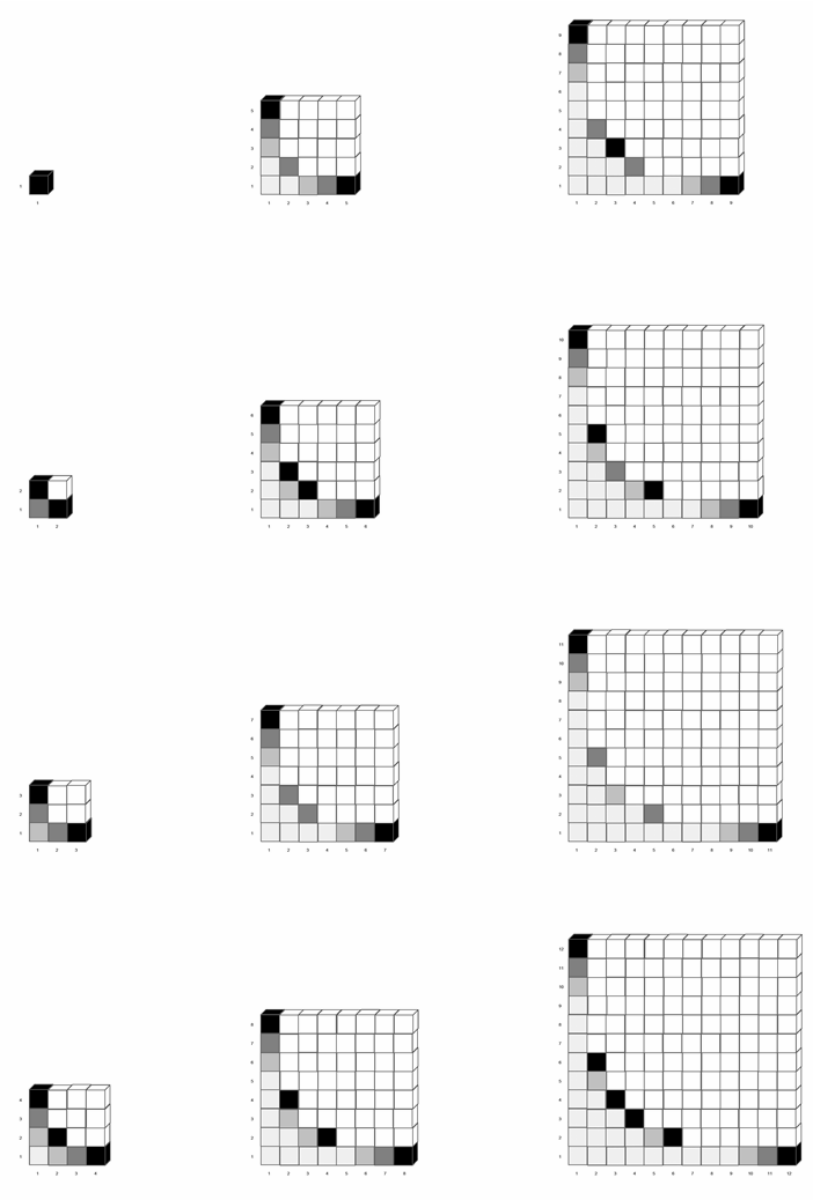
Building the wall

The wall grows and grows. The foundation, one block high, becomes longer and longer as blocks are added to the right. The first stack, the stack at the left edge that is one block wide, increases in height at a similar pace. The foundation and the first stack grow equally fast. In between, the stacks grow according to the discrete inverse proportionality. It would be futile and hopeless to try to build a *square* wall, because it takes more time for the surface in between the axes to be filled with blocks than it takes the axes to grow longer.[398]

A balance starts to appear (a balance *emerges*): although the stacking process is capricious and no two generations are the same, the wall approximates the illusion of the *continuous* inverse proportionality increasingly well *due to* the continuous stacking of discrete generations.

The three methods (the three stacking procedures) are all exactly what is necessary and sufficient to create a perfect wall of blocks. In every generation n, the stacking process adds as many blocks to the wall as there are factors for n (we are dealing with divisors, after all). Every *vertical* column then receives either one block or no blocks at all (and the same is true for every horizontal row due to the diagonal symmetry).

[398] This is precisely why people start to relativize this. We attribute less value to the edges in a harmonic sense, and start filling in the surface biharmonically.



Quantized positions for increasing n fill the surface area up until the line $n = x \cdot y$ without doubling. (Three generations are shown: the darker the area, the more recently the block was added).

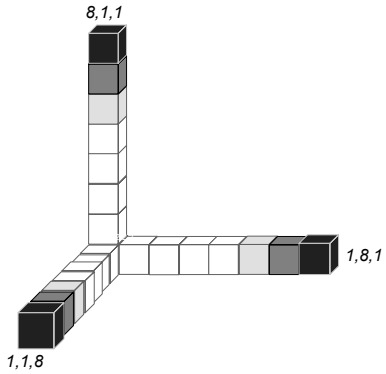
The wall of blocks is perfect in a sense that it has no gaps (for every place there is at least one block) and no conflicts (a new block can never claim a spot that has already been

filled).[399] The process is exactly what is necessary and sufficient to build a perfect wall of blocks.

8.4.2 The determined block stacker (3D)

The discussion above started with stacking a wall in two dimensions: the result is an increasingly accurate approximation of a continuous isoline (x·y=n). The wall stacking process can also be expanded to more dimensions. In three dimensions, it involves the construction of a three-dimensional discrete structure. The basic principles remain the same, because the (prime) factors of a number n do not change. What does change is the number of blocks you can stack, and therefore the number of perspectivist configurations you can form with n perspectives. You have more dimensions at your disposal and are therefore no longer limited to a shortage of dimensions.

Take three dimensions (hence the 3D in the title). If you have a number n with three or more prime factors and you are able to divide these over three dimensions instead of two (with a prior condition that the product is n), you can stack more blocks. Take for example a prime number: in two dimensions, you would add two blocks to the corner stacks. In three dimensions, this naturally becomes three blocks, as you now have three corner stacks. Again, there are three stacking methods, just like there were with two dimensions:



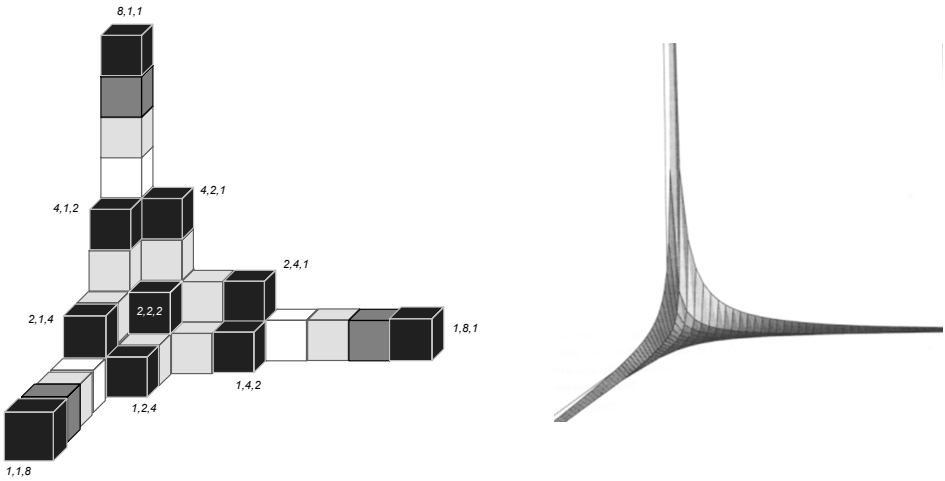
Stacking method 1: In three dimensions, you create a structure that approximates a 'continuous' isosurface in three dimensions increasingly well (an isosurface is a concave three-dimensional surface that adheres to the equation x·y·z=n). This is the analogue of stacking method 1 of the wall. We let n start at 1 and subsequently increase it by 1. For every

[399] This offers a special perspectivist angle on the question 'Why is there something rather than nothing?', a question that was first posed in this specific form by Leibniz in his proof of God's existence (which is intriguing, because recursive perspectivism bounds differential calculations, developed by that same Leibniz and Isaac Newton in the 1600s). For perspective, the following applies: if we experience, there is something; if we do not experience, there is nothing. Consciousness repeatedly focuses itself on experience, which is the experience of (in) perspective.

step (every generation, every subsequent n) only *those* blocks are added that adhere exactly to the discrete quantized inversely proportional relationship that corresponds to that value of n, but now in *three* dimensions. For increasing values of n we thus have:

1= x·y·z => (1 1 1)
2= x·y·z => (1 1 2) and (1 2 1) and (2 1 1)
3= x·y·z => (1 1 3) and (1 3 1) and (3 1 1)
4= x·y·z => (1 1 4)(1 4 1)(4 1 1) (1 2 2)(2 1 2)(2 2 1)
5= x·y·z => (1 1 5)(1 5 1) (5 1 1)
6= x·y·z => (1 1 6)(1 6 1)(6 1 1)(1 2 3)(1 3 2)(2 1 3)(2 3 1)(3 2 1)(3 1 2)
7= x·y·z => (1 1 7)(1 7 1) (7 1 1)
8= x·y·z => (1 1 8)(1 8 1) (8 1 1)(1 2 4)(1 4 2)(2 1 4)(2 4 1)(4 1 2)(4 2 1)(2 2 2)
etc.

The stacked blocks for n=8, numbering 10 in total, are coloured black in the figure below.

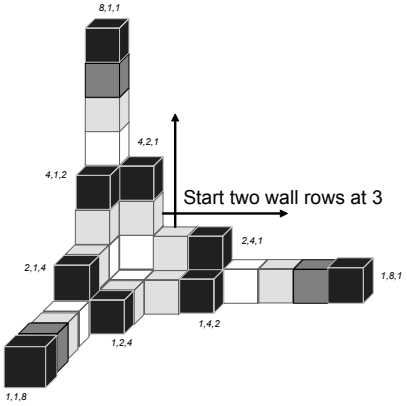


Quantized positions for n=8 (the black blocks) in three dimensions. The darker the blocks, the more recent the generation of added blocks. As you keep stacking, the isosurface in three dimensions is more closely approximated.

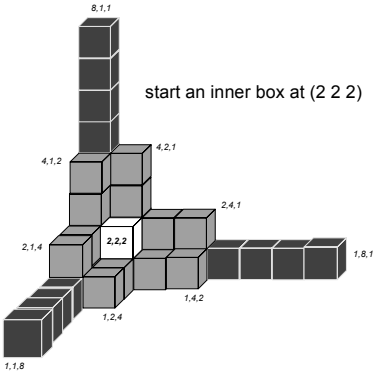
Stacking method 2. We can describe this three-dimensional stacking process with (recursive) *stacking rules* as well, resulting in the same structure. Think of boxes that are placed inside one another. From a recursive point of view, a filled box is nothing more than a collection of smaller empty boxes that are stacked inside each other (or around each other). Think of how the Russian nesting dolls envelop one another, think of the Droste effect, or think of the Sierpinski triangle (presented elsewhere in this book).

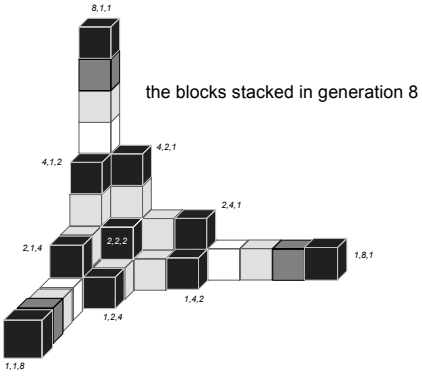
We first lay down the cornerstone. We then continue with three perpendicular stacks instead of two, as was the case for the wall. A box has three walls, after all. *Each* of the three stacks contributes to *two* of the three walls.[400]

We know that when we reach step 4, we will have to place a new wall cornerstone on the diagonal wall positions (2 2) (now we should place three blocks, as there are three walls, the third dimension is 1). And similarly for step 9 – the three positions (3 3) – and 16 (4 4), and 25 (5 5), etc. From the moment we place a diagonal stone, we need to place 6 blocks on the six stacks of the cornerstone (2 2) for every second step, six blocks on the stacks of the inner cornerstones (3 3) for every third step, etc., just as we did with the wall, but now with triples (because there are three walls).



Just as we have a *two*-dimensional diagonal, we also have a *three*-dimensional diagonal: 8=(2 2 2), 27=(3 3 3), 64=(4 4 4), etc. On step 8, we therefore place the cornerstone (2 2 2) of the first inner box (see the figure below on the left), and we start building there too.



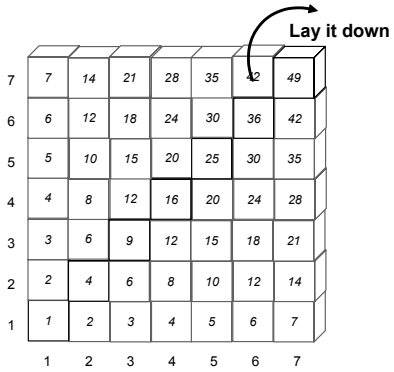


[400] And since each of the three stacks contributes to *two* of three walls, that introduces an advantage.

The other stacking processes that had already started will simply continue (see figure above on the right): all the black blocks, 10 in total, are stacked in step 8.

The general principle of method 2 is that for every generation n and working with k dimensions, you add blocks to *every* stack (k=1), rectangle and square (k=2), beam and cube (k=3), hyperbeam and hypercube (k>3) that can be stacked. Any forms higher than the number of dimensions you work with are ignored. This is a whirling recursive process.

Stacking method 3. We can follow a very simple stacking rule in three dimensions as well that only requires the ability to count properly. We lay down a ground surface in two dimensions and label the blocks with the same numbers as we did with a two-dimensional wall: we actually flip this wall of virtual blocks to put it flat on the ground.



The virtual ground plate of an isosurface

Now we simply start stacking according to the frequency of the numbers on the ground plate. At position 1, or (1 1), we add one block at every step. At the two positions 2, we add a block at every second step. At the two positions 3, we add a block at every third step. At the three positions 4, we add a block every fourth step. At the two positions 5, we add one every fifth step, etc.

Notice that we add ten blocks in step 8 with this method too. We add three new end blocks to the three corner stacks on the eight (just outside the figure), we add two blocks to the 8s at positions (2 4) and (4 2), we add three blocks to the numbers 4 at (4 1), (1 4), and (2 2), and we add two blocks to the numbers 2, as it was their turn again in generation 8. That adds up to 10 blocks, with barely any effort.

Stacking patterns

The number of blocks that are stacked per generation can now be calculated exactly. For two dimensions, the following holds. At generations 1, 4, 9, 16, … (the squares), one cornerstone is added. The diagonal will therefore steadily fill up starting at the origin. For all generations *after* the very first generation, two extra blocks are stacked. For all generations after 4, two more blocks are stacked (on the very first inner cornerstone

stacks). For all generations after 9, two more blocks are stacked (on the second inner cornerstone stacks). Etc.

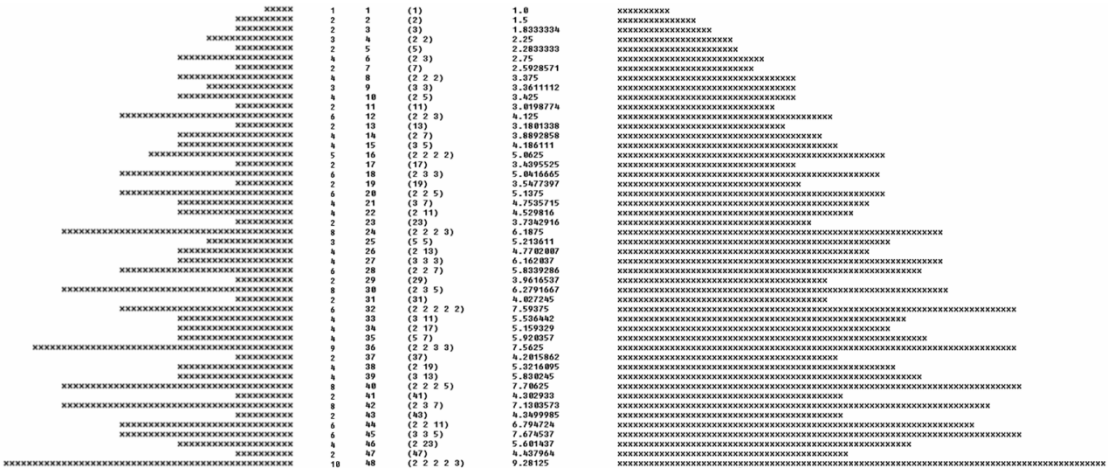
The figure below depicts the capricious but recognizable pattern of this *step function* in two dimensions. (We see it in action for values of n from 1 to 12 in the composite figure at the end of *The determined block stacker (2D)*, right before the start of *The determined block stacker (3D)*). When I scale this up by a factor 5 (every cross becomes five crosses, and five crosses represent one block) and flip it over, the following pattern emerges. We can see that the number of blocks to be added depends on the number of prime factors. Double prime factors reduce this effect (I will come back to this later).

1	1	1	xxxxx
2	2	3	xxxxxxxxxx
3	2	5	xxxxxxxxxx
4	3	8	xxxxxxxxxxxxxxx
5	2	10	xxxxxxxxxx
6	4	14	xxxxxxxxxxxxxxxxxxxx
7	2	16	xxxxxxxxxx
8	4	20	xxxxxxxxxxxxxxxxxxxx
9	3	23	xxxxxxxxxxxxxx
10	4	27	xxxxxxxxxxxxxxxxxxxx
11	2	29	xxxxxxxxxx
12	6	35	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
13	2	37	xxxxxxxxxx
14	4	41	xxxxxxxxxxxxxxxxxxxx
15	4	45	xxxxxxxxxxxxxxxxxxxx
16	5	50	xxxxxxxxxxxxxxxxxxxxxxxxx
17	2	52	xxxxxxxxxx
18	6	58	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
19	2	60	xxxxxxxxxx
20	6	66	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
21	4	70	xxxxxxxxxxxxxxxxxxxx
22	4	74	xxxxxxxxxxxxxxxxxxxx
23	2	76	xxxxxxxxxx
24	8	84	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
25	3	87	xxxxxxxxxxxxxxx
26	4	91	xxxxxxxxxxxxxxxxxxxx
27	4	95	xxxxxxxxxxxxxxxxxxxx
28	6	101	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
29	2	103	xxxxxxxxxx
30	8	111	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
31	2	113	xxxxxxxxxx
32	6	119	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
33	4	123	xxxxxxxxxxxxxxxxxxxx
34	4	127	xxxxxxxxxxxxxxxxxxxx
35	4	131	xxxxxxxxxxxxxxxxxxxx
36	9	140	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
37	2	142	xxxxxxxxxx
38	4	146	xxxxxxxxxxxxxxxxxxxx
39	4	150	xxxxxxxxxxxxxxxxxxxx
40	8	158	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
41	2	160	xxxxxxxxxx
42	8	168	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
43	2	170	xxxxxxxxxx
44	6	176	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
45	6	182	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
46	4	186	xxxxxxxxxxxxxxxxxxxx
47	2	188	xxxxxxxxxx
48	10	198	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Results for the step function per generation in two dimensions

You might experience a sense of familiarity when looking at this resulting pattern. It bears a striking, but not exact, resemblance to a previously shown pattern: the pattern of the improvement potential of *prime factorizations* of a number of perspectives from 1 to 64, calculated with the harmonic formula for the improvement potential in multiple dimensions. To properly compare these two patterns, I have depicted them below, back to back (see the following figure, the left and the right 'wing').

The values of the multi-dimensional harmonic improvement potential that correspond to the right wing are listed in the fourth column, directly to the left of the right wing. The pattern of the left wing represents the number of blocks to be added to an inversely proportional wall that is one perspective higher and wider, and then reaches the height and width n. This number of blocks is listed in the first column, thus directly to the right of the left wing. The second column represents the number of perspectives n and therefore the generation number, and the third column represents the corresponding prime factorization.



Left: number of blocks to be added in 2D with increasing n (5x equals one block). Right: harmonic improvement potential for the prime factorization of n perspectives (5x = 0.5).

There is a strong correlation between the peaks and pits on the left and the right, as well as the areas in between. As human pattern recognizers, we instantly see the resemblance. Apparently, the number of blocks to be added for a specific n correlates with the relative improvement potential of the prime factorization of this n.

On the left we see a baseline emerge for the prime numbers that, after increasing by 50% (five crosses) for n=1, remains constant at two blocks (ten crosses). In two dimensions, a prime number will cause an addition of two blocks, one on top of the first stack, and one to the right at the end of the foundation. Even for extremely high prime numbers, the height remains ten crosses. To the right, we definitely see the improvement potential increase with larger prime numbers, up to infinity, although this process does slow down (d'Oresme).

To the left, we also see a baseline emerge for the multiplications of two different prime numbers. Take for instance 6=(2 3), 10=(2 5), 14=(2 7), 15=(3 5), 46=(2 23); it does not matter which prime numbers we take, but they all require the addition of 4 extra blocks, so 20 crosses. When we look to the right at the improvement potentials of 6, 10, 14, 15, …, 46, we

can see a significant growth in the improvement potential due to the harmonic series, but now in two dimensions instead of one dimension for prime numbers.

This pattern continues: for three different prime numbers, for example 30=(2 3 5), or 42=(2 3 7), 8 blocks are added and we consistently see 40 crosses (8x5). The increase in the improvement potentials is even more significant due to the harmonic series that is now being applied in three directions. For four different prime numbers, such as 210=(2 3 5 7), or 330=(2 3 5 11), 16 blocks are added, with a corresponding 80 crosses, but the improvement potential of the prime factorization of 210 is 16.28, and for 330 we have a value of 18.96, which is quite a difference considering the height. The table below provides you with an impression:

Number	**Number of added blocks**	**Improvement potential**
211 (prime)	2^1=2	5.931
331 (prime)	2^1=2	6.380
206=(2 103)	2^2=4	7.825
309=(3 103)	2^2=4	9.564
222=(2 3 37)	2^3=8	11.55
322=(2 7 23)	2^3=8	14.52
210=(2 3 5 7)	2^4=16	16.28
330=(2 3 5 11)	2^4=16	18.96

In the second column, we see the power 2^p, where p is the number of prime factors of a number that only has unique prime factors. Apparently, the number of blocks to be added does not depend on the size of the prime factors, but purely on the number of prime factors.

The correlation is based on the following phenomenon. A relatively high improvement potential implies a relatively long prime factorization with many small prime numbers. This means that there are many dimensions and therefore many factors (divisors: prime factors and products of prime factors). When there are many (different) factors, many blocks can be added.

The fact that they deviate, that the correlation between the wings is imperfect, is logical too. This has to do with *dimension effects* on one hand, and *symmetries* on the other. When I say dimension effects, I mean that, as n increases, the odds for a longer prime factorization, and therefore more dimensions, increases as well. This also increases the number of blocks to be added. For a prime number, it holds that a block can be added for every dimension available for that n. From generation 4, there are 2 available dimensions, because 2·2=4, from 8, there are three available dimensions, because 2·2·2=8, from 16, there are 4 available dimensions, because 2·2·2·2=16, etc.

Symmetries have to do with diagonal positions: on the diagonals, blocks fall away. Diagonal blocks have double or multiple (equal) primes in the prime factorization. In number theory,

these, including the higher powers, are referred to as *squares*, such as 12=(2 2 3)=(2^2 3) and 27=(3 3 3)=(3^3)). Prime factors with identical prime numbers are therefore squares, and they are positioned in the diagonals. So whenever squares appear, there are fewer blocks to be added, and the left wing becomes lower.

To demonstrate these symmetries, take for example 6 with four stacking blocks: (1 6), (6 1), (2 3), and (3 2), and 9 with three stacking blocks: (9 1), (1 9), and (3 3). For 6, you add four blocks, but for 9, you only add three blocks: (3 3) is identical to the inverse (3 3), so one block falls away. If we look at 4, 8, 16, and 32, for example, we see that the right wing clearly outperforms the left wing, due to the symmetries with 2. When we compare the number of blocks to be added, we get the following picture:

6=(2 3): 4 blocks (in two dimensions)
4=(2 2): 3 blocks (1 fewer due to square)

30=(2 3 5): 8 blocks (in three dimensions)
8=(2 2 2): 4 blocks (14 fewer due to square)

210=(2 3 5 7): 16 blocks (in four dimensions)
16=(2 2 2 2): 5 blocks (11 fewer due to square!)

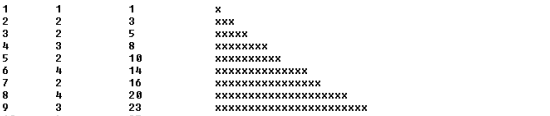
The four graphs below show the *total number* of stacked blocks (the sum) at different scales. The first column lists the generation number. The second column represents the number of blocks added per generation (which is the image of the left half of the back-to-back graph). The third column lists the total sum of the number of blocks added up until that point. The nature of the step function is very notable here: as n increases by one, the function steps up, with a seemingly capricious but well defined and perfectly calculable pattern. The minimum step size is only equal to 1 for the first generation (the cornerstone), and from that moment on it is always at least equal to 2, because prime numbers always feature the addition of just two blocks to the two outer cornerstone stacks of a two-dimensional wall. A jump of 2 therefore always indicates a prime number. The largest jumps correspond to the longest prime factorizations.

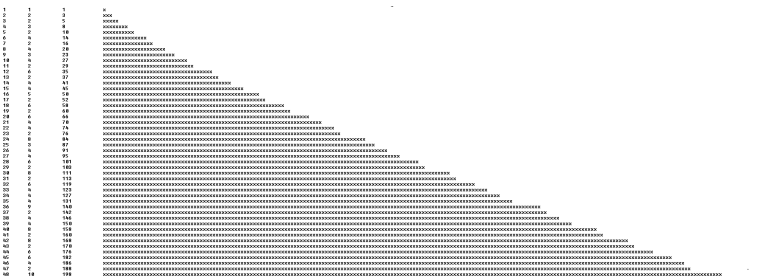
We see that the volatility of the total graph below increases in terms of absolute steps (crosses), but decreases in relative terms (in relation to the total). This reminds us of Bernoulli's √n, where flipping a coin (an example of a so-called Bernoulli experiment) yields a ratio between heads and tails that deviates from the perfect balance. In average terms, from an absolute perspective, the deviation increases, but in relative terms, the deviation becomes smaller. For a balance system in three dimensions, such as the three-dimensional perspectivist space (p, s, and u), we are then dealing with the cube root of n. For a six-dimensional balance system like a dice, we are dealing with the sixth root.

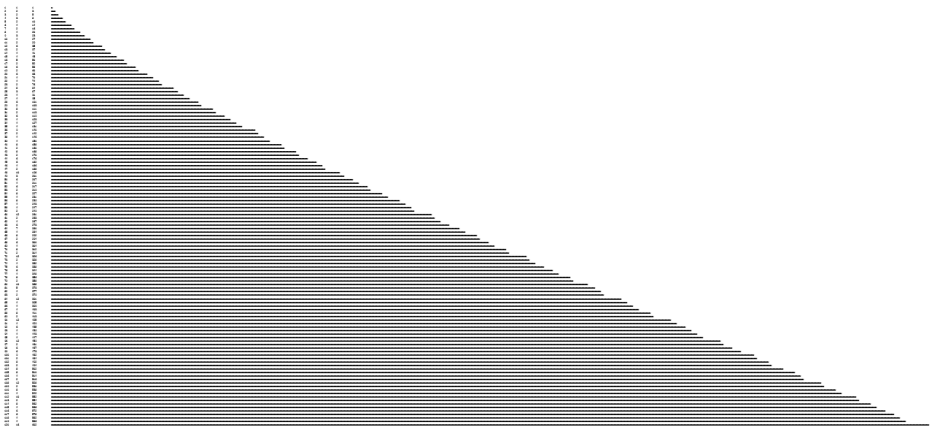
As n increases, we observe fewer small jumps and more large jumps (we observe the largest jumps the least often), and we can slowly see the slope become steeper and less 'curvy'. For

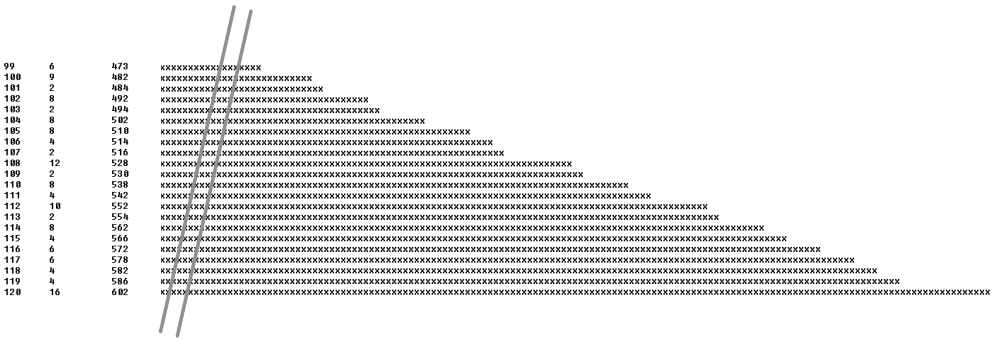
large areas, it becomes easier to interpret the slope as constant. To illustrate this phenomenon, I have created this graph for n=1 to 120 and displayed it below (the third graph below). In terms of the numbers of perspectives held by a consciousness, this is still absolutely nothing, but as n increases, the slope becomes more defined and less curved; it comes to a more settled value. With a certain degree of goodwill, you could even say: it starts as discrete and non-linear, and it *appears* to become more continuous and linear. That last part, continuous and linear, is *never* the case, of course, but it could be interpreted as such from a pragmatic point of view.

N step sum graphical sum









The increase in the sum of the number of blocks to be stacked. Graph 1: from n=1-16. Graph 2: from n=1-48. Graph 3: from n=1-120. Graph 4: the right-most point of graph 3 for n=99-120, enlarged. All graphs are scaled to 1 cross = 1 block.

The difference between two and three dimensions

Below you will find the corresponding step function in three dimensions.

N	blocks	total	blocks graphical
1	1	1	x
2	3	4	xxx
3	3	7	xxx
4	6	13	xxxxxx
5	3	16	xxx
6	9	25	xxxxxxxxx
7	3	28	xxx
8	10	38	xxxxxxxxxx
9	6	44	xxxxxx
10	9	53	xxxxxxxxx
11	3	56	xxx
12	18	74	xxxxxxxxxxxxxxxxxx
13	3	77	xxx
14	9	86	xxxxxxxxx
15	9	95	xxxxxxxxx
16	15	110	xxxxxxxxxxxxxxx
17	3	113	xxx
18	18	131	xxxxxxxxxxxxxxxxxx
19	3	134	xxx
20	18	152	xxxxxxxxxxxxxxxxxx
21	9	161	xxxxxxxxx
22	9	170	xxxxxxxxx
23	3	173	xxx
24	30	203	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
25	6	209	xxxxxx
26	9	218	xxxxxxxxx
27	10	228	xxxxxxxxxx
28	18	246	xxxxxxxxxxxxxxxxxx
29	3	249	xxx
30	27	276	xxxxxxxxxxxxxxxxxxxxxxxxxxx
31	3	279	xxx
32	21	300	xxxxxxxxxxxxxxxxxxxxx
33	9	309	xxxxxxxxx
34	9	318	xxxxxxxxx
35	9	327	xxxxxxxxx
36	36	363	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
37	3	366	xxx
38	9	375	xxxxxxxxx
39	9	384	xxxxxxxxx
40	30	414	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
41	3	417	xxx
42	27	444	xxxxxxxxxxxxxxxxxxxxxxxxxxx
43	3	447	xxx
44	18	465	xxxxxxxxxxxxxxxxxx
45	18	483	xxxxxxxxxxxxxxxxxx
46	9	492	xxxxxxxxx
47	3	495	xxx
48	45	540	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Results for the step function per generation in three dimensions

We can see that all prime numbers (2, 3, 5, 7, 11, …) stack an additional three blocks in 3D instead of two. We can also see that at step 4, six blocks are added instead of three: three on the corner stacks and three on the (2 2) positions in every wall. At step 8, we see a large difference between the two graphs: instead of the 4 blocks added in 2D, there are now 10 blocks added in 3D (as was previously explained).

The difference between 2D and 3D. What is the crucial difference between the 2D and the 3D stacking methods? The difference is in the degree to which the available prime factors can actually be utilized to stack alternative blocks, to assume alternative configurations in the perspectivist space.

Every number n has its own unique prime factorization. So 3=(3), 6=(2 3), 8=(2 2 2) and 12=(2 2 3). The product of the prime factors is always n, and the numbers comprising this product, the prime numbers, cannot be divided any further. If we use a certain number of dimensions that is smaller than the length of the prime factorization, we are limiting the number of configurations (and therefore the number of blocks we can stack), because we constantly have to take the different prime factors *together* as a single product. If our number of dimensions is equal to the length of the prime factorization, we can stack the maximum number of blocks. (If the number of dimensions is larger than the number of prime factors in the prime factorization, we simply add ones for every extra dimension. These are trivial.)

Say that we have just one dimension at our disposal. Then, no matter how many prime factors are included in the prime factorization, we can only configure a number n in one way, namely a single stack of n blocks. The number 3 is configured as (3), the number 6 is configured as (6), the number 8 is configured as (8), and the number 12 is configured as (12). I call this the pseudo-prime factorization, because we treat a non-prime as a prime.

If we have three dimensions at our disposal, we can configure 3 in three different ways: (3 1 1), (1 3 1), and (1 1 3). The number 6 can be configured in six different ways: (3 2 1)(3 1 2)(2 3 1)(2 1 3)(1 3 2)(1 2 3). The number 8 can be represented in 10 different ways: (8 1 1)(1 8 1)(1 1 8)(4 2 1)(4 1 2)(2 4 1)(1 4 2)(2 1 4)(1 2 4) (2 2 2). The number 12 can be configured in 18 different ways as:

(12 1 1)(1 12 1)(1 1 12)

(6 2 1)(6 1 2)(2 6 1)(2 1 6)(1 2 6)(1 6 2)

(4 3 1)(4 1 3)(3 4 1)(3 1 4)(1 4 3)(1 3 4)

(2 2 3)(2 3 2)(3 2 2)

We can see that an increase in the number of dimensions also increases the number of possible configurations. If we have fewer dimensions than prime factors, the number of stacking blocks is limited. The rule of thumb is: the more prime factors, the more dimensions, the more stacking blocks.

We can also see that the occurrence of symmetries in the prime factorization (double prime factors, like with 12=(2 2 3) and 8=(2 2 2), drastically cuts back the number of alternative configurations and therefore the number of stacking blocks. Eight perspectives, with prime factorization (2 2 2), only result in 10 stacking blocks. Thirty perspectives, with prime factorization (2 3 5), result in a whopping 27 stacking blocks (see previous table). This phenomenon will be discussed in detail later on.

More dimensions lead to more improvement potential. Increasing the dimensionality up to a value that at least equals the length of the prime factorization, will lead to a better

balance position with lower values, and therefore a higher improvement potential. The maximally 'factorized' configuration (position), or the prime factorization, is – from a strictly statistical point of view – the one with the highest improvement potential. That is because it is spread out the least in the most dimensions and is therefore closest to the diagonal (possibly on the diagonal).

Take for example 8 perspectives. The best configuration is the prime factorization (2 2 2) with low values in as many dimensions as possible (added ones are trivial). The improvement potential is then 3.375. If we only have two dimensions at our disposal, the best possible positions are (4 2) and (2 4), with an improvement potential of 3.125. In a single dimension, these positions are (8 1) and (1 8), with the lowest improvement potential of 2.7178571. The harmonic improvement values deteriorate due to the increasing number values and worsening balance positions.

Or take 12=(2 2 3). In two dimensions, the best positions are (3 4) and (4 3), with an improvement potential of 3.8194444. In a single dimension, (12) has an improvement potential of 3.1032107. In three dimensions, (2 2 3) has an improvement potential of 4.125.

8.4.3 Stacking blocks in 2D, factors, and perspectivist configurations

Factors

The factors of a number n are the integer divisors, including the prime factors (see the table below, the third and sixth column). The *number* of blocks that is added per generation in a *two*-dimensional wall is equal to the *number* of factors of n, so the *number* of integer divisors of n and therefore the *number of possible* two-dimensional configurations of n. The *position* of the blocks of every generation in a two-dimensional wall is determined by the *specific factors* (their values) of the generation number n.

Every factor of n forms a single x value and a single y value in the inversely proportional wall, and in such a way that their product equals n. We then have two different, diagonally symmetric blocks (e.g. (5 2) and (2 5)), or one symmetric block on the diagonal (e.g. (7 7)). This explains why the number of blocks added per generation (the black blocks in the figure) in two dimensions (a wall), is equal to the number of factors. The number of blocks per generation and their position thereby reflect the number and value of the factors of the generation number n, and conversely: factors determine the number and position of the black blocks.

The two-dimensional coordinates of a block can be found from the list of factors as follows. You take a factor from the list of factors. You take the corresponding factor, which is the one that, if you multiply it by the factor you already have, gives you n. (In the sorted list of factors, this is always the one that is mirrored by the centre of the list, due to the diagonal symmetry). Together they provide you with the coordinates of a block. If the list of factors is uneven, there is a symmetry (the diagonal block, see the explanation below).

For example, generation 12 with factors (1 2 3 4 6 12) leads to six blocks to be added: (1 12)(2 6)(3 4) and their inverse counterparts (12 1)(6 2)(4 3) – six altogether. The previous figure with the inversely proportional stacking of blocks of generations 1 to 12 illustrates this example in the bottom right. The number 36 has the factors (1 2 3 4 6 9 12 18 36), which leads to 9 blocks: (1 36)(2 18)(3 12)(4 9), and (6 6), and their inverse counterparts. You can identify stacking method 1 in this procedure. An uneven number indicates a symmetry: if you flip (6 6), you get the same position, hence a total of 9 blocks.

The fact that the inversely proportional wall of blocks is perfect is caused by the fundamental theorem of arithmetic at play here. This theorem states that every integer n can be factorized into its prime factors in exactly one way. Prime factors are *those* factors that cannot be divided any further (this involves integers, as we are dealing with quanta). The fundamental theorem of arithmetic therefore states that *every* number has its *own* unique set of prime factors, its own unique, order-independent prime factorization. The perspectivist equivalent is as follows: each coherent ensemble of n perspectives has (if the order does not matter), its own *unique* configuration at the highest dimensional (the most factorized) level. The factors are based on these unique underlying prime factors. (See the table below, the second and fifth column).

When you throw the prime factors of n in a list together with 1, and then add all possible partial multiplications smaller than n, you get the factors. It is this fact that makes the position of every black block in the previous stacking figure from 1 to 12 unique: the uniqueness of the prime factorization (according to the fundamental theorem of arithmetic) is passed on, because the coordinates of every position should give n when they are multiplied by each other. In the example above of 36 with prime factorization (2 2 3 3), the coordinates are (1 36), (2 18), (3 12), (4 9), (18 2), (36 1), all with the product 36. *Each* of these coordinate pairs is unique, even when they are compared to all other numbers, because they *fully* rely on the prime factorization that is unique for this number 36. Generations are counted along the entire number line, which ensures a proper connection between the blocks. The prime factorization and the fundamental theorem of arithmetic therefore support the block stacker to neatly stack the wall in two dimensions.

Gen	PrimeFactors	Factors	Gen	PrimeFactors	Factors
1	-	(1)	33	(3 11)	(1 3 11 33)
2	(2)	(1 2)	34	(2 17)	(1 2 17 34)
3	(3)	(1 3)	35	(5 7)	(1 5 7 35)
4	(2 2)	(1 2 4)	36	(2 2 3 3)	(1 2 3 4 6 9 12 18 36)
5	(5)	(1 5)	37	(37)	(1 37)
6	(2 3)	(1 2 3 6)	38	(2 19)	(1 2 19 38)
7	(7)	(1 7)	39	(3 13)	(1 3 13 39)
8	(2 2 2)	(1 2 4 8)	40	(2 2 2 5)	(1 2 4 5 8 10 20 40)
9	(3 3)	(1 3 9)	41	(41)	(1 41)
10	(2 5)	(1 2 5 10)	42	(2 3 7)	(1 2 3 6 7 14 21 42)
11	(11)	(1 11)	43	(43)	(1 43)
12	(2 2 3)	(1 2 3 4 6 12)	44	(2 2 11)	(1 2 4 11 22 44)
13	(13)	(1 13)	45	(3 3 5)	(1 3 5 9 15 45)
14	(2 7)	(1 2 7 14)	46	(2 23)	(1 2 23 46)
15	(3 5)	(1 3 5 15)	47	(47)	(1 47)
16	(2 2 2 2)	(1 2 4 8 16)	48	(2 2 2 2 3)	(1 2 3 4 6 8 12 16 24 48)
17	(17)	(1 17)	49	(7 7)	(1 7 49)
18	(2 3 3)	(1 2 3 6 9 18)	50	(2 5 5)	(1 2 5 10 25 50)
19	(19)	(1 19)	51	(3 17)	(1 3 17 51)
20	(2 2 5)	(1 2 4 5 10 20)	52	(2 2 13)	(1 2 4 13 26 52)
21	(3 7)	(1 3 7 21)	53	(53)	(1 53)
22	(2 11)	(1 2 11 22)	54	(2 3 3 3)	(1 2 3 6 9 18 27 54)
23	(23)	(1 23)	55	(5 11)	(1 5 11 55)
24	(2 2 2 3)	(1 2 3 4 6 8 12 24)	56	(2 2 2 7)	(1 2 4 7 8 14 28 56)
25	(5 5)	(1 5 25)	57	(3 19)	(1 3 19 57)
26	(2 13)	(1 2 13 26)	58	(2 29)	(1 2 29 58)
27	(3 3 3)	(1 3 9 27)	59	(59)	(1 59)
28	(2 2 7)	(1 2 4 7 14 28)	60	(2 2 3 5)	(1 2 3 4 5 6 10 12 15 20 30 60)
29	(29)	(1 29)	61	(61)	(1 61)
30	(2 3 5)	(1 2 3 5 6 10 15 30)	62	(2 31)	(1 2 31 62)
31	(31)	(1 31)	63	(3 3 7)	(1 3 7 9 21 63)
32	(2 2 2 2 2)	(1 2 4 8 16 32)	64	(2 2 2 2 2 2)	(1 2 4 8 16 32 64)

Block stacking in table form up to generation 64

The table above illustrates what was described a moment ago. Factors are directly determined by the prime factors, which are unique for every value of n according to the fundamental theorem of arithmetic.

To summarize, the ***number*** of blocks that are stacked in a generation n in an inversely proportional and two-dimensional wall is equal to the ***number*** of factors n, which is determined by the ***number*** of prime factors p of n.[401] Their specific ***position*** is determined – with the ***value*** of the regular factors – by the ***values*** of the prime factors of n.

In the following paragraphs, I will first assume that the prime factorizations do not contain double primes (no squares). This is *not* always the case, which can be deduced simply by looking at the table above. Take $4=(2\ 2) = 2^2$, or $8=(2\ 2\ 2)=2^3$, or $18=(2\ 3\ 3)=2\cdot3^2$. In the section *Symmetries decrease the number of factors,* I will elaborate on the effects of the presence of double prime numbers (and triple prime numbers, and a variety of other symmetries) in a prime factorization. I refer to double primes in factorizations as symmetries.

Symmetries have a structural and a substantive side. Structure is relevant to the type of symmetry: double, triple, or septuple symmetry, or perhaps a combination of a double and a quadruple symmetry. The value does not matter. All variants are possible. Content-wise, the value of the symmetry is more important: which specific prime factors appear more than once?

[401] Not considering symmetries, but more on that later.

The relationship between primes and factors as a pure structure formula: f_p

The *precise* relationship between the number of primes on the one hand and the number of factors on the other (the number of blocks on the discrete inverse proportionality) can be expressed in a formula. In short, this formula is: $f_p=2^p$, 2 to the power of p, where p is the number of prime numbers, all being different.

The formula f_p is based on centuries-old mathematics. It works as follows. Say we have n=30 with a prime factorization of (2 3 5), because 2·3·5=30. There are 3 primes, and p represents the number of primes, so p=3. We now let the number of prime factors that we use increase from 0 to p.

We know, and this is step 0, that 1 is always a factor (this is trivial). The prime factors themselves are all factors as well, naturally, which is step 1. We put the factors of step 0 (1) and step 1 (2 3 5) together in a list of factors.

Now we go further from 2 (inclusive) up to p. Step 2: we take all the products of *two* prime factors and add them to the list. These are 6, 10, and 15, and we add them to the list of factors: (1 2 3 4 5 10 15). On to step 3 (the last one, because p=3): we take all the products of *three* prime factors (there is only 1, as we have 2·3·5=30). This is trivial too, and we add it to the list as well. Then we stop, because we have reached p, and the list of factors is complete: (1 2 3 5 6 10 15 30). We can find this exact list of factors for 30 in the table above.

We can now formalize this calculation procedure with the mathematical formula for *combinations* (called the binomial formula, which has Newton's name attached to it). Whenever we draw k times from a row of p prime factors, *without* placing the prime factors back in that row, and the order is *not* of importance, we essentially calculate the x coordinate of a stacking block (the product of the rest of the prime factors gives the y coordinate), and the following number of possible combinations applies:[402]

$$\text{Comb}(p, k) = p! \,/\, k!(p-k)!$$

The *integral formula* to calculate the number of factors f for (a number n with) p prime factors is therefore:

$$f_p = \text{Comb}(p, 0) + \text{Comb}(p, 1) + \text{Comb}(p, 2) + \ldots + \text{Comb}(p, p)$$

or, in short:

$$f_p = \Sigma k_{0->p}\, \text{Comb}(p, k)$$

Here p = the number of prime factors in the prime factorization of n, and k = the number of draws from this prime factorization, which together form the combination that provides

[402] Combinations where drawn items are not returned to the pool and where the order *does* matter are called variations. The formula is Var (p, k) = p! / (p-k)!

the x coordinate as their product. The value of this formula does not lie so much with the fact that it shows the total number of factors or blocks, this is just 2^p, but rather that it also shows its structure in terms of prime factorizations, because k increases from 0 to p.

It holds that Comb (p, 0) = 1 (there is only one empty collection, 0!=1, this is step 0 from earlier). It further holds that Comb (p, 1) = p (every prime is one of the combinations, this is step 1 from earlier). Then it holds that Comb (p, p) always equals 1 (this is step k, the final step). For everything in between, you need to do some math. Some example calculations:

```
Comb (1, 1) = 1! / 1!0! = 1

Comb (3, 0) = 3! / 0!3! = 1
Comb (3, 1) = 3! / 1!2! = 3
Comb (3, 2) = 3! / 2!1! = 3
Comb (3, 3) = 3! / 3!1! = 1

Total of 8 factors with 4 prime factors


Comb (4, 0) = 4! / 0!4! = 1
Comb (4, 1) = 4! / 1!3! = 4
Comb (4, 2) = 4! / 2!2! = 6
Comb (4, 3) = 4! / 3!1! = 4
Comb (4, 4) = 4! / 4!0! = 1

Total of 16 factors with 4 prime factors


Comb (5, 0) = 5! / 0!5! = 1
Comb (5, 1) = 5! / 1!4! = 5
Comb (5, 2) = 5! / 2!3! = 10
Comb (5, 3) = 5! / 3!2! = 10
Comb (5, 4) = 5! / 4!1! = 5
Comb (5, 5) = 5! / 5!0! = 1

Total of 32 factors with 5 prime factors
```

The *product* of the elements of *every* combination gives one of the factors, and therefore one of the coordinates, and thus one of the blocks in the stacking process of the inversely proportional wall in two dimensions. For n=30, the example above, p=3 (there are 3 prime factors, the prime factorization is (2 3 5)), and the total algorithm for the number of factors of 30 then results in 8. This corresponds nicely with the length of (1 2 3 4 5 10 15 30):

$$f_3 = 1 + 3 + [p! \,/\, k!(p-k)!]_{k=2} + [p! \,/\, k!(p-k)!]_{k=3}$$

$$= 1 + 3 + 3!/2!(3-2)! + 3!/3!.(3-3)! = 1 + 3 + 3 + 1 = 8$$

With f_p, we therefore have a structure formula that, given only the *length* of the prime factorization, gives the number of factors and therefore the *number* of blocks that can be added *in this generation n* in two dimensions. It is based purely on structure and is independent of the value of the prime factors: it gives just as many factors for the prime factorization (2 3 5) as it does for the prime factorization (478 317 509).

We can summarize the process with the following scheme:

```
30=(2 3 5), p=3 => k=3
k=0 => (1)
k=1 => (2 3 5)
k=2 => (6 10 15)
k=3 => (30)
```

```
List of factors: (1 2 3 5 6 10 15 30)
```

Or take n=78578911 as an example with prime factorization (487 317 509):

```
78578911=(317 487 509), p=3 => k=3
k=0 => (1)
k=1 => (317 487 509)
k=2 => (154379 161353 247883)
k=3 => (78578911)
List of factors: (1 317 487 509 154379 161353 247883 78578911)
```

Both examples are hardly comparable in terms of the values of n, the values of the prime factors, the values of the factors, and therefore the positions of the blocks. However, in terms of the structure of n and therefore the number of prime factors, factors, and blocks, they are exactly the same. Now compare this with, for example, n=509 and n=510.

N	prime factors	factors
509	(509)	(1 509)
510	(2 3 5 17)	(1 2 3 5 6 10 15 17 30 34 51 85 102 170 255 510)

In terms of the values of n, they are almost identical, but in terms of structure (prime factors, factors), they are not comparable at all. In terms of perspectivist configurations, they are, in short, completely different numbers. The table below shows the connection between the number of prime factors (without symmetries, so without doubles) and the total number of factors (the length of the prime factorization and the length of the list of factors). Examples can be found in the table above:

Length of prime factorization	Number of factors
1	2
2	4
3	8
4	16
5	32
6	64

The number of factors increases with the number of prime factors according to the doubling series 2 3 8 16 32 64 ... (see the second column). Put differently: according to the formula $f=2^p$. This is a direct consequence of the formula: the example calculations on the previous page show that the faculties for the different values of k in the denominators are neatly diagonal: the first term in the denominator is increased by one for every step, the second decreases by one (take the third example, with 5 prime factors: 0!5! 1!4! 2!3! 3!2! 4!1! 5!0!). This results in an exact, mirrored sequence from the centre (the introduction of symmetries) and an exact doubling when you increase p by one.

Binomial curves and the normal distribution

The structure of the calculations and the example values of Comb above show us that for larger values of p, a recognizable symmetric pattern starts to emerge: the number of factors first increases with increasing values of k, then neatly decreases again. When p increases, we quickly see a nice discrete pattern emerge, which, for increasing values of p, starts to resemble a Gaussian curve (also called a 'normal distribution' or bell curve, see the figures below). Actually, it is not a 'real' Gaussian curve (the 'real' Gaussian curve will be discussed later on). The discrete Gaussian-like pattern that emerges belongs to a binomial distribution that corresponds to a so-called *Bernoulli experiment* (named after mathematician Jacob Bernoulli, who lived in Basel around 300 years ago). An example of a Bernoulli experiment in two dimensions is the repeated tossing of a coin. A dice then naturally realizes six dimensions. A continuous Gaussian curve lends itself excellently to describing a binomial 'Gaussian' curve, as long as p grows large enough and you keep track of certain matters, because they really are two different things! A binomial Gaussian curve is always discrete and exact, the values are rational, and the tails are bounded, or cut off, as a continuous dualist would say. A continuous Gaussian curve is (as the name already implies) continuous, and the tails go on and on (even though we ignore them as the values become very small).[403]

Content-wise (in terms of value), the prime numbers show little regularity. The fact that a beautiful Gaussian-like pattern starts to emerge that is purely based on the *number* of prime factors of n perspectives clearly shows that there is a very strong structural order at play.

The formula f_p above calculates the number of factors, and therefore the number of stacking stones in two dimensions, purely based on the length of a prime factorization, by increasing k and summing the contributions. The values on the left in the figures below represent the number of factors (and therefore the number of blocks to be stacked in two dimensions) as calculated with the formula Comb (p, k) = p! / k!(p-k)! for increasing values of k from 0 to p, for a number n with p prime factors (without symmetries). The numbers of factors are exact integers for every specific value of k. The figures below depict the results of Comb (p, 0) up to Comb (p, p) for p=1 to 5, 15, and 120. In the last graph, with the numbers for p=120, the height of the 'Gaussian' in relation to the width has been scaled down by a factor of two to make sure it fits on the page. A number with a prime factorization that consists of p=120 different prime factors, 2^{120}, is absolutely massive. It is noteworthy and impressive that the factor structure of numbers such as these can be represented graphically without any knowledge or mentioning of the factual values.

[403] According to recursive perspectivism, the discrete Gaussian represents our experience, and the continuous Gaussian represents a pragmatic approximation. According to dualists, measurement values approximate a 'real' continuous Gaussian.

Accumulation (addition) leads to an S-curve, an accumulative Gaussian (see the last graph for the S-curve of p=15 and p=120, scaled slightly smaller with respect to the binomial Gaussian, and turn it sideways to see the S-shape), as long as p is large enough.[404]

```
________from Comb (1 0)
 1      | x
 1      | x
________till Comb (1 1)

top value 1,  sum value 2,  one x is  1,  sum/top   2.0
```

```
________from Comb (2 0)
 1      | x
 2      | xx
 1      | x
________till Comb (2 2)

 top value 2,  sum value 4,  one x is  1,  sum/top   2.0
```

```
________from Comb (3 0)
 1      | x
 3      | xxx
 3      | xxx
 1      | x
________till Comb (3 3)

 top value 3,  sum value 8,  one x is  1,  sum/top   2.6666667
```

```
________from Comb (4 0)
 1      | x
 4      | xxxx
 6      | xxxxxx
 4      | xxxx
 1      | x
________till Comb (4 4)

 top value 6,  sum value 16,  one x is  1,  sum/top   2.6666667
```

```
________from Comb (5 0)
 1      | x
 5      | xxxxx
 10     | xxxxxxxxxx
 10     | xxxxxxxxxx
 5      | xxxxx
 1      | x
________till Comb (5 5)

 top value 10,  sum value 32,  one x is  1,  sum/top   3.2
```

[404] Transition researchers from DRIFT (Dutch Research Institute For Transitions, Erasmus University Rotterdam) are among those who use the S-curve as an ideal type model for societal transitions towards sustainability.

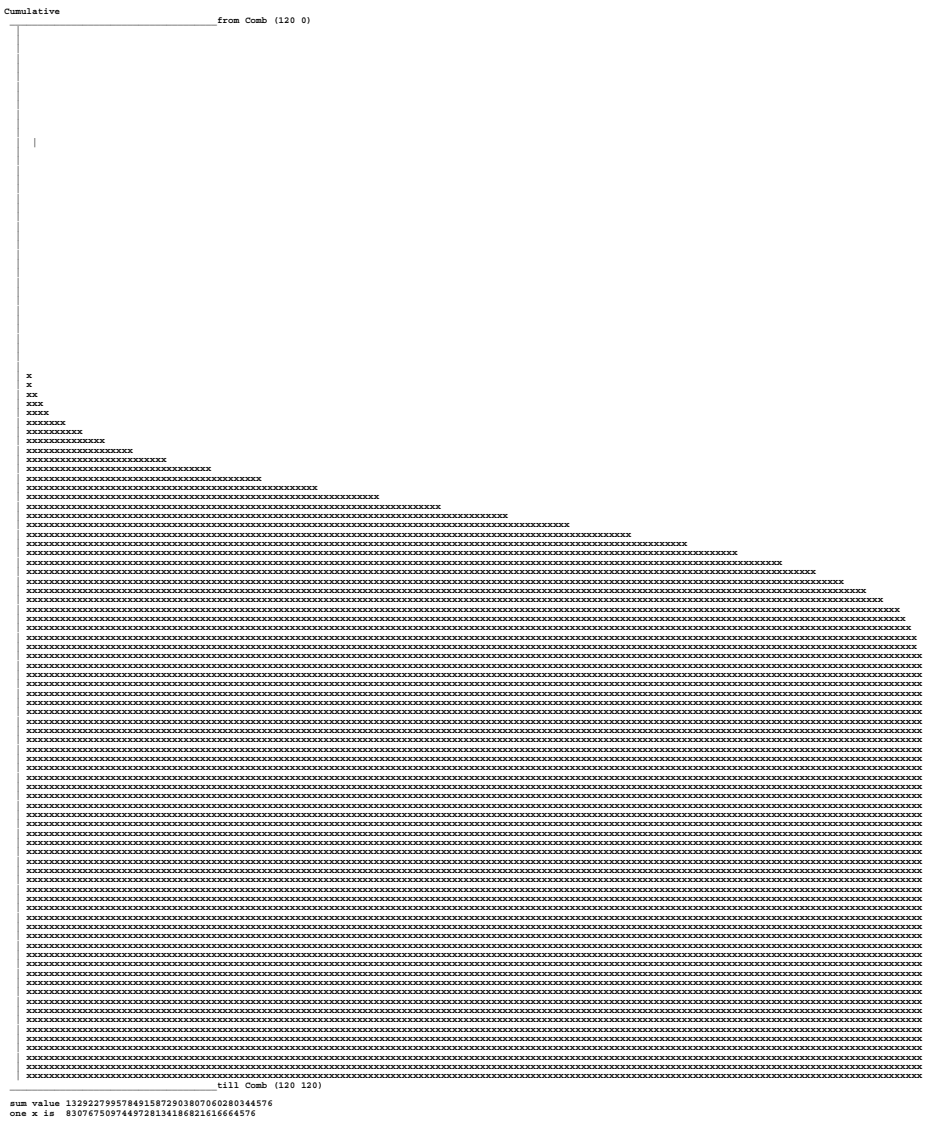
```
           from Comb (15 0)
 1        |
 15       |
 105      x
 455      xxx
 1365     xxxxxxxx
 3003     xxxxxxxxxxxxxxxxx
 5005     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 6435     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 6435     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 5005     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 3003     xxxxxxxxxxxxxxxxx
 1365     xxxxxxxx
 455      xxx
 105      x
 15       |
 1        |
           till Comb (15 15)

 top value 6435
 sum value 215=32768
 one x is  161
 sum/top   5.092152


Cumulative
                                          from Comb (15 0)
   |
   |
   |
   x
   xx
   xxxxxx
   xxxxxxxxxxxx
   xxxxxxxxxxxxxxxxx
   xxxxxxxxxxxxxxxxxxxxxxxxxxxx
   xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
   xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
   xxx
```

from Comb (120 0)	
1	
120	
7140	
280840	
8214570	
190578024	
3652745460	
59487568920	
840261910995	
10456592670160	
1160681786387760	
11606817863877760	
1054285955968882O	
87586833265107120	
669413654240461560	
47305231566325950S4	
3104405821540140484S	
1899165914353968296O	
10867449398803263O2940	
583410441409438331O520	
2946222729117663571812G	
1402963204341744558006O0	
6313334419537850511O2700	
2690029448324823261220200	
1087220235364616068076497S	
4174925703800125701413750S	
1525453622542353621670408S0	
5310838537740045942111793G0	
1763957085749372402201417160	
5596001789273871069052771680	
1697453876079740890460074096	
4928091898296021941456150544O	
1370625559213581102467491870O5	
3655001491236216273246644986S0	
9352503815810318110954650407S0	
2298043794741963878691714100104	
5425936737585192491355436069690	
1231834286370692349388801702308O	
2690585414967564868401856349778O	
5657128308393341518178262068764O	
1145568482449651657431098068924G1	
2235255557551151542913384989058480	
4204409296795469497656527175147O	x
7626602910466200484121143231770960	x
1334655509331585084721199905599180	xx
2254084860204454809751359840567504	xxx
367513835902900240720330408788180O	xxxxx
5786388054641408045383925585175600	xxxxxxx
88001318331004747356880534941212O5	xxxxxxxxxx
1293080595884151389733754799361800	xxxxxxxxxxxxxxxxx
183617444615549497342193181477337S6	xxxxxxxxxxxxxxxxxxxx
2520239435899698983128141706551692O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
3344163866866908266073880341385899O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
4290625333862169362439667666644196440	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
5323553660882471719158839565113262O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
6388264393058966062990607478135914 4	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
7414949741943442751685526537122043S	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
8325557604989128703646906989049312O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9043278088177846695340605867415632O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9651057875767202561206366742333760	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9661490884036332260389313952137265G	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9503105787576720256120636674233376O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
9043278088177846695340605867415632O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
8325557604989128703646906989049312O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
7414949741943442751685526537122043S	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
6388264393058966062990607478135914 4	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
5323553660882471719158839565113262O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
4290625333862169362439667666644196440	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
3344163866866908266073880341385899O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
2520239435899698983128141706551692O	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
1836174446155494973421931814773375G	xxxxxxxxxxxxxxxxxxxxxx
1293080595884151389733754799361800	xxxxxxxxxxxxxxxxx
88001318331004747356880534941212O5	xxxxxxxxxx
5786388054641408045383925585175600	xxxxxxx
367513835902900240720330408788180O	xxxxx
2254084860204454809751359840567504	xxx
1334655509331585084721199905599180	xx
7626602910466200484121143231770960	x
4204409296795469497656527175147O	x
2235255557551151542913384989058480	
1145568482449651657431098068924G1	
5657128308393341518178262068764O	
2690585414967564868401856349778O	
1231834286370692349388801702308O	
5425936737585192491355436069690	
2298043794741963878691714100104	
9352503815810318110954650407S0	
3655001491236216273246644986S0	
1370625559213581102467491870O5	
4928091898296021941456150544O	
1697453876079740890460074096	
5596001789273871069052771680	
1763957085749372402201417160	
5310838537740045942111793G0	
1525453622542353621670408S0	
4174925703800125701413750S	
1087220235364616068076497S	
2690029448324823261220200	
6313334419537850511O2700	
1402963204341744558006O0	
2946222729117663571812G	
583410441409438331O520	
1086744939880326302940	
1899165914353968296O	
3104405821540140484S	
4730523156632595024	
669413654240461560	
87586833265107120	
1054285955968882O	
1160681786387760	
116068178638776	
10456592670160	
840261910995	
59487568920	
3652745460	
190578024	
8214570	
280840	
7140	
120	
1	
till Comb (120 120)	

top value 9661490884036332260389313952137265G
sum value 2120=13292279957849158729038070602803445 76
one x is 805124247223947276916044561645568
sum/top 13.758



According to the formula f_p, the number of factors grows as the prime factorizations become longer (p increases). For 120 unique prime factors (the final two figures, the Gaussian and the S-curve), the total number of factors for all k's is 2^{120}=*1329227995784915872903807060280344575* (see the *sum value*). This is a number with 37 digits: extremely many. The number of people on the planet is represented by only 10 digits, this century it might reach 11 digits. A human life with a span of 100 years contains 3153600000 seconds, a number with only 10 digits. One mole of a substance contains ~$6{\cdot}10^{23}$ particles, as the chemists among you will know, which is 24 digits. An extremely large number, but not even close to 2^{120}. One mole of gas at room temperature has a volume of 22.4 litres, to put Boltzmann's perfume example in perspective. When a room smells like

perfume, you will understand that this integral system contains a truly enormous number of molecules, but that number is still nowhere as large as the number above with 37 digits.

The building process of the inversely proportional wall can become dauntingly large. The blocks are thrown onto the walls in large batches and all in the right position (sort of). That is what it a consciousness does: it works in *parallel* on huge scales and in many more dimensions than two simultaneously.

The field of neurophysiology has a different view of processes of the consciousness than recursive perspectivism. Its point of view is dualist, and that is useful for biophysical and physiological/medical purposes. But neurophysiologists do not shy away from large numbers either. The number of neurons in a human brain, according to the most recent neurophysiological insights known to me, has around 11 digits, just like the expected number of people (would that be a coincidence or a matter of balance?) and *every* neuron has thousands of connections. In any case: the parallel processes are truly massive. A consciousness messes around with enormous numbers of perspectives. (Later on, I will clarify how symmetries simplify these processes).

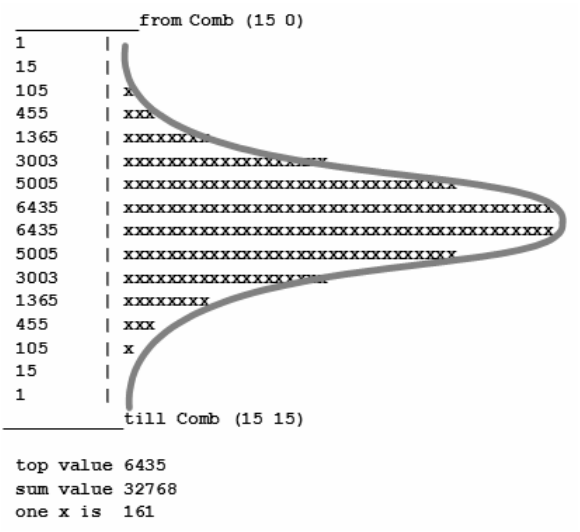
Situated experience. People can sense whether an activity contains many or few partial experiences, partial activities. Recursive perspectivism perceives these experiences as perspectives. We, as experiential humans, find ourselves resituated time and time again, placed inside an experience (an experiential world), and thus the number of perspectives n does not grow larger monotonically. Instead, it is in principle specific to every context of experience, although it may be unknown and unsure, and varying in time and space. On average, the elderly will have experienced a greater number of relevant experiences. Many cultures greatly value that.

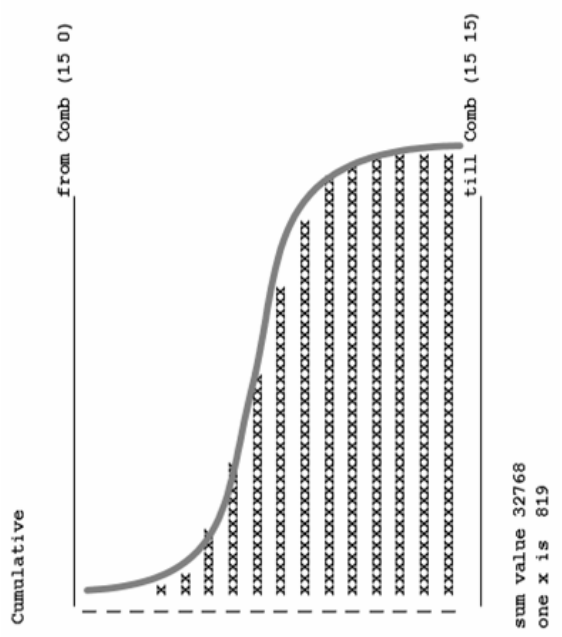
The consequence of a situated experience, and therefore a *set* and *determined* high value of n (as opposed to an ever-increasing n) is that the available prime numbers (and therefore factors) is set as well, and limited in numbers of p. Take the primorial number 210=(2 3 5 7).[405] We know the maximum p exactly: it is 4, and only one number with this p occurs: 210=(2 3 5 7). Up until 210, you will <u>not</u> encounter a square-free number with p>4, and up until 210, the upper limit is therefore p=3.

Here we see the deeper nature of f_p's bell shape and the S-shape of societal transition curves: they take place within an experiential world that is determined by a set number of perspectives, and it is erected by two dimensions with a discrete inversely proportional relationship (think of the stacking blocks). The growth process starts hesitantly, but then it speeds up until the acceleration reaches a maximum, after which it slows down like a saturation effect and then stops like a depletion process. Then you will see the transition curve of societal improvement processes, or the innovation diffusion curve (Gabriel Tarde,

[405] The prime factorization of a primorial number consists of a sequence of successive prime factors starting with two (inclusive). Examples are 210=(2 3 5 7) and 510510=(2 3 5 7 11 13 17).

Everett Rogers), or the life cycle model of organizations of Ichak Adizez, or Kondratieff curves, or the weight distribution of oranges, or any other variant.





The number of factors of a square-free number n with p different prime factors first becomes larger with increasing values of k, in accordance with the corresponding row of

Pascal's triangle. There are enough candidate prime numbers to multiply with. But at a certain moment, a shortage occurs and eventually, the prime numbers run out after k=p. The process is fully symmetric; the downward curve is an exact mirror image of the upward curve.

For p=4, we kind of get a failed (as in: non-Gaussian) bell curve, but for p=15, the resemblance starts to show, and for p=120 (see the figure a few pages back) a beautiful bell curve arises with Gaussian allure, strictly based on *structure*.

8.4.4 The relationship between structure and content

A 'real' Gaussian?

The numbers to the left of the binomial 'Gaussians' (see the previous figures above the S-curve), appear to form an increasingly distinct (partial circular) pattern as p increases (practical scale invariance; the emergence of the Gaussian is another example of this phenomenon). This suggests that this pattern is based on an approximation formula containing π (pi) and a logarithm. Gauss (a German mathematician par excellence, 1777-1855) found such a formula: the (continuous) *Gaussian distribution*, also known as the *Gaussian curve* or the *normal distribution*. The Gaussian distribution can be represented by the following formula:

$$g(x) = 1 / (\sigma\sqrt{2\pi}) \exp (-1/2 [(x-\mu) / \sigma]^2)$$

where exp is the exponential function e (the inverse of the natural logarithm ln); μ is the expectation, which indicates the average value; and σ is the standard deviation, which quantifies the width of the curve. These two parameters (μ and σ) determine the 'real' Gaussian distribution.

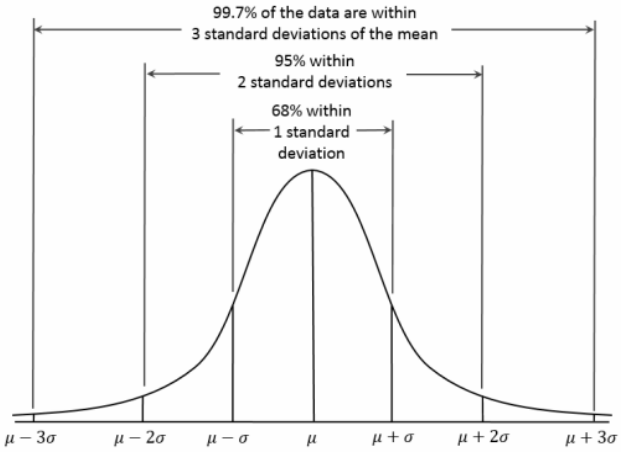
The Gaussian distribution is a well-known concept in probability theory. Take the diameters of oranges in a large stack of boxes: you assume that these are 'normally distributed', or Gaussian distributed. To be sure, you take a random sample of, say, n=100 oranges from various boxes, you measure their diameters (resulting in 100 diameters) and you determine the average. That will be an estimator of the 'real' average. This way, you will not have to measure all the oranges. If you divide the standard deviation of the Gaussian curve with the square root of the sample size (the number of measured oranges), you will find the standard deviation of the average: $S_{average} = S_{Gauss}/\sqrt{n}$. The formula for the standard deviation is:

$$\sigma = S_x = \sqrt{(\Sigma((x_i - x_{avg})^2 / n_x))}$$

where x_{avg} is the sample average (the top of the Gaussian curve), n_x is the sample size, and x_i is the i^{th} value of the sample. The more oranges you measure, the more certain your value is, or so says a dualist. I have my doubts, as I think that those extra measurements introduce their own uncertainties along the other two axes of the p s u system, (repeated measurements only influence s, the similarity axis). At some point, however, you realize

enough is enough and improvements are barely noticeable, which is something the dualist and I can agree on.

A Gaussian curve will therefore show how a value, in this case the diameter of oranges, is distributed among the population of oranges. The far left side shows the smallest diameters, the far right side the largest, but those are exceptions and (as the name indicates) these do not occur often. The area below the Gaussian curve for a certain diameter interval represents the number of oranges compared to the total area under the Gaussian curve, which represents the diameters of the entire orange population. The following key numbers apply to a (continuous) Gaussian curve (see the figure below, from the excellent Wikipedia):



68.26%	within 1 standard deviation from the mean
95.44%	within 2 standard deviations from the mean
99.73%	within 3 standard deviations from the mean
99.9937%	within 4 standard deviations from the mean
99.999943%	within 5 standard deviations from the mean

When you perform probability calculations like the ones described above, you actually *presume* the existence of a continuous Gaussian curve for the entire population (in this case, the diameters of all oranges) from which you take your sample. This is yet another aspect of the *a priori* perspectivist structure that I discussed at the beginning of this book, which I call pattern laws. The Gaussian curve is a pattern law. But according to recursive perspectivism, we do not *recognize* the Gaussian pattern of the diameters of oranges from the outset in our *a priori*, pre-existing material surroundings. Instead, we first need to *acknowledge* oranges as a meaningful category, because they form repeating phenomena. Therefore, they more or less satisfy the *a priori* perspectivist structural aspect of the binomial Gaussian. Indeed, by now we are convinced of the repetitive value realization. This is where the sceptic and the pragmatist meet (the philosopher Hume could have appreciated this point of view in his later years).

For oranges and their diameters, the Gaussian curve has a clear meaning for dualists. The top represents the average. And for every diameter interval, it is very convenient to determine their relative occurrence. (The continuous objective illusion at work!)

A closer look at the binomial pattern

What do the binomial Gaussian-like curves that arise directly from the calculation with the perspectivist structure formula f_p actually depict? Every number n is provided with its own prime factorization: its own unique pattern of prime numbers (this is stated by the fundamental theorem of arithmetic). The function f_p calculates the *number* of factors, and therefore the *number* of blocks to be stacked in a generation in two dimensions (an inversely proportional wall, without any squares), from the *number* of different prime factors. The binomial Gaussian pattern thus corresponds to a *number* of *different* prime factors.

The specific *value* (the height, the content) of these prime factors does not matter at all for this formula, it purely concerns structure. (The content, the value, will be discussed later). A number shares its binomial pattern with *all* other numbers with a (non-symmetric or equally symmetric) prime factorization with the *exact* same length. Prime numbers, for example, all share the same, very simple pattern of two possible configurations (1 n) and (n 1). And numbers that consist of a multiplication of two prime numbers have four configurations. Similarly, there are numbers that consist of the product of five, or fifteen, or one hundred and twenty, or two thousand prime numbers.

As p increases, the resemblance with the Gaussian becomes stronger. At 120, the resemblance is no less than impressive (see the figures and explanation from earlier). But the continuous Gaussian curve is always an approximation – for a set number of different prime numbers – of a discrete, bounded, and unique binomial pattern.

The graph for p=15 (see below) thus shows, for *every* k (increasing from 0 to the number of prime factors p=15 in the prime factorization, k increases as we go down the vertical axis) the number of *different* sets of k prime factors (the order is not important, their value is not important, I repeat: purely structure), that can be drawn from this prime factorization with p different prime factors (the y value). There are 16 values of k: from 0 to 15. The upper curve in the figure depicts the *number* of sets in the left column, and the lower curve shows in the left column the corresponding *percentage share of the total number of factors*. This can be calculated exactly, because all steps involve discrete integers.

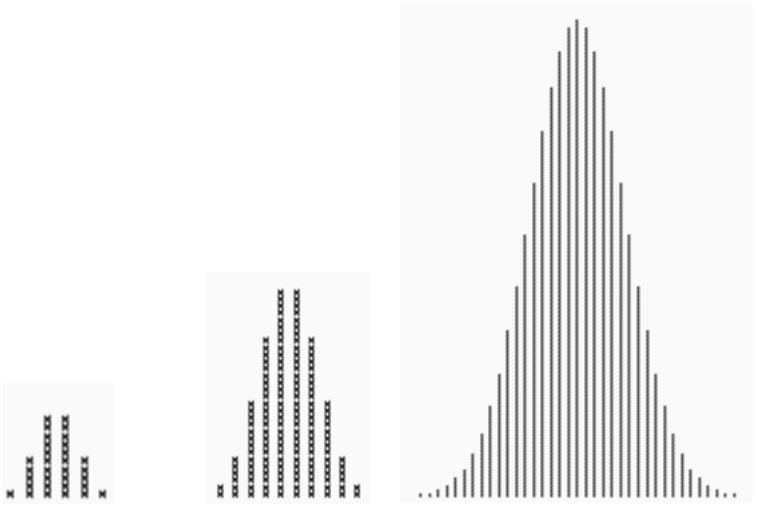
```
__________from Comb (15 0)

        1       |
        15      |
        105     | x
        455     | xxx
        1365    | xxxxxxxx
        3003    | xxxxxxxxxxxxxxxxxx
        5005    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
        6435    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
        6435    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
        5005    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
        3003    | xxxxxxxxxxxxxxxxxx
        1365    | xxxxxxxx
        455     | xxx
        105     | x
        15      |
        1       |
__________till Comb (15 15)
top value 6435
sum value 32767
one x is  161
sum/top   5.0919967


__________from Comb (15 0)
 0.00     |
 0.04     |
 0.32     | x
 1.38     | xxx
 4.16     | xxxxxxxx
 9.16     | xxxxxxxxxxxxxxxxxx
=15.2=====xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
=19.6=====xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
=19.6=====xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
=15.2=====xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 9.16     | xxxxxxxxxxxxxxxxxx
 4.16     | xxxxxxxx
 1.38     | xxx
 0.32     | x
 0.04     |
 0.00     |
__________till Comb (15 15)
```

The binomial curve for p=15. On the top, the number of combinations per k, and on the bottom, the combinations expressed as percentages of the total surface area. On the bottom, ~69.600000% of the area is shaded. (69.826350% according to the data of the top graph; the exact numbers are ratios.)

As the length of the prime factorization p grows, the pattern of the 'real' Gaussian curve becomes more distinct:



As the number of prime factors increases, the binomial pattern becomes increasingly Gaussian-like and the top (the peak) becomes increasingly sharp.

If we multiply the prime factors in a single set of k prime factors by each other, the product will represent one of the coordinates of a block to be stacked (in two dimensions), for example the x coordinate. The *other* coordinate of this block, the y coordinate, must then be the product of the *remaining* prime factors.

Each of the 32767 factors for p=15 thus represents one unique block to be stacked in two dimensions. A binomial 'Gaussian curve' shows the distribution across the coordinates of the total number of stacking blocks per generation, where the x coordinate is the product of 1, 2, …, p prime factors, respectively, and the y coordinate is therefore the product of the remaining p, p-1, …, 1 prime factors. As we saw previously, these coordinates themselves follow a discrete inverse proportionality ($x \cdot y = c$, where x and y are integers), and they are diagonally symmetric – if (x, y) is a stacking block, so is (y, x). There is a very special relationship between content (discrete inversely proportional) and structure (number of prime numbers in the two-dimensional factor).

Boltzmann, perfume, ball pits, and reality

All those blocks to be stacked are unique in terms of position, and therefore in terms of content. But structure-wise, many blocks are the same and indistinguishable from one another. This strongly reminds me of Boltzmann's statistical concept of entropy. He stated that the relative likelihood for a specific macro configuration to appear is determined by the number of different (i.e. distinguishable) micro configurations that can be realized by this specific macro configuration.

The example of perfume that diffuses once it is out of the bottle speaks for itself: there are many more configurations (specific mixtures of gas molecules) of perfume scent molecules

outside the bottle and air molecules *inside* the bottle than the other way around. This is simply because there is a much larger volume around the bottle than there is inside of it (there is no pressure difference), so the perfume is drawn *out* of the bottle due to a random thermodynamic process of the gas molecules, as opposed to being drawn *into* it (or at least as long as the perfume has a higher concentration inside the bottle; once the molecules are maximally dispersed, there is a balance and this will no longer apply). We therefore pick up the scent of perfume quite quickly if the bottle is left open.[406]

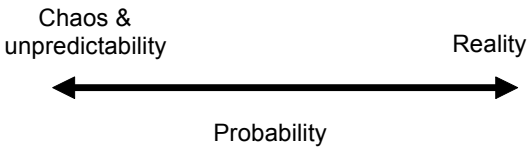
Perhaps the example of a giant children's ball pit is clearer. Imagine a ball pit that is filled with 500,000 green balls and children playing. You carefully place 100 red balls in one central location between the many green balls; this is the starting situation. Then you let enough children play in the ball pit for long enough. The red balls will disperse and eventually they will be randomly distributed among the green balls (the first play patterns will be visible for some time, but eventually they will dissipate and the distribution becomes random).

Now that the red balls have been dispersed completely, try to imagine the reverse situation: what is the likelihood for the playing children to 'play the red balls' back to the exact starting situation without any conscious effort to do so? The odds of that happening are practically zero. To clarify: it *is* possible; it is not *im*possible by definition. But the odds are small, incredibly small, unfathomably small. It is extremely likely that nobody will ever experience that outcome, and that is for the same reason that we will never see perfume spontaneously return to its bottle. In theory, perfume *might* diffuse back into the bottle, the likelihood of which can even be calculated by bright minds (making a few assumptions), but those odds too are incredibly, terribly, and bafflingly small, far smaller even than the example of the ball pit. One mole of gas particles, 22.4 litres, contains around $6{\cdot}10^{23}$ molecules! We are therefore (practically) certain that the perfume will diffuse out of the bottle. Almost entirely certain. But never *really* entirely certain. Nonetheless, I would dare to bet my head on it, metaphorically speaking.

The fact that perfume diffuses and that the balls in the pit disperse when children play in it is therefore what we call 'reality' without any hesitation. Everyone knows that, right? But if you think about it, you will realize that this is due to the truly (sic!) incredibly large number of possible configurations that support diffusion, relative to the number of configurations that support concentration instead. But those last configurations do exist. That is why we sometimes experience the unexpected. Thus, the more unexpected, the less often – nicely inversely proportional (again there are two perspectivist dimensions!). This is more than a pleonasm; this is how our perspectivist consciousness works, on average but at all times. This teaches us the discrete inverse proportionality.

[406] Did you think that perfume could never diffuse into a bottle? Of course it can. Try placing a bottle containing 'clean' air in a room that is filled with the scent of a strong perfume.

From a perspectivist point of view, what we call 'reality' is therefore nothing more than extreme probability.[407] The probability is so extreme that we base our decisions on it every day – decisions that affect our lives or the lives of those we love. The number of configurations at the foundation of this probability is therefore very, very large. Chaos (randomness), probability calculations, and objective reality – it all involves relative positions on a spectrum of probability.



Reality as a position on a perspectivist spectrum. Probability calculations find themselves in between chaos and reality. Both complete chaos and imperturbable reality are unobtainable limits. These two perspectivist dimensions are spectral too.

You might also refer to 'unreality' as extreme improbability; that is another way of looking at the spectrum. As always in recursive perspectivism, the ends of spectra are limit cases: they are never absolute (but sometimes they get very close), and you can never reach them (but you can get close). That is the intrinsic spectral nature of recursive perspectivism.

8.4.5 Convergence of structure and content

When we look back at the Gaussian-like curves for p=5, 15 and 120 from a few pages ago, we first notice that the Gaussian-like pattern becomes more distinct as p increases. But for the discussion above, it is also essential that the *visible* part of the Gaussian pattern concentrates itself *in the centre of the increasingly wide path*. Therefore, this also applies to the *experiential* part of the Gaussian curve! Relatively, the pattern becomes smaller and higher as p increases. If we formulate the inverse, the tails on the left and right (or top and bottom, if the Gaussian is flipped on its side), become relatively lower and wider.

The left columns of the earlier bottom figure for p = 15, and the upcoming figure for p=120 (on the next page) indicate the *percentage* shares of the different k's for the total number of factors. The shaded area is around 69% (one sigma to the left and right if it were a real continuous Gaussian curve). We can see that the shaded area of 69.600000% for p=15 (the earlier figure) is exactly 4/16, or 25% of the total width of the 'Gaussian'. For p=120, the percentage share of the shaded area (now 68.469666%) is exactly 11/120, and around 9% taller (note: 30 values of k are cut from the figure twice at the //------// marks to fit the graph on the page. Both tails are therefore around 30 rows (k's) longer. See the earlier curve for p=120 for the correct image). The function of the Gaussian as a predictor becomes more exact as p increases.

[407] Observing something empirically is also extreme probability.

The percentage for k=0 and k=120 is $7.523164 \cdot 10^{-35}$, and 10^{-35} is 0.00……001 with a total of 35 zeros between the decimal and the 1 at the end. That is very, very small. People experience relatively, and a value of $7.523164 \cdot 10^{-35}$ on a scale of 100 is practically non-existent. It never occurs, and it if would, you would not experience it. The fact that the Gaussian curve falls off the screen for low values therefore corresponds precisely to our experience, or rather our lack of experience: from a perspectivist point of view, that part falls away.

```
_____________________________________from Comb (120 0)

7.523164e-35                        |
9.0277966e-33                       |
5.371539e-31                        |
2.1128053e-29                       |
6.179956e-28                        |
1.4337498e-26                       |
2.7480204e-25                       |
4.475347e-24                        |
6.321428e-23                        |
7.8666663e-22                       |
     //-------------------------------------------------------------------// 30 k's missen
0.008618299                         |
0.016816193                         |
0.03163046                          |
0.057376184                         |x
0.10040832                          |x
0.1695785                           |xx
0.27648667                          |xxx
0.43531945                          |xxxxx
0.66204834                          |xxxxxxx
0.97280574                          |xxxxxxxxxxx
1.3813841                           |xxxxxxxxxxxxxx
1.8960174                           |xxxxxxxxxxxxxxxxxxxxx
2.5158691                           |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
3.227908                            |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
4.004997   Striped part = 11/120    |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  4.805996                          |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  5.578388                          |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  6.2634535                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  6.8034062                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  7.1493425                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  7.268498                          |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  7.1493425                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  6.8034062                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  6.2634535                         |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  5.578388                          |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  4.805996                          |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
4.004997   Striped part = 11/120    |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
3.227908                            |xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
2.5158691                           |xxxxxxxxxxxxxxxxxxxxxxxxxx
1.8960174                           |xxxxxxxxxxxxxxxxxxxxx
1.3813841                           |xxxxxxxxxxxxxx
0.97280574                          |xxxxxxxxxxx
0.66204834                          |xxxxxxx
0.43531945                          |xxxxx
0.27648667                          |xxx
0.1695785                           |xx
0.10040832                          |x
0.057376184                         |x
0.03163046                          |
0.016816193                         |
0.008618299                         |
     //-------------------------------------------------------------------// 30 k's missen
0.731999e-21                        |
7.8666663e-22                       |
6.321428e-23                        |
4.475347e-24                        |
2.7480204e-25                       |
1.4337498e-26                       |
6.179956e-28                        |
2.1128053e-29                       |
5.371539e-31                        |
9.0277966e-33                       |
7.523164e-35                        |
_____________________________________till Comb (120 120)
```

The figures above indicate that the large majority of the blocks that are stacked have an x and y coordinate that are the product of around the same number of prime factors (~p/2). As the number of prime factors p increases, this phenomenon becomes more distinct.

A noteworthy consequence of this is that with experience, the content, or the numerical value of these coordinates approach each other. Structure and content converge towards each other. They are correlated in a special manner, which is the first aspect that will be discussed and elaborated below.

8.4.6 Aspects of the perspectivist analysis

Different aspects of the perspectivist analysis will be discussed and elaborated below. There are many and they are diverse: the perspectivist analysis involves the beating numerical heart of recursive perspectivism and with it the perspectivist experiential process. That is why this section treats so many aspects.

Each of the following aspects contains essential input and therefore contributes to the further understanding of recursive perspectivism. The perspectivist analysis juggles with perspectivist configurations. Juggling and all, I stumbled into one of the deepest mathematical mysteries and the heart of number theory: the Riemann hypothesis. I also encountered intriguing wave patterns that appear to share a resemblance with wave functions from quantum mechanics. I certainly expected my work to cross paths with these areas of expertise, but I was still surprised when they showed up. Mathematicians and physicists can say much smarter things on the subject than I can as a reflective pragmatist.

The aspects treated below will discuss topics ranging from binomial and Gaussian curves, the central limit theorem and uncertainty relationships, Pascal's triangle and symmetries, to the Riemann hypothesis and intriguing wave characteristics that share a resemblance with wave functions and string theory. I will often operate (at times far) outside my domains of competence, but that can hardly be avoided here.

The following aspects will be discussed successively:

1: The relationship between primes and factors: structure and content
2: The central limit theorem connects structure and content
3: Uncertainty relationships in perspective
4: The perspectivist stairs: structure and content
5: Powers
6: Examples of perspectivist analyses
7: The relationship between structure and content: Pascal's triangle
8: The relationship between structure, content, and improvement potential
9: Symmetries decrease the number of factors
10: The symmetry correction for the number of factors
11: Of position and place
12: Number theory, prime numbers, and the Riemann hypothesis
13: Wave patterns and the Riemann hypothesis
14: Conclusion of the perspectivist analysis

1: The relationship between primes and factors: structure and content

The binomial bell pattern (the binomial 'Gaussian curve') is about structure, it illustrates which configurations will appear (how many blocks can be stacked in two dimensions) in terms of *numbers* of prime factors that compose the x and y coordinates in two dimensions.

It does not say anything regarding the *numerical* value of those prime factors. It involves structure, not content.

In contrast to Boltzmann's perfume example, or the example of the ball pit, structure can, in fact, tell us something about content, about the positions of the blocks to be stacked. We are certain that we can expect blocks at specific spots, or at least in specific regions of the perspectivist space, because the number of available configurations is much larger there. The blocks *can* be located in highly unlikely configurations, but the likelihood of that happening is – the term unlikely gives it away – much smaller, and often – practically – impossibly small. It involves analogue but inverse reasoning as to why, when you stir soluble sugar through your coffee, you do not expect to first taste sweetness, and then bitterness. The notions of localization, delocalization, and probability orbitals make an appearance here. I will explain how this works below. Two different angles play a role: an exact *arithmetic* angle and a *stochastic* angle based on probability theory.

Angle 1: arithmetic. We can determine the total *number* of possible stacking blocks from a list of prime factors with length p using the formula f_p. That was discussed earlier: we let k increase from k=0 to k=p. The number of unique stacking blocks then starts at 1, increases slowly at first, then speeds up, and after the inflection point, it slows down again. We find *most* of the stacking blocks at the peak, when k ~1/2 p.[408] The number of stacking blocks goes back down to 1 for k=p via an exact mirror image of the route.

A binomial curve thus functions as a complete structural representation of the *number* of possible configurations, and therefore factors, and therefore the number of stacking blocks in two dimensions, for every number of n perspectives with a prime factorization of length p.

Transition: from arithmetic to stochastics. There are – especially for larger values of p – many values of k for which the binomial curve is incredibly low (the tails of the binomial Gaussian, neatly bounded). These areas are extremely unlikely. Only a specific area of the curve has a substantial number of factors: it is depicted at the top of the 'Gaussian'. The likelihood that a configuration, a stacking block will be located *there* is by far the largest, based purely on stochastic structural considerations.

As p increases, this binomial curve can be described by a Gaussian curve increasingly well (but it never *becomes* a real Gaussian curve).

When we randomly generate stacking blocks and only take into account the probability distribution in terms of structure (a variant of Ockham's razor), it is most likely for a

[408] I stated k ~1/2 p, as in k 'is around' 1/2 p, because in half of the cases – the even p's and therefore the uneven values of k, because k=p+1, like for p=120 – there is no integer value for p/2. Half of the values of k is only an integer if p is an uneven number. We can see this in the binomial Gaussian-like patterns: as soon as there is one highest peak, k is uneven and p is even (take 120). If p is uneven, e.g. 5 or 15, the peak of the Gaussian consists of two equally large stacks and k is even (see the Gaussian-like figures above).

generated stacking block to be located at high values of the Gaussian. For p=120, the likelihood for the number of prime factors that compose the x coordinate as a product to be *between* 55 and 65 (inclusive), is around 69%, and the same applies to the y coordinate (together they are 120). It is for precisely this reason that we can transition from structure (the expected *number* of prime factors for the x and y coordinates) to content (the expected *numerical value* of the x and y coordinates), and therefore from arithmetic to stochastics:

Angle 2: stochastics. The binomial Gaussian predicts (without further assumptions) the probability of the different types of stacking blocks (in terms of number of prime factors) according to the laws of probability theory. If we want to generate one random possible stacking block that belongs to a value of n with a certain number of prime factors p, like p=120, we know the type of block with its probability. With 'type of block', I refer to the number of prime factors in the product that make up the x coordinate, and therefore the y coordinate (namely p minus this number) of this block.

Compare this to a deck of cards from which you draw cards. There are 121 types of cards, they are normally distributed in accordance with the Gaussian-like curve for p=120, and k increases from 0 to 120. Every type of card is a horizontal layer in this graph and belongs to one specific k. For values of k around p/2, there are (very) many cards, and for very small and very large values of, there are only a few (improbably few).

Although, a *deck* of cards might be an *understatement*. For p=120, this deck with all 121 types of cards is *132922799578491587290380706028034457*5 cards thick (the earlier mentioned total sum for p=120, with a whopping 37 digits. Keeping in mind that a card is 0.25 mm thick, divide this number by 4000, and you get the thickness of this deck in meters, which is a number with 32 digits. My calculator, an HP 15C, is outmatched. The distance to the sun is 149597870700 meters (these are 12 digits). A deck of cards with a number of cards with 37 digits is incomprehensibly thick, of interstellar proportions! The ease with which a consciousness deals with large numbers of perspectives is therefore nothing short of impressive and admirable.

The face of each of the 121 types of cards depicts the value of k: the number of prime factors that determines the x coordinate through multiplication (the value of k goes from 0 to 120, hence the 121). The number of prime factors that determine the y coordinate through multiplication is then 120 minus k. If you know one, you know the other. There is only one card where the x coordinate consists of zero prime factors (this gives the trivial value for x of 1), and the y coordinate consists of the product of all other p prime factors (k=0, the top layer). There is also only one card where the inverse is true; where the x coordinate consists of the product of all other prime factors, and the y coordinate consist of the product of 0 prime factors (k=120, the bottom layer, this too gives a trivial 1). By far the most cards are those types where k and 120 minus k are roughly the same: ~p/2, around half (1/2, an intriguing number, I will get back to that later), this refers to the middle layers around k=60. The *exact* number of cards in the middle can be derived simply by looking at the table (the left half of the binomial curve p=120), take for instance the values for k=59 to 61:

k=59 95031057875767202561206366742333760 7.1493 %

k=60 966149088403633226038931395213726 56 7.2684 %

k=61 95031057875767202561206366742333760 7.1493 %

If we divide this number by the total number of cards, 132922799578491587290380706028034457 5, and multiply it by 100, we get the percentage share of this type of cards relative to the total number of cards. I included the percentages above. This is also how we got a percentage share of around 69 for the two times sigma interval (which actually belongs to a continuous, real Gaussian).

This is how the binomial Gaussian determines the *number of prime factors* that places blocks in two dimensions. I can now draw a card at *random* (after shuffling the cards, which would be troublesome for me, but it is about the idea, and that is where the cosmos excels), and read from it the *amount* of prime factors I may use to calculate the x coordinate (and therefore the y coordinate).

The binomial Gaussian purely involves structure. It does not make *any explicit statements* regarding the specific *numerical value* of the prime factors I draw, and therefore the specific position (the coordinates) of the block. That is purely determined by content, numerical values. That is why the following crucial question presents itself:

> How is the number of prime factors that I use to determine x and y (structure, configuration) related to the specific numerical value of the coordinates x and y in a two-dimensional space (content, numerical value, position) where a block, in all likelihood, will be stacked.

Or, in short:

> What is the exact relationship between (configurational) structure and (positional) content?

Say that I draw a card from the enormous, previously mentioned deck of cards. A card with the number 57 printed on it. This is not a surprise: 6.2634535% of the cards, a good 6%, has this print, as I can see from the Gaussian of p=120 above at k=57. I can therefore use 57 prime factors to calculate the x coordinate. Consequently, the corresponding y coordinate is based on 120-57=63 prime factors.

So I randomly draw 57 prime factors from a list of 120 without returning them, I multiply them, and I have an x coordinate. Then I multiply the *remaining* prime factors (63), which gives me the corresponding y coordinate. This specific point (x y) neatly follows the discrete inversely proportional pattern n=x·y, because x times y has to be n, which is an inherent property of the procedure that was followed. Now I repeatedly draw a card, say 100 times. I now have 100 pairs of an x and a y coordinate.

My prediction is that these blocks will be positioned closely together. The content values will adhere to the structural Gaussian. They will be neatly aligned on the discrete inversely proportional line that corresponds to n (the product of x and y is n, after all), and they will concentrate neatly near the diagonal. Larger deviations occur less frequently. The structural Gaussian causes a content-based Gaussian on the discrete points of the isoline x·y=n, and no two points share the same position.

I can also adjust the game. For example, I might return every card immediately after I draw it, and draw random prime factors for both the x coordinate and the y coordinate. In this alternative case, I predict that the blocks will no longer be aligned on the discrete inversely proportional line of n near the diagonal, but instead concentrated around the place where the diagonal meets the isoline.[409] Fewer blocks will appear as you move further.

It is as if I have entered the ball pit filled with green balls, and 'played' the randomly distributed red balls back to each other. Or as if I have returned the perfume molecules back into the bottle. (The genie is back in the bottle!) But that is not possible, right? What is going on here?

What I predict is happening above is that the structure influences the content. The same applies to the opposite: the content influences the structure.

Up until now, I had not yet stated that content influences structure in such an explicit and succinct manner. **But that is precisely the main thesis of this book.** Even the title refers to this implicitly. When I say that human developments follow a path of sorts, *the path of humanity*, and this path follows the diagonal of the perspectivist space, I am essentially saying that **content influences structure**. All those content improvement actions of all those people together result in *the path of humanity*, a pure structural path, even though we are not consciously striving for it. We humans are mainly preoccupied with content, and it would do us good to be more explicitly aware of the structural consequences and potentials. Because:

> *Structure and content are deeply and mutually connected, and this happens on very large scales as well and generally without the awareness of a perspectivist consciousness.*

f_p is a formula that describes the possible configurations in their entirety, solely in terms of structure: the *number* of prime factors that is used to calculate the x and y coordinates of a stacking block. As it happens, when I increase k, and therefore use more *random* prime numbers of the available p to calculate one of the two coordinates (that is the product), I am better able to determine this coordinate beforehand. The sample, without returning, then becomes larger.

[409] For the chemists among us: it resembles an s-orbital from quantum chemistry.

If I draw *all* prime factors – you cannot really call it drawing anymore, I just take all of them – I know the exact x coordinate, which is n. The y coordinate is then 1, but I can add ones to the product indefinitely, so the y dimension is practically out of the picture and utterly uncertain. The same applies to the inverse pair of coordinates (1 n): the x axis is now completely uncertain and out of the picture.

2: The central limit theorem connects structure and content

The fact that I can determine a coordinate increasingly well as the sample becomes larger is also supported by the central limit theorem. The central limit theorem, also referred to as Lindeberg's theorem (named after the Finnish mathematician Jarl Waldemar Lindeberg, 1876-1932) justifies the use of the normal distribution for sums and averages of samples of sufficiently large numbers of all sorts of populations (distributions) that are sufficiently large. Those populations *themselves* do not have to be normally distributed, but stochastic or exponential distributions will also suffice, or distributions where the value is 0 at times. The central limit theorem only requires the population and the samples to be sufficiently large. A discrete inversely proportional distribution, e.g. the prime factorization of n with p=120, therefore also suffices, *and that is exactly what is happening here*.

The fact that the distribution of the population, or the prime factorization in this case, is not Gaussian but discrete inversely proportional, does not matter that much, or so says the central limit theorem. The spread of the *sums* (not the *products*, the limit theorem involves sums and averages) retrieved from the draws of the prime factorization will also adopt a Gaussian form, as long as the length of the prime factorization p and the number of draws k are large enough.

So when we repeatedly draw a determined amount of primes k from the prime factorization, and we *sum* them all, we do not see a random collection emerge, but a Gaussian pattern. The peak of this Gaussian becomes higher and the sigma of this Gaussian becomes smaller as we let the number of draws k increase. If the number of draws k is equal to p, we are left with one stack that is exactly as high as the sum of the p prime factors, right in the centre. We use all the prime numbers in the factorization, there is no spread, no uncertainty.

The *product* (the multiplication) of a series of numbers is much larger than the *sum* of these numbers if we are dealing with prime factors (because these are all > 1). But if we have a determined number of different integers for which the sum is larger than the sum of another, but an equal number of different integers, the product must be larger as well. And if the *sums* of the randomly drawn prime factors from the prime factorization converge for increasing sample sizes, the *products* of randomly drawn prime factors will converge as well when the number of draws from the prime factorization increases. In a moment, we will see that this happens in a specific manner.

The binomial structure formula f_p has a distinct shape. And this is exactly why structure determines content: the x and y coordinates are much more likely to consist of the products

of ~p/2 prime factors, quite a sizable sample from the prime factorization, as opposed to a very low number of prime factors, near but larger than 1, or very large number, near but below p. That is why the coordinates are drawn to the diagonal in terms of content as well. The degree to which this happens is determined by *both* the value of the prime factors *and* the number of prime factors (along the curve of the binomial Gaussian-like structure formula f_p).

3: Uncertainty relationships in perspective

'It would be most satisfactory of all if physis (matter, HD) and psyche (mind, HD) could be seen as complementary aspects of the same reality. We do not yet know, however, whether or not we are here confronted – as surmised by Bohr and other scientists – with a true complementary relation, involving mutual exclusion, in the sense that an exact observation of the physiological process would result in such an interference with the psychical processes that the latter would become downright inaccessible to observation.'

Wolfgang Pauli, Writings on Physics and Philosophy,
21: The influence of archetypal ideas on the scientific theories of Kepler, p.260.

The relationship between structure and content implies an intriguing *uncertainty relationship*. If the product for the determination of the x coordinate is based on *many* prime factors (k is large), the product for the determination of the y coordinate is subsequently based on *few* prime factors (p minus k is small), and vice versa. The remarkable consequence of this is that you can estimate the position of your stacking block in two dimensions, the x and the y coordinate, quite well, based purely on structure, if the number of prime factors used for the x coordinate is similar to the number of prime factors used for the y coordinate. Quite well is not exact, it is a Gaussian after all. But if p becomes extremely large, the estimate becomes very good and the likelihood of large deviations is small.

You might choose to determine one of the two coordinates in a more exact manner by enlarging the number of prime factors. The certainty of the other coordinate will then inevitably degrade, as there are fewer prime factors available for that one. The process for that coordinate is the exact inverse. The increased accuracy of the determination of one coordinate inevitably diminishes the accuracy of the determination of the other.

Natural scientists among us may be reminded of Heisenberg's uncertainty principle from quantum mechanics. They are named after the German physicist Werner Heisenberg (1901-1976), one of the developers of quantum mechanics who discovered the first uncertainty relationship in atom physics. Uncertainty relationships exist between *incommensurable* pairs of operators: if you determine one correctly, the value of the other becomes uncertain, and vice versa. It is thus impossible for the values of both operators to be known *exactly at the same time*.

In this case, I use the x and the y coordinate of a block on a discrete inversely proportional line of n as an incommensurable pair. If I use *all* prime factors to calculate the x coordinate (the y coordinate is then 1), I am *absolutely certain* of its location. However, consequently, I have fully marginalized the contribution of a possible y coordinate, which is then completely uncertain; even the y coordinate is unknown. The same principle applies to the inverse situation.

When I took a second look at the illustration of Zipf's law that was shown earlier (the figure is depicted below again), I saw the uncertainty relationship, as described above. A few notes:

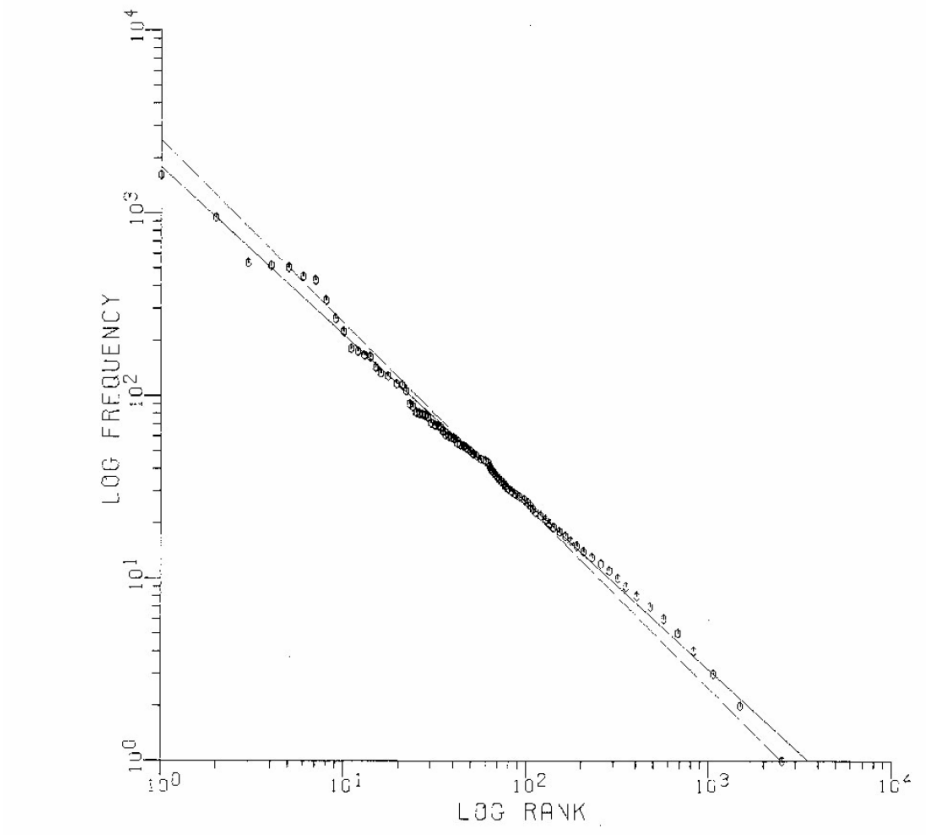


Figure 1. Observed Rank-Frequency Pairs for a Corpus of 21,354 Words
The solid line is the regression line for the data and has slope -0.92; the dashed line has slope -1.0.
Source: Wyllys, Ronald E. *The Measurement of Jargon Standardization in Scientific Writing Using Rank-Frequency ('Zipf') Curves*. Ph.D. dissertation, University of Wisconsin—Madison, 1974.

First of all: for rank and frequency, the following holds: if one is high, the other is low, and vice versa. The relationship is discrete inversely proportional. The figure graphs the natural log of the frequency of words in a book versus the natural log of the rank, which straightens the line (but not completely, the logarithm is an approximation, with discrete inverse proportionality at the basis).

Secondly, in the centre, the line behaves quite well, but at the ends of the line, we see the variance increase (despite the flattering natural logs, the ln). That is precisely what the uncertainty relationship predicts in perspectivist terms. Rank and frequency behave as incommensurable pairs. If one is large and certain, the other is small and uncertain, and vice versa. That expresses itself as heightened variance.

But these are just small comments. The wondrous aspect of Zipf's patterns lies in the fact that there are extremely regular patterns at all in e.g. the frequency of words in books, even though it appears to be completely unintentional and without any cause. In the large middle area, the regularity is stunning, but it diminishes at the ends, as that is where the effects of the uncertainty relationship come into play in one of the two dimensions. If one of these dimensions becomes much larger and the other much smaller, the accuracy inevitably suffers, because nothing stands in the way of the uncertainty relationship to do its job. If they both become larger, which is also a possibility, this will inevitably cost more perspective, and therefore more effort. Experiential value comes at a price. This applies to everything in two dimensions, but also to a random number of dimensions larger than 2.

Recursive perspectivism thus provides the notion of the uncertainty relationship and incommensurable pairs with a philosophical–perspectivist foundation.

A known incommensurable pair from quantum mechanics is *energy and time*. In quantum mechanics, the duo *position and velocity* is an even more famous incommensurable pair (in quantum mechanics they refer to this as *position and impulse*). That is not a new theme. The parable of Achilles and the turtle, by Zeno of Elea (described in my own words below, taken from *A Philosophy of the Societal Practice*, Volume I of this series), around 2500 years old, already toyed with position and velocity:

> *A turtle challenged Achilles to a running match. The turtle claimed that Achilles would not be able to beat him if Achilles gave him a small head start of around 100 metres. 'Ha-ha, you're going to lose', Achilles laughed. 'Not at all, I don't even have to run to prove to you that I won't', the turtle answered. 'Sure, explain that one', Achilles said.*
>
> *'Well now', the turtle said, 'you agree with me when I say that I will have run about 1 meter in the time it takes you to run 100 meters?' 'Yeah, if you walk fast enough, you might make that', Achilles hooted. 'Very well, so at that moment I still have a head start of exactly 1 meter', the turtle said. 'For now, yes', Achilles said, 'but not for long!'*
>
> *'Really?' the turtle said. 'But if you run that meter, I will have moved 1 centimetre, correct?' 'Yes, I guess that's right', Achilles said more slowly.*
>
> *'And that will happen every time, right? Whenever you get to my starting point, I will be slightly further ahead.'*

> *Achilles could already see it coming. 'But that way I will never catch up to you!' he said distressed. 'Exactly!' the turtle said. 'So you can never beat me. And I don't even have to move a muscle!'*

In this paradox, continuity and perspectives, infinite repetition and finite competitions are significantly mixed up. It is no wonder that you end up with inconsistencies, because that is what they are; I do not think it is a paradox at all. If you treat the problem discretely and finitely, and if you name the perspectives as a proper recursive perspectivist, there is no problem at all. You take it one perspective at a time, step by step, millimetre by millimetre, or microsecond by microsecond, and at some well-defined perspectivist 'moment' (or in a well-defined perspectivist episode, whichever you choose), Achilles runs past the turtle. Achilles wins the match. I would therefore make the turtle run instead of listening to him talk. After all, it is a running match. If you fall into the continuous and infinite pit, things start going sideways. If you put things in perspective, you will do just fine. This paradox of Zeno is not a paradox; it is merely a matter of crossing the boundaries of the continuous illusion.

Philosophers in those days (2500 years ago) were divided between those who thought that everything was unchangeable (for example Parmenides, see his poem *On Nature*), and those who thought that everything always changes (especially Heraclitus and his *panta rhei*, everything changes, *everything flows*). It is nice to see that recursive perspectivism does both sides justice.

A consciousness is unique at *every* moment and is situated and contextualized differently in a perspectivist space, a perspectivist landscape. It is never the same as before. I wrote this earlier in *A philosophy of the societal practice*: even if you visit the exact same ice cream parlour again, in exactly the same clothes, and you order the exact same ice cream cone, you will still know that it is your second time, and you knew it was your first time when you visited earlier. And if you repeatedly visit the pyramids, they will erode in the meantime, no matter how little. (This last point also applies to the ice cream shop and your clothes). You might say that this repeated state of unique situation and contextualization is what Heraclitus meant.

But the perspectivist space is *always and unchangeably* there, the perspectivist structural landscape in which consciousness resides. This landscape rests on the unperturbable prime numbers, which remain the same for all eternity, completely inert to all changes. If something exists *a priori*, or rather: if something inevitably emerges in a perspectivist consciousness, it are prime numbers and structural landscapes, even though we humans, the carriers of perspectivist consciousness, yet have to realize it. You might say that this eternal and unchanging structural landscape has grabbed the attention of Parmenides. This book attempts to demystify this and bring it out in the open.

As soon as you have consciously experienced an extra content perspective, you are no longer where you were before. That experience places you somewhere else in the

unchanging, structural *a priori* perspectivist space. Structure and content, object and subject relate to the philosophies of Parmenides and Heraclitus (and Plato and Aristoteles, I suspect, but I will leave that for another discussion). For at least 2500 years. The only requirement for the experience of value on both extremes is a perspectivist consciousness. This constantly connects both extremes, but it is primarily active with the many possibilities in between. Did Parmenides and Heraclitus both make a strong case? Well, I will leave that to the fundamentalists. To me, 'nearly always the same' and 'nearly always different' are befitting ends of the perspectivist spectrum of experience. Eventually, you can determine the structure based on the content of perspectives, and the content is determined by structure. From a pragmatic point of view, they are in excellent harmony. Fundamentalism is not required, the price for that is much too high.

But recursive perspectivism also announces and reveals entirely different incommensurable pairs. From a perspectivist point of view, incommensurable variables are related through inverse proportionality. The conclusion is then that for every pair that depicts an inverse proportionality in perspectivist terms, or a Benford-like pattern, we start seeing uncertainties near the ends of inverse proportionality, and therefore near the axes in the corresponding variable. For example, take pressure and volume at an equal temperature with the ideal gas law (PV=nRT). If the volume becomes very large, it becomes impossible to measure the pressure (you never know whether the local pressure measurements are valid for the *entire* volume). And if the pressure becomes very large, the volume becomes unpredictable (no expert will give you any guarantees and things can literally explode, as I experienced every now and then as a chemistry student).

Another incommensurable pair is object and subject (see the prelude). Mind and matter. Time and space. Or effort and experiential value. But why should we limit us to two dimensions? The three perspectivist axes pluriformity, similarity, and unity (p, s, u) form an incommensurable triplicate. And so do the three spatial dimensions (if you move forward, the other directions are less visible).

The core of the perspectivist balance issue is that there is a balance near the diagonal. Only near that balance will you be able to determine the different relevant perspectivist dimensions with a reasonable degree of certainty. If you tend towards one or more dimensions, the other dimensions will pay the price. They do not only become small, they become chaotic.

That is why resounding fascism, resounding neoliberalism, or resounding communism are recipes for disaster when they are isolated: as a society, you pay the price for the shortcomings of the other axes. A combination of resounding fascism and communism will therefore also fail: your society becomes totalitarian; you pay the price for the crippled liberal axis. Or the combination of liberalism and fascism: your society becomes selfish, you pay the price for the communist axis. Structure and content from perspectivist configurations also have a mutual incommensurable relationship. This opens a very large

reservoir that definitely requires further research and discussion. But this here concludes the uncertainty relationship in perspective for now.

4: The perspectivist stairs: structure and content

For the record: in the following analyses, I am still only working with prime factorizations *without* symmetries (without squares). Thus, you will still not run into a prime factorization such as (2 2 3 5), or in a different notation (2^2 3 5) of n=60. Symmetries will be covered extensively further in the book (you will be notified when this happens).

Back to the binomial curves. The number of *possible* factors of the 121 values of k for p=120 follows a neat pseudo-Gaussian distribution conform the binomial curve. For every k, the *specific* factors form the product of *unique* draws of k as a group of distinguishable prime factors from the available unique prime factorization.

Looking at the list of factors (for p=120, this contains *1329227995784915872903807060280344575 factors*), we could construct this analogously with the earlier shown schemes. Below you will find the scheme for n=30 and p=3. The first column shows k, the second the *product* of the factors, and the third the factors themselves (not the number of factors this time, but their numerical values).

```
n=30 primes: (2 3 5), p=3 => k=3

k=0 =>  1           (1)
k=1 =>  30          (2 3 5)
k=2 =>  900         (6 10 15)
k=3 =>  30          (30)

List of factors: (1 2 3 5 6 10 15 30)               8 factors, so 8 blocks
```

Even for simple schemes such as this, with few perspectives of n=30 and p=3, we can already see a pattern emerge that shows which factors belong to which k. We can see some sort of stairs start to form with clear steps, or maybe jumping stones is a better way to describe them: steep at the start, then smoothening out: (1) and (2 3 5) and (6 10 15) and (30). The last step becomes quite treacherous: you need to leap across half the x axis. See the following figure:

```
k=3                                                          ※
k=2              x        x          x
k=1     x x    x
k=0   ※
k//f  1 2 3    5 6        10         15                       30
```

The factors for k=0, 1, 2, and 3 for n=30. The factors for k=1 are the prime factors.

This characteristic stair pattern appears, because for increasing values of k, the unique number of prime factors k that are multiplied to calculate the factor increase as well. We stop when k is equal to the number of prime factors (in this case, k=3), and that is where we place n, the product of the three prime factors, which is 30 in this case.

As always, we can interpret every factor, every product of k prime factors, as an x coordinate. The number that, after multiplication, leads to 30 is then the product of the

remaining p minus k prime factors, and thus gives the y coordinate. The stacking blocks for n=30 are then: (1 30) (2 15) (3 10) (5 6) (6 5) (10 3) (15 2) (30 1). Eight in total, as befits p=3.

For every n with p=3, there is a strongly related but slightly different and unique pattern with eight factors. Take n=105 with prime factors (3 5 7), for example. The steps here are as follows (note: a part of the scale has been removed between 35 and 105, the largest jump determined by the smallest prime number in the factorization, indicated by //---// to fit the figure on the page):

```
k=3                                                                  //---//   x
k=2                          x           x                   x
k=1       x   x   x
k=0   x
k//f  1   3   5   7          15          21                  35     //---//  105
```

The factors for k=0, 1, 2, and 3 for n=105. The factors for k=1 are the prime factors.

We can also build the stairs in a step by step manner. The bottom step with k=0 is always 1 (similar to the top step, which is always n). The step k=1 contains the prime factors. The step k=2 contains the product pairs of the prime factors of step k=1, so 2·3, 2·5, and 3·5. The step k=3 contains the triple products of step k=1, so 2·3·5=30. This is where we stop. But had there been more primes, and therefore more values of k, this would be followed by quadruple products for k=4, quintuple products for k=5, etc.

For p=3 (without symmetry), the following structural scheme generally holds:

```
number of factors:

________from Comb (3 0)
 1      | x
 3      | xxx
 3      | xxx
 1      | x
________till Comb (3 3)

 top value 3
 sum value 8
 one x is  1
```

Now take 105=(3 5 7). We can see how the scheme directly below fills in the structural scheme directly above for n =105:

```
products:
n=105 primes: (3 5 7), p=3 => k=3

k=0 =>  1           (1)
k=1 =>  105         (3 5 7)
k=2 =>  11025       (15 21 35)
k=3 =>  105         (105)

factors: 8 (1 3 5 7 15 21 35 105)
```

Note that this depicts a simple staircase, but in a slightly different format. We can now see something special in the structural scheme (the stairs) directly above. The *pattern of factors* above shows, as expected, a nice symmetric pattern in terms of *number* of factors: we go from (1), via (3 5 7) and (15 21 35) to (105): 1 3 3 1. The *product pattern* below is symmetric as well, but it appears interrupted: it goes from 1, via 105 and 11025 to 105, and then stops. It is

as if there is a value of k missing, namely k=4 with a product of 1. This would complete the symmetric pattern of the products in the column behind the '=>'. We are missing a line, which we could add:

```
products:
n=105 primes: (3 5 7), p=3 => k=3

k=0 =>  1           (1)
k=1 =>  105         (3 5 7)
k=2 =>  11025       (15 21 35)
k=3 =>  105         (105)
➔ k=4 =>  1           (1)               [added!]

factors: 8 (1 3 5 7 15 21 35 105)
```

There exists a philosophical reason as to why we could add this. For the values of k=1, 2, and 3, there is a selection of available prime factors from the prime factorization with p=3 and n=105. They are 'possible'; they exist. For all other values of k that we can imagine, other than k=1, 2, and 3, there is not a single selection of k prime factors available for which the product is between 1 and 105, for n=105. They are 'impossible'. The same applies to k=0, but also to k=4, and all other values of k we can think of. This is similar to how all other colours of a spectrum are not possible for a dominant, specific (possibly local) temperature of the hearth fire (think of Planck's first quantum theory).[410]

As k=0 opens the pattern, so too does k=4 close the pattern. For all other values of k besides k=1, 2, or 3, both the product and the factor are 1. There is always the universal cornerstone 1, no matter how many dimensions there are: 1·1·1·1·1· … = 1. We can constantly include more dimensions. The idea that experiences can simply emerge is a central thought in recursive perspectivism, which made earlier appearances in the Methods section of my dissertation, in the discussion of the cornerstone in Part 1 of this series: *A philosophy of the societal practice*, and in the concept of the *panta rhei* arrow in Part 4 of this series: *Multi-actor process management in theory and practice*. That is why I add k=0 at the start and k=p+1 at the end.

5: Powers

For k=1, it holds that 3·5·7=105. For k=2 it holds that 15·21·35=11025 (see the table above). And 11025 is exactly equal to 105^2. For k=3, the product is 105, which in turn is exactly equal to √11025. Here we can see how the *products* of the factors increase or decrease quadratically by increasing or decreasing k by one, for n=105 (they only stay the same if there is a symmetric peak at the centre, so for even values of p).

[410] In recursive perspectivism, 'impossible' does not equal 0, but 1. After all, we are multiplying; we are dealing with a product. If we multiply a product by 1, nothing changes. If we multiply a product by 0, something does change. *Nothing* remains. Why is there something rather than nothing? This question is attributed to the diplomat, mathematician, and philosopher Gottfried Wilhelm Leibniz (1646-1716). The answer is often related to a proof of God. Here we get a mathematical answer instead: as long as we do not multiply by 0, we have something rather than nothing. A consciousness multiples with integers >= 1.

That follows from the previously mentioned formula: Comb (p, k) = p! / k!(p-k)!. The structural scheme and 'the stairs' (in table form) for p=3, because that is what this example is about, are on the previous page.

The factors for k=2 and k=3 can be calculated based on the factors of k=1. For k=2, this involves the products of unique pairs of prime factors: 3·5, 3·7, and 5·7. These provide the factors for k=2: 15, 21, and 35. They are then multiplied in the total product: 3·5·3·7·5·7. Rearranging gives 3·3·5·5·7·7, or $(3\cdot5\cdot7)^2 = 105^2 = 11025$.

For k=3 (and still for p=3), it involves the products of triplets: $(3\cdot5\cdot7)^1 = 105 = \sqrt{11025}$. If we take 210 and 462, under *products*, from k=1 to k=2, the factors are pairs of prime factors (because k=2). For n=210:

$2\cdot3 \cdot 2\cdot5 \cdot 2\cdot7 \cdot 3\cdot5 \cdot 3\cdot7 \cdot 5\cdot7 = 2^3\cdot3^3\cdot5^3\cdot7^3=(2\cdot3\cdot5\cdot7)^3=2103=9261000$

And for n=462:

$2\cdot3\cdot2\cdot7\cdot2\cdot11\cdot3\cdot7\cdot3\cdot11\cdot7\cdot11=2^3\cdot3^3\cdot7^3\cdot11^3=(2\cdot3\cdot7\cdot11)^3=462^3=98611128$

The inverse route, from k=2 to k=1, or from k=3 to k=4 (the figure is symmetric, after all) requires the inverse process: a cube root.

Finally, I will address the sixth power for k=3 for n=2310=(2 3 5 7 11), with p=5 (you will find the perspectivist analysis of this number further along in this book). After multiplication, we find all possible triples (because k=3) from the prime factorization with p=5: $2\cdot3\cdot5 \cdot 2\cdot3\cdot7 \cdot 2\cdot3\cdot11 \cdot 2\cdot5\cdot7 \cdot 2\cdot5\cdot11 \cdot 2\cdot7\cdot11 \cdot 3\cdot5\cdot7 \cdot 3\cdot5\cdot11 \cdot 3\cdot7\cdot11 \cdot 5\cdot7\cdot11 = (2\cdot3\cdot5\cdot7\cdot11)^6 = 2310^6$.

6: Examples of perspectivist analyses

We have now discussed numerous elements of the perspectivist analysis. First, I want to combine them into an integral perspectivist analysis. Subsequently, I will discuss a few other special aspects. I call the analyses below *perspectivist analyses*, because at their core, they describe the configurations that can be assumed by a *collection of n perspectives*, both from a structural and a content (numerical) point of view. That is why it is not really an analysis of a *number* n, but of a *number of perspectives* n. Thus I place the concept of number in perspective. One stack with a height n is then the configuration with the lowest improvement potential. In common speech, n is also merely a number along the natural line of numbers, so whenever I regularly discuss numbers of n, I actually mean the collections of n perspectives and their possible configurations.

Every perspectivist analysis consists of six parts:

1. The first part (the first line) gives the number of perspectives, the prime factorization of this number, and therefore the number of prime factors p (that is equal to the number of 'non-trivial' values of k).

2. The second part, *number of factors*, the developing Gaussian pattern directly below it, is the structural scheme of the factors (the denominators). For every value of k, the *number of possible* unique configurations is calculated exactly. This pattern is not unique for every n: it is exactly the same for every n with an equal number of prime factors p. Even if the values of those prime factors p are miles apart, it does not matter to the number of factors in a strictly combinatory sense.

3. The third part, *factors*, displays the possible factors for n, content-wise (numerical). Here we add the additional k as well, due to the symmetry. This pattern – see also the fundamental theorem of arithmetic – is *unique in terms of content* for every value of n.

4. The fourth part, *products*, calculates the products of the factors for every k. The reason for this is that it properly illustrates that, although the factors *increase* for increasing values of k, the '*frequency times height*' factor also goes down again in a nice symmetric fashion. The number of possible configurations quickly diminishes once k is 'over the peak'. The fourth part shows this exact phenomenon in the form of a very characteristic power pattern: it shows the powers with which the steps progress (upwards involves a power, downwards involves a root).

5: The fifth part, *ln products (natural log)*, then shows the natural logarithm of these products. Due to the power structure of part 4, we again see a Gaussian pattern in the making.

6: The final sixth part, *all factors*, gives the complete list of factors for this number (for this total number of perspectives n).

I will give plenty of examples, albeit at a small scale, as these provide the most insight. But they work exactly the same at larger scales. First we see the numbers 30 and 105. They are structurally identical: each has eight factors of which three are prime factors (p=3). Then two numbers follow that each have 16 factors and four prime factors: n=210 and n=462. The similarities in terms of structure and the differences in terms of content (numerical values) are clearly visible *within* the two pairs 30 and 105, and 210 and 462.

Then n=2310 follows, as well as n=4830, n=30030, and n=510510 (for n=510510 the readability is slightly compromised due to the large scale). We can also see that the structure of n=2310 and n=4830 is analogous: both have a prime factorization of 5. The overlap in steps differs, that is content. But the jumps in the powers for the products – the third part of the analyses – are exactly the same again for both n=2310 and n=4830. (Of course, that also applies to the previous pairs 30 and 105, and 210 and 462).

```
n=30 primes: (2 3 5), p=3 => k=3


number of factors:
____________________from Comb (3 0)
k=0 =>  1      | x
k=1 =>  3      | xxx
k=2 =>  3      | xxx
k=3 =>  1      | x
____________________till Comb (3 3)
 top value 3
 sum value 8
 one x is  1

--------------
factors:
k=0 =>  1      (1)
k=1 =>  3      (2 3 5)
k=2 =>  3      (6 10 15)
k=3 =>  1      (30)
k=4 =>  1      (1)

--------------
products:
k=0 =>  1
k=1 =>  30     power: 1
k=2 =>  900    power: 2
k=3 =>  30     power: 1
k=4 =>  1

--------------
ln products (natural log):
____________________from Comb (3 0)
k=0 =>  0.0            |
k=1 =>  3.401197       | xxx
k=2 =>  6.802395       | xxxxxxx
k=3 =>  3.401197       | xxx
k=4 =>  0.0            |
 one x is  1
____________________till Comb (3 3)

all factors: 8
(1 2 3 5 6 10 15 30)
```

```
n=105 primes: (3 5 7), p=3 => k=3


number of factors:
_____________________from Comb (3 0)
k=0 =>  1      | x
k=1 =>  3      | xxx
k=2 =>  3      | xxx
k=3 =>  1      | x
_____________________till Comb (3 3)
 top value 3
 sum value 8
 one x is  1

--------------

factors:
k=0 =>  1      (1)
k=1 =>  3      (3 5 7)
k=2 =>  3      (15 21 35)
k=3 =>  1      (105)
k=4 =>  1      (1)

--------------

products:
k=0 =>  1
k=1 =>  105       power: 1
k=2 =>  11025     power: 2
k=3 =>  105       power: 1
k=4 =>  1

--------------

ln products (natural log):
_________________________from Comb (3 0)
k=0 =>  0.0           |
k=1 =>  4.65396       | xxxxx
k=2 =>  9.30792       | xxxxxxxxx
k=3 =>  4.65396       | xxxxx
k=4 =>  0.0           |
 one x is  1
_________________________till Comb (3 3)

all factors: 8
(1 3 5 7 15 21 35 105)
```

```
n=210 primes: (2 3 5 7), p=4 => k=4


number of factors:
_____________________from Comb (4 0)
k=0 =>  1      | x
k=1 =>  4      | xxxx
k=2 =>  6      | xxxxxx
k=3 =>  4      | xxxx
k=4 =>  1      | x
_____________________till Comb (4 4)
 top value 6
 sum value 16
 one x is  1
--------------

factors:
k=0 =>  1      (1)
k=1 =>  4      (2 3 5 7)
k=2 =>  6      (6 10 14 15 21 35)
k=3 =>  4      (30 42 70 105)
k=4 =>  1      (210)
k=5 =>  1      (1)

--------------

products:
k=0 =>  1
k=1 =>  210         power: 1
k=2 =>  9261000     power: 3
k=3 =>  9261000     power: 3
k=4 =>  210         power: 1
k=5 =>  1

--------------

ln products (natural log):
_____________________________from Comb (4 0)
k=0 =>  0.0              |
k=1 =>  5.3471074        | xxxxx
k=2 =>  16.041323        | xxxxxxxxxxxxxxx
k=3 =>  16.041323        | xxxxxxxxxxxxxxx
k=4 =>  5.3471074        | xxxxx
k=5 =>  0.0              |
 one x is  1
_____________________________till Comb (4 4)

all factors: 16
(1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210)
```

```
n=462 primes: (2 3 7 11), p=4 => k=4


number of factors:
_____________________from Comb (4 0)
k=0 =>  1      | x
k=1 =>  4      | xxxx
k=2 =>  6      | xxxxxx
k=3 =>  4      | xxxx
k=4 =>  1      | x
_____________________till Comb (4 4)
 top value 6
 sum value 16
 one x is  1
--------------

factors:
k=0 =>  1      (1)
k=1 =>  4      (2 3 7 11)
k=2 =>  6      (6 14 21 22 33 77)
k=3 =>  4      (42 66 154 231)
k=4 =>  1      (462)
k=5 =>  1      (1)

--------------

products:
k=0 =>  1
k=1 =>  462          power: 1
k=2 =>  98611128     power: 3
k=3 =>  98611128     power: 3
k=4 =>  462          power: 1
k=5 =>  1

--------------

ln products (natural log):
_____________________________from Comb (4 0)
k=0 =>  0.0            |
k=1 =>  6.135565       | xxxxxx
k=2 =>  18.406694      | xxxxxxxxxxxxxxxxxx
k=3 =>  18.406694      | xxxxxxxxxxxxxxxxxx
k=4 =>  6.135565       | xxxxxx
k=5 =>  0.0            |
 one x is  1
_____________________________till Comb (4 4)

all factors: 16
(1 2 3 6 7 11 14 21 22 33 42 66 77 154 231 462)
```

```
n=2310 primes: (2 3 5 7 11), p=5 => k=5


number of factors:
____________________from Comb (5 0)
k=0 =>  1       |  x
k=1 =>  5       |  xxxxx
k=2 =>  10      |  xxxxxxxxxx
k=3 =>  10      |  xxxxxxxxxx
k=4 =>  5       |  xxxxx
k=5 =>  1       |  x
____________________till Comb (5 5)
 top value 10
 sum value 32
 one x is  1
--------------
factors:
k=0 =>  1      (1)
k=1 =>  5      (2 3 5 7 11)
k=2 =>  10     (6 10 14 15 21 22 33 35 55 77)
k=3 =>  10     (30 42 66 70 105 110 154 165 231 385)
k=4 =>  5      (210 330 462 770 1155)
k=5 =>  1      (2310)
k=6 =>  1      (1)
--------------

products:
k=0 =>  1
k=1 =>  2310                      power: 1
k=2 =>  28473963210000            power: 4
k=3 =>  151939915084881000000     power: 6
k=4 =>  28473963210000            power: 4
k=5 =>  2310                      power: 1
k=6 =>  1
--------------

ln products (natural log):
_____________________________________from Comb (5 0)
k=0 =>  0.0             |
k=1 =>  7.7450027       |  xxxxxxxx
k=2 =>  30.980011       |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=3 =>  46.470016       |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  30.980011       |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  7.7450027       |  xxxxxxxx
k=6 =>  0.0             |
 one x is  1
_____________________________________till Comb (5 5)

all factors: 32
(1 2 3 5 6 7 10 11 14 15 21 22 30 33 35 42 55 66 70 77 105 110 154 165 210 231 330
385 462 770 1155 2310)
```

```
n=4830 primes: (2 3 5 7 23), p=5 => k=5


number of factors:
_____________________from Comb (5 0)
k=0 =>  1       |  x
k=1 =>  5       |  xxxxx
k=2 =>  10      |  xxxxxxxxxx
k=3 =>  10      |  xxxxxxxxxx
k=4 =>  5       |  xxxxx
k=5 =>  1       |  x
_____________________till Comb (5 5)
 top value 10
 sum value 32
 one x is  1
--------------
factors:
k=0 =>  1      (1)
k=1 =>  5      (2 3 5 7 23)
k=2 =>  10     (6 10 14 15 21 35 46 69 115 161)
k=3 =>  10     (30 42 70 105 138 230 322 345 483 805)
k=4 =>  5      (210 690 966 1610 2415)
k=5 =>  1      (4830)
k=6 =>  1      (1)
--------------

products:
k=0 =>  1
k=1 =>  4830                          power: 1
k=2 =>  544237575210000               power: 4
k=3 =>  12696463968316569000000       power: 6
k=4 =>  544237575210000               power: 4
k=5 =>  4830                          power: 1
k=6 =>  1
--------------

ln products (natural log):
_____________________________________________from Comb (5 0)
k=0 =>  0.0             |
k=1 =>  8.482602        |  xxxxxxxx
k=2 =>  33.93041        |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=3 =>  50.89561        |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  33.93041        |  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  8.482602        |  xxxxxxxx
k=6 =>  0.0             |
 one x is  1
_____________________________________________till Comb (5 5)

all factors: 32
(1 2 3 5 6 7 10 14 15 21 23 30 35 42 46 69 70 105 115 138 161 210 230 322 345 483
690 805 966 1610 2415 4830)
```

```
n=30030 primes: (2 3 5 7 11 13), p=6 => k=6


number of factors:
____________________from Comb (6 0)
k=0 =>  1       | x
k=1 =>  6       | xxxxxx
k=2 =>  15      | xxxxxxxxxxxxxxx
k=3 =>  20      | xxxxxxxxxxxxxxxxxxxx
k=4 =>  15      | xxxxxxxxxxxxxxx
k=5 =>  6       | xxxxxx
k=6 =>  1       | x
____________________till Comb (6 6)
 top value 20
 sum value 64
 one x is  1
--------------
factors:
k=0 =>  1     (1)
k=1 =>  6     (2 3 5 7 11 13)
k=2 =>  15    (6 10 14 15 21 22 26 33 35 39 55 65 77 91 143)
k=3 =>  20    (30 42 66 70 78 105 110 130 154 165 182 195 231 273 286 385 429 455 715 1001)
k=4 =>  15    (210 330 390 462 546 770 858 910 1155 1365 1430 2002 2145 3003 5005)
k=5 =>  6     (2310 2730 4290 6006 10010 15015)
k=6 =>  1     (30030)
k=7 =>  1     (1)
--------------
products:
k=0 =>  1
k=1 =>  30030                                                   power: 1
k=2 =>  24421743243121524300000                                 power: 5
k=3 =>  59642154303295182755378537795549049000000000000    power: 10
k=4 =>  59642154303295182755378537795549049000000000000    power: 10
k=5 =>  24421743243121524300000                                 power: 5
k=6 =>  30030                                                   power: 1
k=7 =>  1
--------------
ln products (natural log):
_____________________|_____________________________________________
k=0 =>  0.0          |
k=1 =>  10.309952    | xxxxx
k=2 =>  51.54976     | xxxxxxxxxxxxxxxxxxxxxxxxxxx
k=3 =>  103.09952    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  103.09952    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  51.54976     | xxxxxxxxxxxxxxxxxxxxxxxxxxx
k=6 =>  10.309952    | xxxxx
k=7 =>  0.0          |
 one x is  2
_____________________|_____________________________________________

all factors: 64
(1 2 3 5 6 7 10 11 13 14 15 21 22 26 30 33 35 39 42 55 65 66 70 77 78 91 105 110 130
143 154 165 182 195 210 231 273 286 330 385 390 429 455 462 546 715 770 858 910 1001
1155 1365 1430 2002 2145 2310 2730 3003 4290 5005 6006 10010 15015 30030)
```

n=510510 primes: (2 3 5 7 11 13 17), p=7 => k=7

number of factors:

```
____________________from Comb (7 0)
k=0 =>  1      | x
k=1 =>  7      | xxxxxxx
k=2 =>  21     | xxxxxxxxxxxxxxxxxxxxx
k=3 =>  35     | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  35     | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  21     | xxxxxxxxxxxxxxxxxxxxx
k=6 =>  7      | xxxxxxx
k=7 =>  1      | x
____________________till Comb (7 7)
 top value 35
 sum value 128
 one x is  1
```

---

factors:

k=0 => 1 (1)
k=1 => 7 (2 3 5 7 11 13 17)
k=2 => 21 (6 10 14 15 21 22 26 33 34 35 39 51 55 65 77 85 91 119 143 187 221)
k=3 => 35 (30 42 66 70 78 102 105 110 130 154 165 170 182 195 231 238 255 273 286 357 374 385 429 442 455 561 595 663 715 935 1001 1105 1309 1547 2431)
k=4 => 35 (210 330 390 462 510 546 714 770 858 910 1122 1155 1190 1326 1365 1430 1785 1870 2002 2145 2210 2618 2805 3003 3094 3315 3927 4641 4862 5005 6545 7293 7735 12155 17017)
k=5 => 21 (2310 2730 3570 4290 5610 6006 6630 7854 9282 10010 13090 14586 15015 15470 19635 23205 24310 34034 36465 51051 85085)
k=6 => 7 (30030 39270 46410 72930 102102 170170 255255)
k=7 => 1 (510510)
k=8 => 1 (1)

---

products:

k=0 => 1
k=1 => 510510 power: 1
k=2 => 177021298243128209323380938010000000 power: 6
k=3 => 41693063164848882332928409009062652362948511915425009760979041079653251000000000000000 power: 15
k=4 => 144572293768472643295931078644390925171442011709034225044611358293739469755580252236901342460010000000000000000000 power: 20
k=5 => 41693063164848882332928409009062652362948511915425009760979041079653251000000000000000 power: 15
k=6 => 177021298243128209323380938010000000 power: 6
k=7 => 510510 power: 1
k=8 => 1

```
ln products (natural log):
_____________________________________________________________________
k=0 =>  0.0             |
k=1 =>  13.14316        | xxx
k=2 =>  78.85899        | xxxxxxxxxxxxxxxx
k=3 =>  197.1474        | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  262.8633        | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  197.1474        | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=6 =>  78.85899        | xxxxxxxxxxxxxxxx
k=7 =>  13.14316        | xxx
k=8 =>  0.0             |
 one x is  5
_____________________________________________________________________

all factors: 128
(1 2 3 5 6 7 10 11 13 14 15 17 21 22 26 30 33 34 35 39 42 51 55 65 66 70 77 78 85 91
102 105 110 119 130 143 154 165 170 182 187 195 210 221 231 238 255 273 286 330 357
374 385 390 429 442 455 462 510 546 561 595 663 714 715 770 858 910 935 1001 1105
1122 1155 1190 1309 1326 1365 1430 1547 1785 1870 2002 2145 2210 2310 2431 2618 2730
2805 3003 3094 3315 3570 3927 4290 4641 4862 5005 5610 6006 6545 6630 7293 7735 7854
9282 10010 12155 13090 14586 15015 15470 17017 19635 23205 24310 30030 34034 36465
39270 46410 51051 72930 85085 102102 170170 255255 510510)
--------------
```

```
n=4849845 primes: (3 5 7 11 13 17 19), p=7 => k=7

number of factors:
                                  from Comb (7 0)
k=0 =>  1     | x
k=1 =>  7     | xxxxxxx
k=2 =>  21    | xxxxxxxxxxxxxxxxxxxxx
k=3 =>  35    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  35    | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  21    | xxxxxxxxxxxxxxxxxxxxx
k=6 =>  7     | xxxxxxx
k=7 =>  1     | x
                                  till Comb (7 7)
 top value 35
 sum value 128
 one x is  1

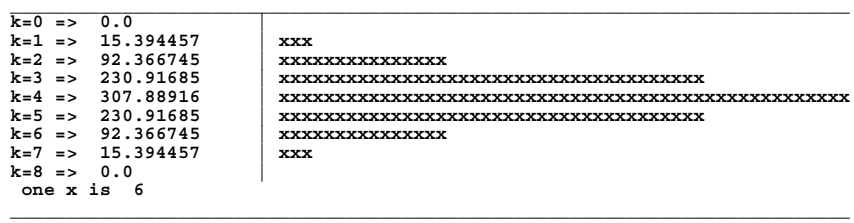
--------------

factors:
k=0 =>  1    (1)
k=1 =>  7    (3 5 7 11 13 17 19)
k=2 =>  21   (15 21 33 35 39 51 55 57 65 77 85 91 95 119 133 143 187 209 221 247 323)
k=3 =>  35   (105 165 195 231 255 273 285 357 385 399 429 455 561 595 627 663 665 715 741 935 969 1001 1045 1105 1235 1309 1463 1547 1615 1729 2261 2431 2717 3553 4199)
k=4 =>  35   (1155 1365 1785 1995 2145 2805 3003 3135 3315 3705 3927 4389 4641 4845 5005 5187 6545 6783 7293 7315 7735 8151 8645 10659 11305 12155 12597 13585 17017 17765 19019 20995 24871 29393 46189)
k=5 =>  21   (15015 19635 21945 23205 25935 33915 36465 40755 51051 53295 57057 62985 74613 85085 88179 95095 124355 138567 146965 230945 323323)
k=6 =>  7    (255255 285285 373065 440895 692835 969969 1616615)
k=7 =>  1    (4849845)
k=8 =>  1    (1)

--------------

products:
k=0 =>  1
k=1 =>  4849845
k=2 =>  13012692080643310630579484573885682515625    power: 6
k=3 =>  19316030522771136642015567895091096851547017097356823080838570496941492225387430012465271145629882812 5    power: 15
k=4 =>  51827132086309657986066711228212976809982383099695684890585274426678313368231770696922267259060071939666653212417798234559059314306640625    power 20
k=5 =>  19316030522771136642015567895091096851547017097356823080838570496941492225387430012465271145629882812 5    power: 15
k=6 =>  13012692080643310630579484573885682515625    power: 6
k=7 =>  4849845
k=8 =>  1
--------------
```

```
ln products (natural log):
```




```
all factors: 128
(1 3 5 7 11 13 15 17 19 21 33 35 39 51 55 57 65 77 85 91 95 105 119 133 143 165 187
195 209 221 231 247 255 273 285 323 357 385 399 429 455 561 595 627 663 665 715 741
935 969 1001 1045 1105 1155 1235 1309 1365 1463 1547 1615 1729 1785 1995 2145 2261
2431 2717 2805 3003 3135 3315 3553 3705 3927 4199 4389 4641 4845 5005 5187 6545 6783
7293 7315 7735 8151 8645 10659 11305 12155 12597 13585 15015 17017 17765 19019 19635
20995 21945 23205 24871 25935 29393 33915 36465 40755 46189 51051 53295 57057 62985
74613 85085 88179 95095 124355 138567 146965 230945 255255 285285 323323 373065
440895 692835 969969 1616615 4849845)
--------------
```

7: The relationship between structure and content: Pascal's triangle

The structural Gaussian pattern above (part 2 of the analyses) and the content Gaussian pattern below (part 5 of the analyses) converge in a very specific manner. The values inch closer to each other, k differs by 1, to be exact, and the difference of 1 in the basis becomes increasingly insignificant as p increases. There is a limit: as p increases, the difference approaches 0, both for the integral Gaussian and the position of the peak.

Consequently, the upper two Gaussians have one centre peak whenever the bottom two have a double peak (or rather a double wide peak), and vice versa (the basis above is even or uneven, and if it changes by one k, even becomes uneven, and uneven becomes even). There is a causal difference regarding the position of the peak of 1/2 k when you look at structure or content. There is an ironclad regularity, I call it the *constant k-interval*.

To properly highlight this convergence process, I will first show the binomial structural Gaussians (part 2 of the analyses), followed by the power sequences, and then the ratios of the logarithmic 'Gaussians' (part 5 of the analyses), for an increasing length of p of the prime factorization (you can find most of this data in the previous perspectivist analyses).

p=2
Examples: n=14 and n=33
The structural Gaussian is: 1 2 1
The power sequence is: 1 1
The content ln Gaussian has the ratios: 0 1 1 0

p=3
Examples: n=30 and n=105 (see earlier).
The structural Gaussian is: 1 3 3 1
The power sequence is: 1 2 1
The content ln Gaussian has the ratios: 0 1 2 1 0

p=4
Examples: n=210 and n=4382 (see earlier).
The structural Gaussian is: 1 4 6 4 1
The power sequence is: 1 3 3 1
The content ln Gaussian has the ratios: 0 1 3 3 1 0

p=5
Examples: n=2310 and n=4830 (see earlier).
The structural Gaussian is: 1 5 10 10 5 1
The power sequence is: 1 4 6 4 1
The content ln Gaussian has the ratios: 0 1 4 6 4 1 0

p=6
Examples: n=30030 (see earlier).
The structural Gaussian is: 1 6 15 20 15 6 1
The power sequence is: 1 5 10 10 5 1
The content ln Gaussian has the ratios: 0 1 5 10 10 5 1 0

p=7
Examples: n=510510 (see earlier).
The structural Gaussian is: 1 7 21 35 35 21 7 1
The power sequence is: 1 6 15 20 15 6 1
The content ln Gaussian has the ratios: 0 1 6 15 20 15 6 1 0

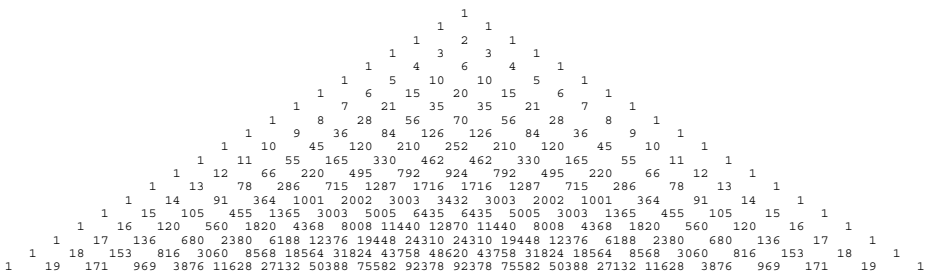
etc.

Structure and content are therefore intimately linked through prime factors. Structure and content play an intriguing game of leapfrog in a recursive manner.

Again, this pattern is not empirical, but it is rooted in the binomial construction of f_p. This structure–content connection is based on a centuries-old mathematical pattern: Pascal's triangle. This triangular pattern was discovered earlier in China and Arabia, but it has become known in the West as Pascal's triangle, because the French philosopher, physicist, and mathematician Blaise Pascal (1623-1662) discovered the pattern as well, along with many sub-patterns, and with it created the foundation for probability theory. Pascal's triangle depicts the following pattern:

```
                … 1 …       row 0
              … 1  1 …       row 1
            … 1  2  1 …       row 2
          … 1  3  3  1 …       row 3
        … 1  4  6  4  1 …       row 4
      … 1  5  10 10  5  1 …       row 5
    … 1  6  15  20  15  6  1 …       row 6
  … 1  7  21  35  35  21  7  1 …       row 7
… 1  8  28  56  70  56  28  8  1 …       row 8
```

Pascal's triangle up to row 8.



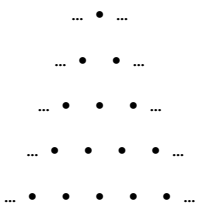
Pascal's triangle up to row 19.

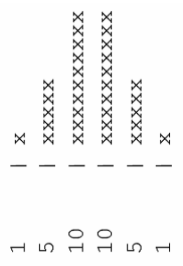
The triangle simply arises as follows. Take two neighbouring numbers, add them together, and then write down this sum in the row below, between the two numbers. When you pick a number from a position in Pascal's triangle, you will know the number of combinations (factors). For example, take 6 in the centre of row 4. We now know that for p=4 (the row) and k=3 (the third position from the row 1 4 6 4 1), the number of factors is 6.

Also, we instantly know the number of routes to reach this position from the top. That is 6 too, the number of routes and the number of combinations in Pascal's triangle are exactly the same. This is an important principle of the improvement potential of a number n: when n has more configurations, and therefore more paths, the improvement potential is higher.

> *Improvement potential is a direct indication of the flexible reachability of a position and the configurational availability of the perspectives (structure). The other principle of improvement potential is the size of the prime factors that realize this flexibility and configurability (content).*

A special, well-known consequence of this is the following. If we hammer nails into a board according to Pascal's triangle, and then repeatedly drop a steel ball exactly on top of the top nail, this ball can either drop to the right or to the left of every nail it hits on the way down. The numbers in Pascal's triangle show the exact number of paths that exist to get to that position at the base of the triangle, and a row of Pascal therefore depicts the average binomial curve that will form on that layer, if you repeatedly drop a ball. This is a stochastic process, so the individual series will differ from one another and from the ideal typical pattern. But eventually, the histogram of many, many ball drops will approximate the binomial bell curve of that layer, and therefore Pascal's pattern, increasingly well. When both p and the number of drops increase, the bell shape will become more distinct. That is how statistics is based on prime numbers through Pascal's triangle.

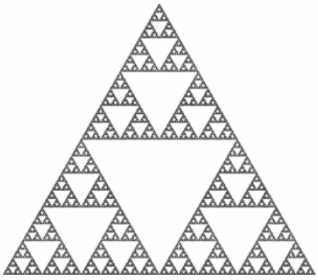




On the internet, you can find nice simulations of the progression of these bell patterns when searching for the name *quincunx*. Such a board of nails is also referred to as *Galton's board*, named after the Englishman *Sir Francis Galton* (1822-1911), who used to illustrate the *central limit theorem*. The central limit theorem states that the spread of the average of a sample will approximate a normal bell curve, independent of the distribution of the collection from which this sample is taken. The spread of this collection is larger than the spread of the average sample value.

Pascal's triangle is inherently recursive: when we replace the uneven numbers with black dots, and print the even numbers in grey, the Sierpinski triangle emerges (named after its discoverer, the Polish Waclaw Sierpinski, who lived from 1882-1969):

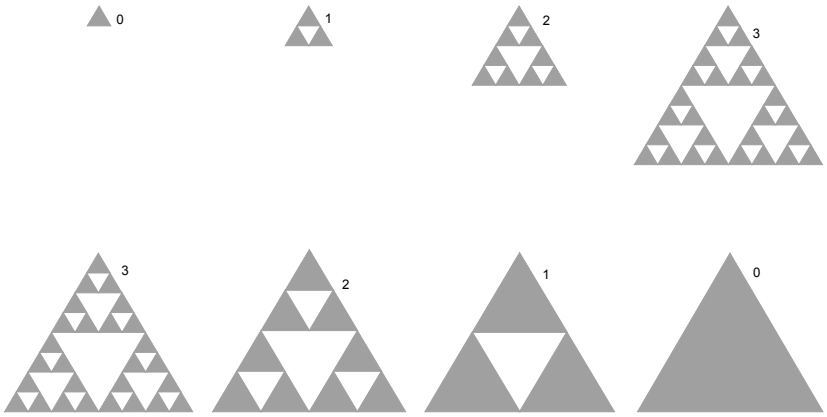
```
… • …          row 0
… •  • …       row 1
… •  2  • …    row 2
… •  •  •  • … row 3
… •  4  6  4  • … row 4
… •  •  10 10  •  • … row 5
… •  6  •  20  •  6  • … row 6
… •  •  •  •  •  •  •  • … row 7
```



Sierpinski's triangle

This is a recursive triangle: the centre of the black triangles contain white triangles that connect the halves of the sides of the black triangle. The white smaller triangle is therefore always upside down in the bottom half of the black triangle, and this repeats itself on every scale level. The surface starts as 100% black. For every recursive generation, the surface (the black share of the total triangle) diminishes to three-fourths of the previous surface. If you continue indefinitely, the black share of the surface will approach 0.[411] The figures below show how the white share increases – in this case relative to grey – as the recursivity progresses.

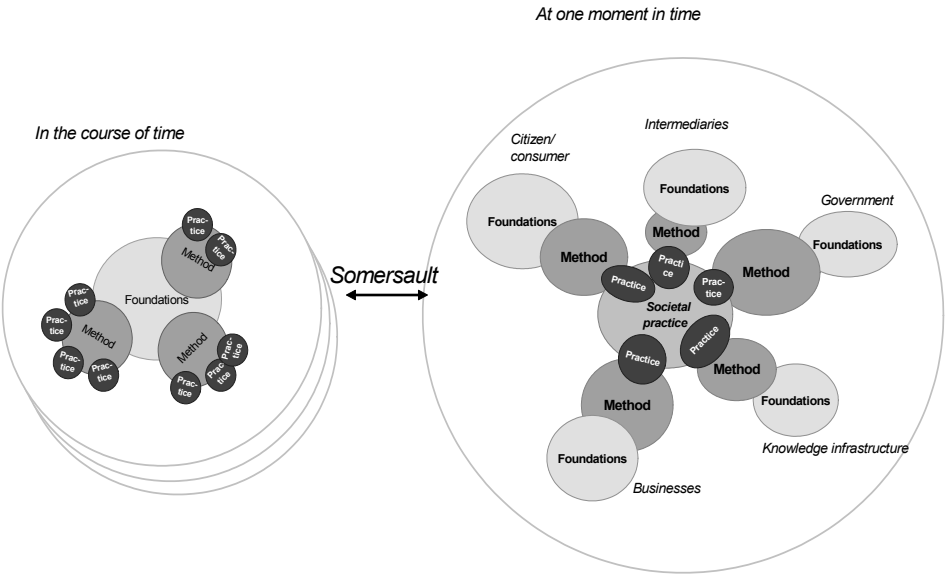
Now, as it happens, the number of steps in which Pascal's triangle can be created recursively in a process is exactly equal to the number of recursive steps that are recognizable in the resulting Sierpinski triangle at a certain moment. The figure below illustrates this. By looking at the configuration of a recursive structure at a certain moment, you will see the number of essential steps (the minimum number of steps, you could go back and forth, but here we adhere to the notion of a *state function*) in the formation history. Here we can see a visualization of the formula process=identity from Part 1: *A philosophy of the societal practice.*



Upper half: a recursive expansion process (building process). Lower half: a recursive abstraction process. See my dissertation for a theory of perspectivist extension, restriction, abstraction, and specification processes.

[411] It is an anachronism, of course, as there is a 2500 year gap, but Zeno might smile at the sight of such hubris. If you stop on time, Sierpinski offers a good strategy for dematerialization. Dematerialization is a sustainability strategy that attempts to lessen the excessive use, spread, or storage of valuable and dangerous raw materials. Less visibly, but equally true, is that the Sierpinski triangle offers a route towards a better society. You will hold onto more value this way (if it works in two dimensions, it will also work in three or more dimensions).

You might also say: the recursivity that builds up in time (the process) is exactly the same as the recursivity that displays itself at this moment (the result) in terms of steps. The upper half of the figure shows how the triangle expands from the top of the triangle downwards in a recursive expansion process. The bottom figure shows how a triangle colours itself differently in a recursive transformation process. Both cases involve three steps. Again, we play with process and identity, and we can see the structural side of the content discussion of principles, method, and practice from Theme II (figure repeated on the next page):



The perspectivist identity of an actor develops slowly in time...

...and shows itself at one moment in the societal multi-actor practice

With the above Pascal's triangle, we can now directly predict the patterns in the extensive analyses on the previous pages for every value of p. The rows of the triangle are called binomial coefficients: they will fill in the values of k of the previously mentioned binomial formula (Newton), starting with n=0, and increasing by 1 at every step:

$$\text{Comb}(p, k) = p! \,/\, k!(p-k)!$$

So if we have a number n with p=4, for example n=462 or n=210, then the fourth row of Pascal's triangle depicts the number of factors, which corresponds to the second part of the analysis, the structural Gaussian: 1 4 6 4 1. (Note that the first non-trivial number is 4. The first non-trivial number is always equal to p). In the third row, so one row higher, we can find the power sequence of part of the analysis: 1 3 3 1.

Or take n=510510 with p=7. The structural Gaussian can then be found on row 7: 1 7 21 35 35 21 7 1. The power sequence is therefore on row 6: 1 6 15 20 15 6 1. The content power sequence

– and therefore the ratios in the ln Gaussian – is always located one row above the structural sequence. This is the specific variant of convergence that I discussed earlier.

The 'footprint' of the logarithmic Gaussian pattern is exactly 1 k wider than the 'footprint' of the structural Gaussian (respectively k=8 => footprint = 8+1=9, and k=7 => footprint = 7+1=8. For the structural Gaussian, it holds that the value for k=0 and k=7 is equal to 1. As p increases, this becomes increasingly negligible *in terms of value*. For the logarithmic Gaussian, the value for k=0 and k=8 is equal to 0. The peak of the logarithmic Gaussian is therefore exactly 1/2 k higher than the peak of the structural Gaussian for every value of p. For p=7 it is at k=4 instead of k=3 1/2 (there is a single peak in the structural Gaussian, and a double peak in the logarithmic Gaussian, that holds for every uneven value of p). For p=6 it is at k= 3 1/2 instead of k=3 (now there is a double peak in the structural Gaussian, and therefore a single peak in the logarithmic Gaussian, this holds for all even values of p).

A few more peculiarities regarding Pascal's triangle. The sum of the powers is always equal to $(p+1)^2$: 1+6+15+20+15+6+1=64, and indeed, $(7+1)^2=8^2=64$. Row n from Pascal's triangle gives the coefficients of the formula $(x+y)^n$. Furthermore, the sum of the powers[412] is equal to $2^{(p-1)}$. Indeed: $2^{(7-1)}=2^6=64$. This explains the previously found pattern where the total number of factors progress with powers of two for a certain value of p (table repeated below). After all, there are two ways down at every point (hence binomial). When we sum the numbers of every row of the triangle, we will find a power of two from top to bottom: 2, 4, 8, 16 … Only the closing stone, in this case the top, is excluded.

Length prime factorization	Number of factors
1	2
2	4
3	8
4	16
5	32
6	64

Summarized:

- we have found a direct relationship between structure and content of perspectivist configurations,
- it neatly and consistently progresses with one vertical step in Pascal's triangle, and,
- consequently, both Gaussian-like patterns (the structural Gaussian and the content ln Gaussian) become *increasingly congruent* (practical scale invariance) as p increases, and the difference of 1 at the basis of the Gaussians therefore becomes relatively insignificant.

[412] For Pascal's triangle: the sum of a row n is 2^n

8: The relationship between structure, content, and improvement potential

The log values in the fifth part of the perspectivist analyses are in the same orders of magnitudes as the improvement potentials. That might remind you of Euler's previously approximation formula for the harmonic series:

$\mathbf{\Sigma}_n 1/n = 1/1 + 1/2 + 1/3 + ... + 1/n \approx \ln(n) + \gamma + 1/2n + 1/12n^2$

Where γ (gamma) is the Euler–Mascheroni constant: $\gamma = \mathbf{\Sigma}_{n=>\infty} 1/n - \ln(n) = 0.5772156...$ for n => ∞. For n => ∞, 1/2n and $1/12n^2$ becomes increasingly small.

The natural logarithm plays a prominent role here. The logarithmic values (part 5 of the analyses) become increasingly similar to the one-dimensional harmonic improvement potential of the product of the factors. Take, for instance, n=30:

```
n=30 primes: (2 3 5), p=3 => k=3

number of factors:
_____________________from Comb (3 0)
k=0 =>  1      | x
k=1 =>  3      | xxx
k=2 =>  3      | xxx
k=3 =>  1      | x
_____________________till Comb (3 3)
 top value 3
 sum value 8
 one x is  1
--------------
factors:
k=0 =>  1      (1)
k=1 =>  3      (2 3 5)
k=2 =>  3      (6 10 15)
k=3 =>  1      (30)
k=4 =>  1      (1)
--------------
products:
k=0 =>  1
k=1 =>  30     power: 1
k=2 =>  900    power: 2
k=3 =>  30     power: 1
k=4 =>  1
--------------
ln products (natural log):
_____________________from Comb (3 0)
k=0 =>  0.0            |
k=1 =>  3.401197       | xxx
k=2 =>  6.802395       | xxxxxxx
k=3 =>  3.401197       | xxx
k=4 =>  0.0            |
 one x is  1
_____________________till Comb (3 3)

all factors: 8
(1 2 3 5 6 10 15 30)
```

For k=1, we can draw the x values 2, 3, and 5, so k=1 gives 30 as a product. For k=2, we can draw the pairs (2 3)=6, (2 5)=10, and (3 5)=15, and the product of this is 900. If we now calculate the harmonic one-dimensional improvement potential for the product values of k=1 (with 30 as a product) and k=2 (with 900 as a product), we get:

Improvement potential (30) = $\mathbf{\Sigma}_{n=30} 1/n = 3.9949872$

Improvement potential (900) = $\mathbf{\Sigma}_{n=900} 1/n = 7.380166$

These results deviate from the ln values:

ln 30 = 3.40119736

ln 900 = 6.80239476

But if we correct them with Euler's approximation formula, which was repeated above, we get the following values:

$\Sigma_{n=30}\, 1/n \approx \ln(30) + 0.5772156 + 1/(2{\cdot}30) + 1/12(30)^2 = 3.99517224$

$\Sigma_{n=900}\, 1/n \approx \ln(900) + 0.5772156 + 1/(2{\cdot}900) + 1/12(900)^2 = 7.38016602$

These coincide with the *exact* harmonic values: the quality of Euler's approximation formula is high and improves for increasing values of n.

Logarithms and scale invariances

'Eadem mutata resurgo.'
(Although changed, I arise the same.)
Epitaph Jacob Bernoulli, Swiss mathematician, 1655-1705.

Logarithms allow you to treat multiplications as additions: ln(a·b) = ln(a) + ln(b). You can also treat ratios (divisions) as subtractions: ln(a/b) = ln(a) – ln(b). Rounded to four decimals, the following thus holds:

ln(2·3) = ln(6)=1.7918
ln(2) + ln(3) = 0.6931 + 1.0986= 1.7917

Similarly, for ratios:

ln(3/2) = 0.405
ln(3) – ln(2) =1.0986 – 0.6931 = 0.405

ln(15/10) = 0.406
ln(15) – ln(10) =2.7081 – 2.3026 = 0.406

Because ln(15/10) = ln(30/20), ln(15) – ln(10) must also be equal to ln(30) – ln(20). The absolute values are not relevant for natural logarithms when it involves their ratios. It is about relative values. Natural logarithms can cause practical scale invariances, ratios that apply to large scales, but are slightly different there (see the epitaph of Jacob Bernoulli above). They are based on prime numbers and cause pattern laws.

A good example of this, other than the previously discussed patterns of Zipf, Benford, *the path of humanity*, bell curves, and inverse proportionalities, is the *Spira Mirabilis*: the 'Miraculous Spiral', extensively studied by Jacob Bernoulli. This shape has a property that, when you enlarge it, shows you the virtually same pattern again. On top of that, we can also

find this pattern at entirely different scale levels at entirely different phenomena: on the Nautilus shell (some type of snail shell), on flowers, in tropical cyclones (the typical spiral-shaped storms) and on a galactic scale in spiral-shaped galaxies.

And yet I have mixed feelings when it comes to natural logarithms.[413] I think that integers, rational ratios, and the harmonic series form a much more suitable key to a better understanding of the prime numbers and the inner workings of our perspectivist consciousness that is based on the improvement of experience, as opposed to natural logarithms. Natural logarithms approximate this underlying discrete reality of experience. But whenever natural logarithms appear, they always cause practical scale invariance, or just-short-of-equalities (see also the discussion of Gauss's *Prime Number Theorem*). If we wish to better understand our experiences, perhaps we should credit the natural logarithm with less originality, and instead go back to the source: the experience of recursive perspective.

9: Symmetries decrease the number of factors

We have a formula f_p at our disposal that relates the number of prime factors and the number of factors, and therefore the number of stacking blocks per generation in two dimensions. That leads to a number of special relationships between structure and content.

But the use of the formula f_p comes with a strong precondition: it only applies to asymmetric prime factorizations, so prime factorizations without doubles, without squares. A combination (a prime factorization) can certainly be *symmetric*, and in that case, the number of *different* combinations, and therefore the number of factors and the number of blocks that can be stacked in two dimensions is overestimated by this formula. If there are far-reaching symmetries in the prime factorization, this overestimation becomes enormous.

The symmetry in prime factors is related to the previously used cube symmetry, which correlates with improvement potential, and yet is entirely different. Cube symmetry is the *degree to which* a position is near the diagonal of a surface, space, or hyperspace. The closer you are to a diagonal based on a certain number of perspectives, the higher the improvement potential. Prime factors are symmetric if they are identical. So there is no '*degree to which*', only on or off: you are either the same, or you are not. The list of factors (499 503 509) is *fully* asymmetric in its prime factors (all three are primes), even though you might say that it fairly accurately represents a cube. The list (2 2 509), on the other hand, has a double symmetry, even though you cannot make a cube out of it with the entire world's might. (You could make a small square, and that is precisely what the present symmetry is).

[413] Infinitesimals always give me similar mixed feelings. Just like natural logarithms they come in handy in many different ways, but at the same time they conceal the deeper discrete experience-based perspectivist reality.

Take, for an example of prime symmetry, the number 9, with prime factorization (3 3) and list of factors (1 3 9) with a length of 3. The formula for the number of factors would give you 4. The number 3 does not even belong to the possible number of factors that could be given by the asymmetric formula. Or take 16, with prime factorization (2 2 2 2), and factors (1 2 4 8 16), so five factors (in a nice doubling sequence), while the formula gives a number of factors of 16. The number 512 with prime factorization (2 2 2 2 2 2 2 2 2) takes the cake, with 512 factors according to the formula, but only 10 factors in reality ((1 2 4 8 16 32 64 128 256 512), stacked neatly according to the doubling sequence, the inverse proportionality, due to the enormous symmetry of twos.

It is precisely this symmetric effect that makes one believe that the formula f_p is incorrect, and that the generally regular Gaussian image of the stacking process is disrupted. If we look at the examples on the next page and focus on column 5, below C, which lists the *actual* number of factors (F lists the number of factors according to f_p, Δ shows the difference, and A represents fully asymmetric, so a difference of 0), we can instantly find a few prime factorizations with symmetries by noting that this number of factors does not equal the results of the formula. The *possible* results of the formula f_p are given by the doubling sequence 2, 4, 8, 16, … These are the sums of the incremental rows of Pascal's triangle.

Gen	prime factors	improvement potential	number of factors F	C	•	factors
252	(2 2 3 3 7)	19.60	32	18	14	(1 2 3 4 6 7 9 12 14 18 21 28 36 42 63 84 126 252)
253	(11 23)	11.27	4	4	A	(1 11 23 253)
254	(2 127)	8.138	4	4	A	(1 2 127 254)
255	(3 5 17)	14.39	8	8	A	(1 3 5 15 17 51 85 255)
256	(2 2 2 2 2 2 2 2)	25.62	256	9	247	(1 2 4 8 16 32 64 128 256)
504	(2 2 2 3 3 7)	29.41	64	24	40	(1 2 3 4 6 7 8 9 12 14 18 21 24 28 36 42 56 63 72 84 126 168 252 504)
505	(5 101)	11.86	4	4	A	(1 5 101 505)
506	(2 11 23)	16.91	8	8	A	(1 2 11 22 23 46 253 506)
507	(3 13 13)	18.54	8	6	2	(1 3 13 39 169 507)
508	(2 2 127)	12.20	8	6	2	(1 2 4 127 254 508)
509	(509)	6.810	2	2	A	(1 509)
510	(2 3 5 17)	21.59	16	16	A	(1 2 3 5 6 10 15 17 30 34 51 85 102 170 255 510)
511	(7 73)	12.63	4	4	A	(1 7 73 511)
512	(2 2 2 2 2 2 2 2 2)	38.44	512	10	502	(1 2 4 8 16 32 64 128 256 512)

Excerpt from the table in the appendix. F = number of factors according to the formula, C = number of factors after correcting for symmetry, Δ = difference between formula and correct. If Δ = 0, the prime factorization is asymmetric (this is indicated by the A).

We can see large differences in the configurational structure of both sets of numbers depicted above, although the values of the numbers in every set are virtually the same (252 to 256 and 504 to 512). The differences express themselves in terms of content and structure:

a: content, in terms of prime dimensionality and prime values, and therefore improvement potential, and
b: structural, in terms of prime dimensionality and symmetry, and therefore number of factors.

a: Content. The previously discussed upward effects of high dimensionality and low prime on improvement potential relative to n still applies in full. Minimizing possible prime values and (therefore) maximizing possible dimensionality leads to a maximum possible improvement potential. The numbers 252 and 256 (the upper half of the table) and 504 and 512 (the lower half of the table) illustrate this.

Conversely, a low dimensionality (a short prime factorization) with relatively high primes leads to a low improvement potential. Illustrative numbers for this case are 253 and 254, and 505 and 509 (the last of which is a prime).

In succinct terms: a relatively long prime factorization (for that range of n) leads to high improvement potentials (for that range of n). A relatively short prime factorization (for that range of n) leads to low improvement potentials (for that range of n). The prime factorizations with the relatively highest improvement potentials consist solely of twos, and those with the relatively lowest improvement potentials consist of a single prime number. So far, nothing new has been said.

b: Structure. But now we can also see that a relatively *high* symmetry in the prime factorization severely limits the number of factors, and a relatively *low* symmetry in the prime factorization provides plenty of room to all possible factors.

A low symmetry therefore provides more factors, more black stepping stones for a certain value of n. For example, take a look at the numbers 252 and 256, which are about the same size (see the previous table). Both have a long, low prime factorization. As a result, both improvement potentials are high. However, 256 is the clear winner, with a rounded improvement potential of 26 versus 20, as the prime factorization already suggests (see the table above). But if we look at the number of factors, number 252 appears to provide a much richer image, with 18 factors, as opposed to 256 with only 10 factors.

Numbers of factors of 10 and 18 both do not comply with the recently derived formula with numbers of factors of 2 4 8 16 32, etc. The number 252 has a prime factorization of length 5, with 32 factors according to the formula, and 256 has a prime factorization of length 8, with a number of factors of no less than 256. The fact that the number of factors is much lower than the formula predicted completely comes down to the double prime factors. Indeed, in both cases, there is a strong symmetry in the list of prime factors. For 256, the symmetry is extreme (it only involves twos). If we include 254 in the discussion, it appears that both the improvement potential and the number of factors are miserable. The number of factors, 4, does comply with the formula for a prime factorization of length 2: there is indeed no symmetry in the prime factorization of 254.

A similar comparison is made between the numbers 504 and 512, both virtually identical as well (see the table above). The number 512 wins in terms of the length of the prime factorization, and therefore consists of low prime factors. When this number is fully factorized, it displays a truly excellent improvement potential. But 504 does not perform badly either, it has about 75% of the improvement potential of 512. At the same time, 504

displays a much more differentiated list of factors (24 of the maximum possible 64 factors for 504, versus 10 of the maximum possible 512 (!) factors for the number 512, again these numbers are miles away from the values of the formula that relates the number of prime factors to the number of factors).

Apparently, the formula f_p provides an *upper bound* for the number of factors, and the total absence of symmetries in the prime factorizations leads to this upper bound. Relatively many black stepping stones are the result. This is shown, for example, by the numbers 30 and 210, with factorization of (2 3 5) and (2 3 5 7), respectively, so a total *absence* of symmetries, and a maximum number of factors of 8 and 16, respectively, neatly in line with the formula f_p that relates the number of prime factors to the number of factors.

In terms of the metaphor of the mountainous landscape, we can therefore attempt to unite the best of two worlds: a highest possible prime dimensionality (and therefore the lowest possible primes, which leads to the highest possible improvement potential) and the lowest degree of symmetry (and therefore the highest possible number of different low primes, which leads to as many factors as possible). *This leads to a preference for a mix of different low prime numbers in the prime factorization*. That is how we achieve strong improvements, without perishing or having to stop on the way there. The peak we wish to reach is quite high, and the path is passable, there are sufficient stepping stones. Thales and the Thracian maid go hand in hand. Most people prefer this over climbing to a ridiculously high peak that cannot be reached (Thales), or a very easily passable path that does not lead to any improvement (the Thracian maid).

If we apply this rule of thumb, a mix of different low prime numbers, to meet the demands of having sufficient stepping stones and sufficient improvement potential, we get prime factorizations such as (2 2 2 3), or (2 2 3). Precisely these prime factorizations cause Zipf patterns (see the discussion on Zipf earlier in this theme). There are few who attempt to climb the highest and most difficult mountains. Doing so even puts you at risk of not surviving the endeavour. But most people can be persuaded to climb a mountain that is reasonably high yet simple, preferably with a cable cart.

Purely symmetric prime factorizations show nice patterns in factors. Take the twos, for example: the factorizations follow the pattern (1 2 4 8 16 32 …), the doubling sequence. Or the threes: the factorizations follow the pattern (1 3 9 27 …), the tripling sequence. Or take the fives: the factorizations follow the pattern (1 5 25 125 …), the quintupling sequence.

A *big* difference in the values in a prime factorization does little good for both the improvement potential and the regularity in the stepping stones. The largest asymmetries show the largest prime numbers, and prime factorizations that contain large prime numbers. See the numbers 60, 61, and 62.

Gen	prime factors	improvement potential	number of factors F	C	•	factors
60	(2 2 3 5)	9.418	16	12	4	(1 2 3 4 5 6 10 12 15 20 30 60)
61	(61)	4.696	2	2	A	(1 61)
62	(2 31)	6.040	4	4	A	(1 2 31 62)

The number 61 is a prime number, with a lousy improvement potential and list of factors. The number 52 has a list of factors of (1 2 32 62) and therefore a slightly higher improvement potential, but it is nothing to write home about. The number 60, in comparison, is like a fresh oasis of good judgement. The improvement potential is no less than 9.4, and the path is very passable. The prime factorization (2 2 3 5) indeed follows the above-mentioned rule of thumb: a reasonable mix of low prime numbers.

10: The symmetry correction for the number of factors

The presence of symmetry reduces the number of factors. As soon as a symmetry appears, we need to use the formula for combinations in a different way; we need to correct it. But how does this correction work?

If we draw a prime number k times from a row of p different prime factors, *without* returning them, and the order of the drawing is *not* important, then the previously mentioned number of possible combinations applies:

Comb (p, k) = p! / k!(p-k)!

This formula presupposes that every prime factor is unique. Summed over the incremental values of k, it leads to Pascal's triangle (repeated):

```
                … 1 …          row 0
              … 1   1 …        row 1
            … 1   2   1 …      row 2
          … 1   3   3   1 …    row 3
        … 1   4   6   4   1 …  row 4
      … 1   5   10  10  5   1 …    row 5
    … 1   6   15  20  15  6   1 …  row 6
  … 1   7   21  35  35  21  7   1 …    row 7
… 1   8   28  56  70  56  28  8   1 …  row 8
```

Pascal's triangle up to row 8 (repeated)

What if not every prime factor p is unique? In other words, what if there are squares in the prime factorization: double primes, triple primes, or higher orders, or a double and another triple together?

When there are symmetries, we can no longer distinguish the number of 'combinations' that would appear without symmetry, and we can only deduce that these combinations together provide a single identical combination. The formula above overestimates the number of combinations, and therefore the number of factors, whenever symmetries are present.

I am reminded again of the statistical concept of entropy, and more specifically the perfume bottle of the previously mentioned physicist and chemist Boltzmann. He was asked why perfume evaporates out of a bottle into the environment, but not spontaneously returns into the bottle via the inverse process, because such a reversibility of processes seemed to make his random statistical theory possible. He parried magnificently with his statistical concept of entropy: it is about the number of possible different microstates that configures a macrostate. The probability of a macrostate is proportional to the number of micro ways in which this same macrostate can be realized. You then assume that every micro configuration has, on average, an equal 'chance of succeeding', or 'chance of being'. So when there exist many more configurations for which perfume is partly out of the bottle than configurations for which all perfume remains inside the bottle, this expresses itself as a diffusion process of perfume diffusing out of the bottle.

But if this is true, and I am now diametrically reversing the Boltzmann principle, then the inverse should hold as well: macro states disappear when distinguishable micro configurations disappear! We are discussing the same principle here, but now the number of macrostates varies. The number of macrostates (factors) decreases, because the number of distinguishable microstates (prime factorizations) decreases.

The effect of symmetries is not easy to comprehend, but it does happen in an exact and predictable binomial manner. I think that this is mainly material for mathematicians. It comes down to the deletion of double factors for every value of k, constantly working from the prime factorization that is at the foundation of it all. Note that the quadratic notation $420=(2^2\ 3\ 5\ 7)$ is factually misleading, because the construction of factors for a number with p=5 with a single double prime factor (a simple 'square') follows a different structural pattern than a square-free number with p=4 such as 210=(2 3 5 7), and the number of factors is different too. That is why the non-quadratic notation 420=(2 2 3 5 7) is more correct (and less misleading) than the quadratic notation $420=(2^2\ 3\ 5\ 7)$.

Say we do not have 30=(2 3 5) with p=3, square-free as an example, which is fully asymmetric (see the previously elaborated example in the perspectivist analysis), but 45=(3 3 5), a quadratic number, with p=3 and a double symmetry (a square, two threes, $(3^2\ 5)$). I now follow the exact process from a few pages ago for 30=(2 3 5), but now for 45=(3 3 5), with a correction for this double symmetry. This may be a bit hard to follow in words, but immediately afterwards I will provide you with that scheme. The scheme for the square-free number 30=(2 3 5) is:

```
n=30 primes: (2 3 5), p=3 => k=3

number of factors:
____________________from Comb (3 0)
k=0 =>  1      | x
k=1 =>  3      | xxx
k=2 =>  3      | xxx
k=3 =>  1      | x
____________________till Comb (3 3)
 top value 3
 sum value 8
 one x is  1
--------------
factors:
k=0 =>  1      (1)
k=1 =>  3      (2 3 5)
k=2 =>  3      (6 10 15)
k=3 =>  1      (30)
k=4 =>  1      (1)
--------------
All factors: (1 2 3 5 6 10 15 30)
```

Now for the square number 45=(3 3 5)=(3^2 5). We know that 1 is always a factor (this is trivial, the k=0 situation). Prime factors are ordinary factors too, this is the k=1 situation, and together with 1 it gives the list of factors (1 3 3 5). But a factor that makes an appearance twice does not add anything, so this is excluded. We therefore throw one redundant factor 3 away, resulting in (1 3 5).

Now we work our way further up from k=2 to p (p is three), similar to before, but now we go constantly go back to the prime factorization: first we take all the products of two prime factors from the prime factorization (k=2), then the product of three prime factors (k=3). For k=2, these are 9, 15, and 15, and again we throw the double away, a 15, resulting in (1 3 5 9 15). Note that the 9 would never have been noticed if we worked on k=2 with the list of factors from k=1, because that only contains a single 3.

Then we take all the products of three prime factors k=3=p, the last one), which is only one, as 3·3·5=45, and we add that one too: (1 3 5 9 15 45). If we now look at the calculated list of factors of 45 in the previous table, we can indeed find the exact list of factors (1 3 5 9 15 45). The two doubly occurring factors, 3 for k=1 and 15 for k=2, add nothing to the list of factors. That is why the number of factors is lower compared to a fully asymmetric prime factorization

In a scheme:

```
45=(3 3 5), p=3 => k=3
k=0 => (1)
k=1 => (3 3 5) => (3 5)
k=2 => (9 15 15) => (9 15)
k=3 => (45)
List of factors: (1 3 5 9 15 45)
```

Naturally, we will find a number of factors of 6 for *all* p=3 prime factorizations with a double symmetry. This is a structural characteristic. Take the numbers 12=(2 2 3), or 18=(3 3 2), or 50=(2 5 5), or 475=(5 5 19): they all have a prime factorization with a double symmetry, and therefore six factors.

I summarize. If we have a double symmetry in a triple prime factorization, the number of maximum factors 8 is reduced by 2 to 6. One factor disappears from the k=1 contribution, the other from the k=2 contribution.

Now take a fully symmetric prime factorization: 8=(2 2 2), with p=3: a triple and complete symmetry. The list of starting factors is now (1 2), we miss a 2 compared to the asymmetric situation. The double products of the prime factorization (k=2) are 4, 4, and 4. Removing the doubles, *two* of these three factors, leads to a total list of factors of (1 2 4). The product of all three (k=3) gives 8. The total list of factors (1 2 4 8) is neatly in accordance with the previous table. The number 4 seems like a legal number of factors according to the formula for square-free numbers, but this actually applies to two prime factors, not to three. In this case, we miss a total of 4 factors when compared to the asymmetric (square-free) situation: two twos of k=1 and two fours of k=2.

In a scheme (this illustrates it better than words do):

```
8=(2 2 2), p=3 => k=3
k=0 => (1)
k=1 => (2 2 2) => (2)
k=2 => (4 4 4) => (4)
k=3 => (8)
List of factors: (1 2 4 8)
```

I summarize. If we have a triple symmetry in a triple prime factorization, the maximum number of factors 8 decreases by 4 to 4. Two disappear from the k=1 contribution and two from the k=2 contribution. Indeed, in the previous table, we find a number of factors of 4 for all triple prime factorizations with a triple symmetry. Take the numbers 8=(2 2 2), or 27=(3 3 3), or 125=(5 5 5)), or 343=(7 7 7): they all have four factors.

A double symmetry in a quadruple prime factorization then naturally has a different effect compared to a double symmetry in a triple prime factorization, because the process continues one step further. Take 60=(2 2 3 5). We put 1 (k=0) and the prime factors (k=1) in the list of factors. The second is double, we throw it out, resulting in (1 2 3 5).

Now we work our way up from 1 to p, the same as last time, but p=4 for a quadruple prime factorization. First, we take all the products of two prime factors (k=2) and add them to the list. These are 4, 6, 6, 10, 10, 15, and again we eliminate the doubles, two this time, leading to a new list: (1 2 3 4 5 6 10 15). So here we miss two factors. Then we take all the products of three prime factors (k=3): 12, 20, 30, 30, we get rid of a 30. The result is (1 2 3 4 5 6 10 12 15 20 30). Then remains the product of four prime factors (k=4): 60, and then we have to stop, and the list of factors is complete. We have eliminated a total of four factors: 2 (k=1), 6 (k=2), 10 (k=3), 30.

In a scheme:

```
60=(2 2 3 5), p=4 => k=4
k=0 => (1)
k=1 => (2 2 3 5) => (2 3 5)
k=2 => (4 6 6 10 10 15) => (4 6 10 15)
k=3 => (12 20 30 30) => (12 20 30)
k=4 => (60)
List of factors: (1 2 3 4 5 6 10 12 15 20 30 60)
```

The result is (1 2 3 4 5 6 10 12 15 20 30 60), 12 factors. In the case of a double symmetry in a quadruple prime factorization, 4 out of a possible 16 factors fall away, and 12 remain. Indeed: 444=(2 2 3 37) and 490=(2 5 7 7) show this correction as well.

I want to point out two things here. First of all: unity. Note that adding a factor to the list of factors in the making can *never* lead to a doubling with this procedure, because this product would already be on the list, unless there are symmetries and we are *in the same value of k* (and in that case, we instantly throw the double factors away). The reason for this is that the prime numbers in the prime factorization cannot be divided any further (they are primes, after all), and are unique together for this value of n (the fundamental theorem of arithmetic). Secondly: interleaving. The degree of overlap of the 'steps' or 'ranges' that belong to a single k depends on the prime factors at hand. For higher values of k, factors can appear that are lower than the highest values of k up until then (the factors of different values of k enter each other's domain, I call this *interleaving*). In the scheme above, for example, a 12 is added in k=3, even though 15 was already added in k=2. The number 12 positions itself as a k=3 factor in between the k=2 factors. This interleaving is a typical content-wise phenomenon: the degree to which this happens depends on the numerical values of the (prime) factors involved, it does not affect the structural discussion from earlier. I will return to the specific workings of *interleaving* during the discussion of wave patterns (further in the book).

Here we see how symmetries in the prime factorization diminish the number of prime factors when compared to asymmetric prime factorizations. There are many possible variants of symmetries. It is very possible for a double symmetry to appear along with a triple symmetry in a quintuple prime factorization, or a sextuple prime factorization. For example, take 72=(2 2 2 3 3) with an improvement potential of 11.34. In the asymmetric situation, a quintuple prime factorization should have 32 factors according to the non-corrected formula. The number 72, with a double and a triple symmetry, has only 12 factors: (1 2 3 4 6 8 9 12 18 24 36 72). Twenty factors fall away.

In a scheme:

```
72=(2 2 2 3 3), p=5 => k=5
k=0 => (1)
k=1 => (2 2 2 3 3) => (2 3)
k=2 => (4 4 4 6 6 6 6 6 9) => (4 6 9)
k=3 => (8 12 12 12 12 12 12 18 18 18) => (8 12 18)
k=4 => (24 24 36 36 36) => (24 36)
k=5 => (72)
List of factors: (1 2 3 4 6 8 9 12 18 24 36 72)
```

There are 12 factors out of a possible 32 factors in a fully asymmetric configuration of five primes.

For a fully symmetric configuration of five primes, there is the following number of factors. In a scheme:

```
32=(2 2 2 2 2), p=5 => k=5
k=0 => (1)
k=1 => (2 2 2 2 2) => (2)
k=2 => (4 4 4 4 4 4 4 4 4 4) => (4)
k=3 => (8 8 8 8 8 8 8 8 8 8) => (8)
k=4 => (16 16 ) => (16)
k=5 => (32)
List of factors: (1 2 4 8 16 32)
```

The total is 6 factors out of 32 possible factors in a fully asymmetric configuration of five primes, so 26 factors fall away.

I will now list the possible types of symmetries for p=5. Row 5 of Pascal's triangle indicates that there are 1 5 10 10 5 1 factors for a square-free number. A double prime in a prime factorization of p=5 eliminates a factor at k=1 (the double prime), a factor at k=4 (the double product of 4), three factors at k=2 (the double 2·3, 2·5, and 2·7) and k=3 (the double 3·5·1, 3·7·2, and 5·7·2, and substitutes a factor at k=5. See the example of 420=(2 2 3 5 7)=(2^2 3 5 7) below.

```
n=420 primes: (2 2 3 5 7), p=5 => k=5

      number of factors uncorrected:
      _____________________from Comb (5 0)
      k=0 =>  1       | x
      k=1 =>  5       | xxxxx
      k=2 =>  10      | xxxxxxxxxx
      k=3 =>  10      | xxxxxxxxxx
      k=4 =>  5       | xxxxx
      k=5 =>  1       | x
      _____________________till Comb (5 5)

      Factors corrected:
      k=0 =>  1      (1)
      k=1 =>  4      (2 3 5 7)
      k=2 =>  7      (4 6 10 14 15 21 35)
      k=3 =>  7      (12 20 28 30 42 70 105)
      k=4 =>  4      (60 84 140 210)
      k=5 =>  1      (420)
```

A double-double prime (two double primes) at p=5 (row 5 of Pascal's triangle prescribes a number of factors of 1 5 10 10 5 1) eliminates two factors at k=1 (both double primes), five factors at k=2 and k=3, and two at k=4.

```
n=588 primes: (2 2 3 7 7), p=5 => k=5

      number of factors uncorrected:
      _____________________from Comb (5 0)
      k=0 =>  1       | x
      k=1 =>  5       | xxxxx
      k=2 =>  10      | xxxxxxxxxx
      k=3 =>  10      | xxxxxxxxxx
      k=4 =>  5       | xxxxx
      k=5 =>  1       | x
      _____________________till Comb (5 5)
```

```
Factors corrected:
k=0 =>  1     (1)
k=1 =>  3     (2 3 7)
k=2 =>  5     (4 6 14 21 49)
k=3 =>  5     (12 28 42 98 147)
k=4 =>  3     (84 196 294)
k=5 =>  1     (588)
```

A triple prime in a prime factorization of p=5 causes a widening pattern of two at k=1 (the two threes) and k=4 (two times 3·3·5·17) and six at k=2 and k=3.

```
n=2295 primes: (3 3 3 5 17), p=5 => k=5

number of factors uncorrected:
_____________________from Comb (5 0)
k=0 =>  1       | x
k=1 =>  5       | xxxxx
k=2 =>  10      | xxxxxxxxxx
k=3 =>  10      | xxxxxxxxxx
k=4 =>  5       | xxxxx
k=5 =>  1       | x
_____________________till Comb (5 5)

Factors corrected:
k=0 =>  1     (1)
k=1 =>  3     (3 5 17)
k=2 =>  4     (9 15 51 85)
k=3 =>  4     (27 45 153 255)
k=4 =>  3     (135 459 765)
k=5 =>  1     (2295)
```

Presented on the following page is a prime factorization of p=5 with a quadruple and a quintuple prime. For the fully symmetric version, we find, as expected, the quintupling sequence 5 25 125 625 3125.

```
n=6875 primes: (5 5 5 5 11), p=5 => k=5

number of factors uncorrected:
_____________________from Comb (5 0)
k=0 =>  1       | x
k=1 =>  5       | xxxxx
k=2 =>  10      | xxxxxxxxxx
k=3 =>  10      | xxxxxxxxxx
k=4 =>  5       | xxxxx
k=5 =>  1       | x
_____________________till Comb (5 5)

Factors corrected:
k=0 =>  1     (1)
k=1 =>  2     (5 11)
k=2 =>  2     (25 55)
k=3 =>  2     (125 275)
k=4 =>  2     (625 1375)
k=5 =>  1     (6875)
```

```
n=3125 primes: (5 5 5 5 5), p=5 => k=5

number of factors uncorrected:
____________________from Comb (5 0)
k=0 =>  1       | x
k=1 =>  5       | xxxxx
k=2 =>  10      | xxxxxxxxxx
k=3 =>  10      | xxxxxxxxxx
k=4 =>  5       | xxxxx
k=5 =>  1       | x
____________________till Comb (5 5)

Factors corrected:
k=0 =>  1      (1)
k=1 =>  1      (5)
k=2 =>  1      (25)
k=3 =>  1      (125)
k=4 =>  1      (625)
k=5 =>  1      (3125)
```

For a final example, we again see the difference between two double primes and a single triple prime for different numbers. If you noted them down in a quadratic form: n=300=(2 2 3 5 5)=(2^2 3 5^2) and n=945=(3 3 3 5 7)=(3^3 5 7), they would both be pseudo-p=3. In both cases, two prime factors are thrown away for k=1, but these symmetries still have a different effect on higher k levels: n=300 has 18 factors, and n=945 has 16 factors.

```
n=300 primes: (2 2 3 5 5), p=5 => k=5

number of factors uncorrected:
____________________from Comb (5 0)
k=0 =>  1       | x
k=1 =>  5       | xxxxx
k=2 =>  10      | xxxxxxxxxx
k=3 =>  10      | xxxxxxxxxx
k=4 =>  5       | xxxxx
k=5 =>  1       | x
____________________till Comb (5 5)

Factors corrected:
k=0 =>  1      (1)
k=1 =>  3      (2 3 5)
k=2 =>  5      (4 6 10 15 25)
k=3 =>  5      (12 20 30 50 75)
k=4 =>  3      (60 100 150)
k=5 =>  1      (300)


n=945 primes: (3 3 3 5 7), p=5 => k=5

number of factors uncorrected:
____________________from Comb (5 0)
k=0 =>  1       | x
k=1 =>  5       | xxxxx
k=2 =>  10      | xxxxxxxxxx
k=3 =>  10      | xxxxxxxxxx
k=4 =>  5       | xxxxx
k=5 =>  1       | x
____________________till Comb (5 5)

Factors corrected:
k=0 =>  1      (1)
k=1 =>  3      (3 5 7)
k=2 =>  4      (9 15 21 35)
k=3 =>  4      (27 45 63 105)
k=4 =>  3      (135 189 315)
k=5 =>  1      (945)
```

Above we saw how symmetry in the prime factorization of a number of perspectives n reduces the number of factors (the number of two-dimensional stacking blocks) relative to an asymmetric (square-free) prime factorization.

An important observation is that in *all* cases, both for asymmetric (square-free) and symmetric (square) prime factorizations, the pattern of the number of factors for progressing values of k is exactly symmetric: *as the number of factors increases, so too does it decrease.*

For square=free prime factorizations, the corresponding row of Pascal's triangle is followed. The peak is lower at a triple symmetry compared to two double symmetries, because two double prime factors lead to more combinatory diversity than a single triple prime factor. The reasons for this are hidden away in the combinatory formulas at the foundation of the patterns. Take the final two examples: 300=(2 2 3 5 5) and 945=(3 3 3 5 7), both with p=5 and three different prime factors. For p=5, the pattern is 1 5 10 10 5 1. For both 300 and 945, the 5 in the pattern becomes a 3 for k=1: in both cases, there are only three different prime factors. But the number of values of k=2 changes differently: for 300 there are 5, and for 945 there are 4. Here is an overview for different symmetries (squares) in a p=5 prime factorization:

(row 5 Pascal's triangle)		2310=(2 3 5 7 11):	1 5 10 10 5 1=32
420=(2 2 3 5 7):	1 4 7 7 4 1=24	210=(2 3 5 7):	1 4 6 4 1=16
300=(2 2 3 5 5):	1 3 5 5 3 1=18	30=(2 3 5):	1 3 3 1=8
945=(3 3 3 5 7):	1 3 4 4 3 1=16	30=(3 5 7):	1 3 3 1=8
6875=(5 5 5 5 11):	1 2 2 2 2 1=10	55=(5 11):	1 2 1=4
625=(5 5 5 5 5):	1 1 1 1 1=6 5=(5)	1 1=2	

11: Of position and place

The number of factors of n, the number of building blocks on the discrete inverse proportionality n=x·y, is therefore well-defined and subject to strict rules. This number is completely determined by structural considerations: the number of prime factors p in a prime factorization and the presence and nature of squares. If there are no squares in the prime factorization, Newton and Pascal are dominant. If there are squares in the prime factorization, the number of factors relative to the p^{th} row of Pascal's triangle reduces, as indicated previously.

Squares in prime factorizations are far from rare. Of the first 512 integers, 198 numbers feature a prime factorization with at least one symmetry (a double prime factor), and are therefore quadratic, which is around 39%. The share of square-free integers up to 512 is then around 61%, as 39 and 61 together make 100. According to the table below, the number of square-free numbers progresses to around 60.79% for n=1000000000000000000.

x	n	Number of square-free integers <= 10^n
0		1
1	1	7
2	100	61
3	1000	608
4	10000	6083
5	…	60794
6		607926
7		6079291
8		60792694
9		607927124
10		6079270942
11		60792710280
12		607927102274
13		6079271018294
14		60792710185947
15		607927101854103
16		6079271018540405
17		60792710185403794

The share of square-free integers seems to converge to around 60.7927% (OEIS[414] A059956).

The *number* and the *symmetry* (symmetry here in terms of number of doubles) of the prime factors of a number determine the number of factors of this number, and therefore the number of **positions** where a building block can be stacked. If we look at the number of factors (all factors, not just the prime factors), we can see that there are slim pickings for high symmetries. Take 32=(2 2 2 2 2): the number of factors (the number of stepping stones) reduces from 32 to 6 due to the enormous symmetry.

If we only take the harmonic calculation of the improvement potential into account, we can see that high symmetries of low prime factors, such as 32=(2 2 2 2 2), promise a truly excellent improvement potential. The *values* of the (prime) factors, so their exact **places**, determine the improvement potential. A form of symmetry is at play here too, namely the previously mentioned but more forgiving square and cube symmetry: if the prime factors are positioned *closer to* a maximum dimensional diagonal position, the improvement potential is larger. By now, we can also interpret this as a more convenient distribution of the black stepping stones.

That concludes this discussion of the special relationship between prime factorizations and factors. Squares in prime factorizations, or prime factorizations with symmetries, reduce the number of factors.

Number theorists have mathematically proven that the share of numbers with a square-free prime factorization converges to $6/\pi^2$, the value of $1/\zeta(2)$; 1 divided by the value of the zeta function of 2. This is indeed 60.7927…%. This is where we enter the equally interesting and

[414] The Online Encyclopaedia of Integer Sequences.

intellectually challenging zeta world of Riemann. This is inevitable, really, as the possible configurations of a perspective are determined by prime numbers, and the famous and infamous Riemann hypothesis is at the heart of ideas regarding prime numbers. Here we find ourselves on a deep connection between number theory and recursive perspectivism. For the zeta function and the Riemann hypothesis, see the next paragraph.

12: Number theory, prime numbers, and the Riemann hypothesis

> *'All in all, except to remember that a first-rate mathematician* (Thomas Joannes Stieltjes jr., 1856-1894, HD) *once believed that the most fruitful approach to the Riemann hypothesis was through a study of the growth of M(x) as x -> ∞, the incident is perhaps best forgotten.'*
> H.M. Edwards, 1974, *Riemann's zeta function*, chapter 12.1: The Riemann hypothesis and the growth of M(x).

Recursive perspectivism has slowly, yet inevitably, taken me to the centre of number theory. $1/\zeta(2)$, where ζ is the Greek letter zeta, gives the share of quadratic prime factorizations for all numbers up to an including the asymptotically increasing value of n, which is $6/\pi^2$, and therefore 60.7927…%. I ended up at the zeta function, and therefore the Riemann hypothesis, via the quadratic prime factorizations (see further in this book).

That I end up at the Riemann hypothesis, of all places, is noteworthy. This hypothesis has a near-mythical status among mathematicians. Some mathematicians would give an arm to prove the Riemann hypothesis, as there are many mathematical theorems that rely on it being true (but I suspect it is also true that they think that eternal fame would befall them).

That is not why it has my interest. The Riemann hypothesis revolves around prime numbers. It says – if it is true – something about the distribution of prime numbers over the line of numbers. Improvement processes are based on prime numbers, because prime numbers place quantum theoretical boundaries on perspectivist configurations to define which are possible and which are impossible, and therefore which are simple and which are difficult improvement steps. That is why I include the Riemann hypothesis in this paragraph in my exploration of recursive perspectivism.

I will first detail my relationship with mathematics, number theory, prime numbers, and the Riemann hypothesis, before I inadvertently suggest that I am a connoisseur, or specialist, or even a practiced amateur in these matters. I am none of the above. The purpose of this book is not primarily mathematical, but it is methodological and pragmatic in nature. I want to better understand, highlight, and *apply* the integral path of humanity – as the most imposing example of an experience-based pattern law – together with you to further societal development and improvement. That last part seems to have been neglected during the storm of numbers of the last few pages and this entire Theme IV. However, it will be central again in Section III: *Societal Innovation*.

When searching for a deeper understanding of recursive perspectivism and perspectivist configurations, I automatically end up in number theory and there appears to be a

relationship between the Riemann hypothesis, sizable improvement processes, and societal innovation. Number theory studies integers. Prime numbers form a central topic: integers that are only divisible by 1 and themselves. The fact that prime numbers are deeply rooted in recursive perspectivism, and therefore in everything we experience, is amazing. This 'everything' contains all our interactions with our non-human surroundings (such as perceiving the electron paths of Hydrogen atoms, or giraffes), our multi-actor experiential worlds organized in actors, and our integral human development along *the path of humanity*. Prime numbers structure our experiences, our composite experiences into perspectivist configurations, from perceiving subatomic particles to experiencing our integral societies. And if you say prime numbers, you also say Riemann.

I find mathematics intriguing; it offers a cornerstone for the understanding of anything. Unfortunately, I was never gifted in mathematics as a professional discipline. In high school, it fascinated me, but I also, and mainly, thought – probably due to a lack of understanding – it was a recipe book of which the quality of both the preparations and the meals was varying, from truly inspiring to miserably bad. At university, I was only able to pass my mathematics courses once I stopped thinking about them and simply complied. (I thought that was ironic). Matters such as power laws, logarithms, and infinitesimals have always raised questions from me. Sure, they are useful, but for me, they did not answer any questions regarding the why, what, and how of (discrete and limited in a perspectivist sense) experiencing. (Recursive perspectivism offers a more explicit point of view on these feelings that I was not able to understand and articulate as a teenager). I am still not fond of long mathematical formulas (even short ones). The fact that I regularly had to dive deep into the world of mathematics in the process of writing this book did not put me at ease at all.

Furthermore, the relationship between developing and improving understanding on one hand, and formally proving something on the other hand, is not always clear to me. I have a hard time[415] understanding when mathematicians deem something (formally) proven), or why and how they draw hard lines between formal, conceptual, and empirical argumentations.[416] The mathematical knowledge I do possess is riddled with gaps, and things that I regard as special, or unclear, or worthy of further investigation are apparently matters of common sense or deemed clear *a priori* by some professional mathematicians. For example, number sense, the line of numbers, and its origin.

But, as I said earlier: I make these comments as a non-professional mathematician, or rather a mathematical layperson. I am probably the last person who should make comments like the ones above, because I do not know enough about it and I have not explored these topics deeply. That is why, in the process of writing this book, I often find

[415] I, as a 'philosophical hybrid' of a phenomenologist and a pragmatist.
[416] The question remains whether it is possible to draw hard boundaries between sizeable domains in recursive perspectivism.

myself on truly thin ice, and then I hold on again to the Schrödinger's quote from my preface. Perhaps it would do you good, especially if you are a professional mathematician, to consider this while you are reading this book. With this as a background, I will now, slightly uninhibited, enter the domain of the Riemann hypothesis. I think that this hypothesis, in its non-complex, discrete interpretations (see later on), is of central importance to our understanding of *the path of humanity*.

The Riemann hypothesis and the zeta function. On to the Riemann hypothesis itself. This hypothesis is named after (Georg Friedrich) Bernhard Riemann, German mathematician and physicist (1826-1866), who, among other things, paved the way for the general theory of relativity of Albert Einstein. The Riemann hypothesis was nothing more than a comment in one of his scarce but central works on number theory. But the hypothesis might be regarded as the Olympus of mathematics as well, and it has defied every proof or rebuttal since 1859. Riemann was an undisputed genius.

There are excellent examples of popularizing mathematics books regarding the Riemann hypothesis that will be known among enthusiasts. I am thinking of *The music of the primes* by Marcus du Sautoy and *Prime Obsession* by John Derbyshire. As an interested layperson, I found myself eagerly reading them. Scientific specialists who are proud of their extensive professional knowledge would not be found dead with popularizing books. Admitting to reading such books – especially learning from them – is bad for your stature as a professional specialist in the scientific world, with conceptual languages and dialects that are often hard to understand for outsiders. I do like to read good popularizing books about new domains, and I learn a lot from them. By writing these books, people form inviting bridges over the moats of their disciplinary castles. It is precisely our fragmented and late-modern time that requires these books to be written and read. They help us become more plurimodern.[417]

When you study the original sources, the fate of the specialist quickly awaits you: you will know a lot about little (but you know that with quite some certainty). If you only read superficial sources, the fate of the generalist hits you: you will know little about a lot (but if that is true?) Again, we see the discrete inverse proportionality in all its glory, now with the generalist and the specialist on both ends. The broadness of the topic on one hand, the depth of knowledge on the other hand, they too form two perspectivist dimensions and an incommensurable pair. Both the generalist and the specialist fall short when you want to improve complex matters, such as societal practices.[418] This is no easy matter!

[417] Rudiger Safranski's book about Heidegger also has my recommendation.

[418] See also my dissertation, the generalist is the B type and the specialist is the C type. For complex situations, the addition of a D type is required. In general, that is located at, you guessed it, the diagonal.

John Derbyshire's book attempts to explain the Riemann hypothesis to intelligent laypeople, and that won me over.[419] At first, the Riemann hypothesis sounded somewhat cryptic to me:

> *All non-trivial zeros of the zeta function have a real part 1/2*

The zeta function is as follows:

$$\zeta(s) = 1 + 1/2^s + 1/3^s + 1/4^s + 1/5^s + \ldots$$

Or, in short:

$$\zeta(s) = \sum_n^\infty 1/n^s$$

For s=1, the zeta function results in the harmonic series: $1 + 1/2^1 + 1/3^1 + 1/4^1 + 1/5^1 + \ldots$, which – when used in the correct situations – calculates the improvement potentials of configurations in a single perspectivist dimension. If you let the harmonic series continue indefinitely, it diverges, as was proved by d'Oresme in the Middle Ages: take an arbitrarily large value, and there will be a value for n for which the zeta function for s=1 is substantially larger. This way, $\zeta(1)$ progresses to infinity.

For s=2, the zeta function results in the quadratic harmonic series: $1 + 1/2^2 + 1/3^2 + 1/4^2 + 1/5^2 + \ldots. \approx \pi^2/6$, over 1.64, and thus converges. For *all* values of s larger than 1, the zeta function converges. In other words, there is a 'solution' for every value of s.[420] This is caused by the increasing value of the denominator. If you interpret the zeta function as continuous, which is typical in the 'zeta world' as far as I can tell, then zeta progresses to infinity as s moves down towards 1. When s takes on very large values, zeta approaches 1. The graph of zeta for a value of s that continuously increases resembles that of a continuous inverse proportionality. The table below lists some determined and calculated values of the zeta function.

[419] The title '*Prime Obsession*' did not do that at all.

[420] 'A solution' is actually a special way to phrase it, because for every subsequent n, this solution is different per s on a micro level, because it is slightly larger. As the irrational number π can be calculated for increasing numbers of decimals, so too can this 'one solution' be determined increasingly well: there is a limit. Mathematicians become pragmatists here too.

s	zeta
1	No solution, divergent
1.0001	*10000,576* (*Non-existent from a perspectivist point of view.*)
2	1.6449 ≈ $\pi^2/6$ (Euler's closed form solution of the Basel problem)
3	1.2021… (Apéry's constant)
4	1.0823… ≈ $\pi^4/90$ (Euler)
5	1.0369…
6	1.0173… ≈ $\pi^6/945$ (Euler)

Solutions for the zeta function

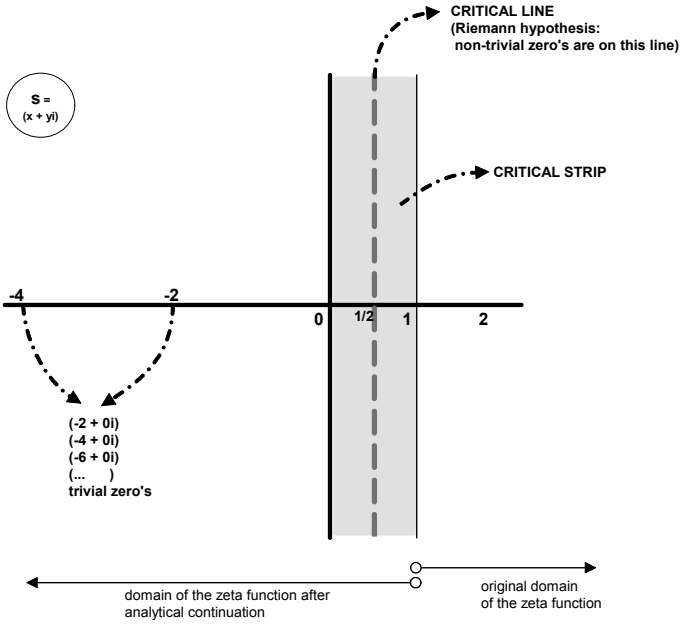
The phrase 'real part' in the Riemann hypothesis implies the use of complex numbers: a mathematical expansion of real numbers. Understanding complex numbers and complex arithmetic is not a requirement for this book, my own knowledge regarding the topic is superficial. For a brief overview, I will refer to Wikipedia: complex numbers allow you to find solutions for equations such as $x^2=c$, where c is a negative number. It is then sufficient to define an *imaginary* solution for $x^2=-1$, a solution that we will not discuss further, which is i (imaginary). Complex numbers have two components, one real and one imaginary, and they can be visualized as a position on a surface with a real horizontal x axis and an imaginary vertical y axis. They take the form (x+yi). When performing calculations with complex numbers, which is similar to calculating with regular numbers, there is now an extra rule: $i^2=-1$. For example, multiplying two complex numbers can allow the products of the imaginary components to become real again: take 3i times 5i = $15i^2$= -15. That concludes a very brief explanation of the topic, but as I said: further understanding of complex numbers is not required for this book.

In the original text by Bernhard Riemann, the Riemann hypothesis uses these complex numbers as input (as domain) for the zeta function.[421] According to mathematicians who have a lot more understanding on the topic than I do, Riemann masterfully manages to expand the domain of the zeta function of all complex numbers > x=1 to virtually the entire complex surface, using *analytical continuation* (again, further understanding of this concept is not required).

The Riemann hypothesis then boils down to the fact that all non-trivial[422] zeros of the zeta function are between (0+yi) and (1+yi), which is called the critical strip, a vertical beam of width 1 just right from x=0. (See the figure below).

[421] Bernhard Riemann, *on the number of primes less than a given magnitude*, published by Monatsberichte der Berliner Akademie, November 1859.

[422] *Trivial* zeros are located to the left of the zero on the real axis for integer multiples of (-2 + 0i).



The Riemann hypothesis: all non-trivial zeros of the analytically continued zeta function are on the critical line on the complex surface.

To be more exact, the Riemann hypothesis states that all non-trivial zeros are located *exactly* on the vertical complex line (1/2 + yi), halfway on this critical strip (the critical line, the vertical dotted line in the figure). According to the Riemann hypothesis, the critical zeros *all* have a real part of 1/2 and therefore *all* follow the form (1/2 + yi). This has been determined for hundreds of millions of individual zeroes to extreme values of y, and so far, it has been found to be true in all cases. Empiricists (in this context, people who believe in laws based on series of individual observations) are generally easily convinced by such an enormous experimental burden of proof, but evidence base will never lead to a conclusive mathematical proof. Number theory, for example, also knows of cases in which assumptions were experimentally true to a very high degree, and then were found to be false for large amounts of numbers, or large numbers in general. (This also occurs frequently in the empirical world).

Prime numbers arise pragmatically by recursive perspectivism. Understanding of complex numbers is not required for the purposes of this book. From a recursive perspectivist point of view, there exist only positive integers in the n-dimensional perspectivist space. The mathematics surrounding recursive perspectivism are thus mainly involved with integers. *Perspectives can consist of perspectives, but there are no arbitrary fractions of perspectives.* Fractions are non-existent to a perspectivist, perspectives are quanta. (Think of Planck's energy quanta: energy packets do not occur in 'random in-between states'). Other examples are π or *e* amount of perspectives, or even half a perspective. It is hard to

connect them with an experiential meaning, unless you turn them into a configuration. The same applies to the concepts of zero and infinity: they are not useful to a perspectivist consciousness. Zero perspectives implies a state without consciousness, and a state of consciousness is always set at a specific number of perspectives.

A change of consciousness either results in a different configuration for the same value of n (the position on the isosurface changes), or in a different value of n (a jump to a position on a different isosurface).[423] A set of a number of n perspectives can only assume very specific positions due to the quantum theoretical discrete nature of perspectives, and thus it can only form very specific configurations of perspectives in a perspectivist space (see the discrete points on the isolines and isosurfaces, no matter how many dimensions it takes). Factually, you are folding a long line of n perspectives neatly back from one to multiple dimensions, and whenever you run into a prime number, it limits your folding possibilities: you cannot fold them any further. Therefore, for every value of n, you can only reach the discrete points on the isosurface that is shaped by all factorizations that correspond to that n.

The domain of recursive perspectivism is thus shaped by specific natural integers n. The domain in which the Riemann hypothesis is at play, the critical strip and the critical line with x=1/2, is untouched by recursive perspectivism, as the Riemann hypothesis only involves complex numbers there.[424] In terms of the figure above, recursive perspectivism can only deal with the real integer points 1, 2, 3, …, on the baseline to the right.

However, when I found the function f_p from the entire number line along with the previously mentioned subsequent jump from structure to content (the difference of 1/2 k in the perspectivist analysis), numerous thoughts regarding prime numbers and symmetries started to surface, thoughts I had been struggling with many years ago, but they were not entirely coherent at that time.

I already realized in the 1980s, when I first thought about the topic of my dissertation (on multi-actor models and processes) that perspectivist consciousness, the perspectivist space and societal innovation (progress) are crucially linked to prime numbers. The zeta function, as presented above,[425] seamlessly fits in with the concepts of *improvement potential* and *experiential value* along the axes and the diagonals of the perspectivist space.[426] It follows the

[423] See also my dissertation, Trinity: Model-based support for multi-actor problem solving, Chapter 4: *A generic theory of qualitative modelling*. Page 88, to be more specific.

[424] From a strict recursive perspectivist point of view, the famous analytical continuation of Riemann does not apply here, and I am honestly glad about that, because I find it hard to understand how such a process can turn divergence into convergence.

[425] The regular zeta function, not the analytical continuation of Riemann.

[426] I myself have wondered, looking at the multidimensional perspectivist space, why it is so hard for mathematicians to prove the Riemann hypothesis. Is it not evident that when you fill the square-free positions between the axes and diagonals with blocks, symmetries are bound to occur? But this probably does not suffice as a mathematical proof.

axes for s=1 (the diverging harmonic series 1/1, 1/2, 1/3, 1/4, …), the two-dimensional diagonal for s=2 (the series 1/1, 1/4, 1/9, 1/16, …), the three-dimensional diagonal for s=3, and so on for higher dimensions. When you sum the series to infinity, which is pointless from a perspectivist point of view and reaffirmed here by mathematics due to convergence ('it does not add anything'), you have a value for the zeta function for integers > 1, so 2, 3, 4, ….

Furthermore, the perspectivist space is closely related to the symmetry corrections: the diagonals contain quadratic configurations (second and higher orders, and combinations), and blocks fall away relative to the asymmetric (square-free) positions, because diagonal positions are, bearing Boltzmann in mind, not distinguishable from one another. The position (3 3) is exactly the same as the inverse, (3 3), they more than strongly resemble each other: they are indistinguishable and therefore represent one and the same identity, one fewer than two. The position (3 3) is one diagonal position on the two-dimensional discrete surface, not two, so one disappears. That does not apply to (2 3) and (3 2), or (1000000000 1000000001) and (1000000001 1000000000): (2 3) and (3 2) are two different positions, and therefore two different identities,[427] and that also applies to (1000000000 1000000001) and (1000000001 1000000000)

This way, the perspectivist space naturally ('automatically') deals with symmetry corrections: symmetries, quadratic factorizations, disappear from the corresponding diagonals (dependent on the dimensionality of the diagonal). Isohypersurfaces without diagonal positions are square-free by definition. If we continue all the way up to the level of the prime factorizations, the square-free prime factorizations will be located beside the diagonals, or better put: *in between the various diagonals.* In short: all non-diagonal positions of prime factorizations are square-free.

In terms of statistical entropy, symmetries, or quadratic (prime) factorizations allow for fewer *alternatives*, or micro configurations,[428] compared to square-free (prime) factorizations. They thus influence the entropy considerations of Boltzmann and the probability of macro configurations to occur.

This indicates deep relationships between the perspectivist space, prime numbers, and probability processes such as flipping a coin or throwing a dice. ***All three are based on Pascal's triangle: a triangle with a combinatory, binomial, and a probabilistic interpretation.*** We can now better understand the central position of the zeta function that plays a key role

[427] Similarly, the points (2 2 3), (2 3 2), and (3 2 2) are positioned neatly on the two-dimensional diagonals of a three-dimensional cube of blocks: three positions remain. The point (3 3 3) only takes one position in the three-dimensional space. The points (2 3 5), (2 5 3), (3 2 5), (3 5 2), (5 2 3), and (5 3 2) take six positions.

[428] I always thought – and still think – that it is intriguing that when identities disappear from diagonals, prime numbers pop up on the edges of this surface to compensate for the recently vacated positions. Prime numbers along the axes (the dimensions) compensate for the disappeared identities, and repair – or so I suspect – some kind of identity balance.

in the Riemann hypothesis and it will be discussed further in a moment. The zeta function connects the perspectivist space with prime numbers and probability theory.

Furthermore, something never sat quite right with me regarding prime numbers, namely the *Sieve of Eratosthenes*. A sieve is a great way to *retain* prime numbers from a series of numbers up to a certain value of n. You first remove – I am describing a simple sieve – the multiples of two, then the multiples of three, then the multiples of five (the multiples of four were already removed with the multiples of two), then the multiples of seven (the multiples of six were removed with the multiples of three), and so on, for the entire line of numbers up to n. You are then left with the prime numbers up to n. Prime sieves operate from the assumption of the *a priori* existence of the entire line of numbers. They then remove all non-prime numbers from this line, resulting in a list of prime numbers. You are left with the prime numbers, hence the name *sieve*.

I believe that a sieving procedure such as this, essentially an elimination process, turns a more original, a more fundamental *constructivist* process upside down. I regard prime numbers as essential *vacancy fillings* when you consistently wish to build inversely proportional constructions both effectively and efficiently. Prime numbers therefore do not remain after a sieving process is unleashed on an *a priori* existing integral line of numbers (they are not analytical), but they confront you as unfilled positions, as vacancies, as numbers to be added in a construction process (they are synthetic, constructivist). They are added *ex aequo* to a developing line of numbers to realize the best possible discrete inversely proportional relationships. From this point of view, prime numbers and lines of numbers do not exist *a priori* or out of necessity, but they are the result of an experience-based optimization process, allowing manipulation with increasing amounts of perspectives as effectively and as efficiently as possible. This manipulation requires you to easily compose, disassemble, and reconfigure perspectives along numerous perspectivist dimensions in the perspectivist space, which is done based on principles of balance along inverse proportionalities (along isolines and isosurfaces of often two or three dimensions, because that is simple) and by jumping between isosurfaces. And when you shift set amounts of quantized perspectives n along inverse proportionalities, isolines and isosurfaces arise with prime numbers as smallest possibilities. If n is a prime number, then – strictly for n – you have no stepping stones at all between the embankment stones on the perspectivist dimensions (see also the upcoming figure, for two dimensions, where the black blocks for the prime numbers 2, 3, 5, 7, and 11 are *only* located on the axes).

The previously shown figure of a developing discrete inverse proportionality (repeated below) illustrates how prime numbers emerge (arise) pragmatically in the process. Rising along the axes, we can see how non-prime numbers can be created from previously occurring numbers along the developing line of numbers, such as 4 from 2 times 2, 6 from 2 times 3, and 12 from 2 times 6 and 3 times 4 (and from 2 times 2 times 3 in three dimensions). But the vacancies for prime numbers are emergent, they arise automatically as obstacles, they cannot be calculated by multiplying previously occurring (passed)

numbers in any way. They can only arise by the addition of a single block: the unity block, to the blocks that are already present.

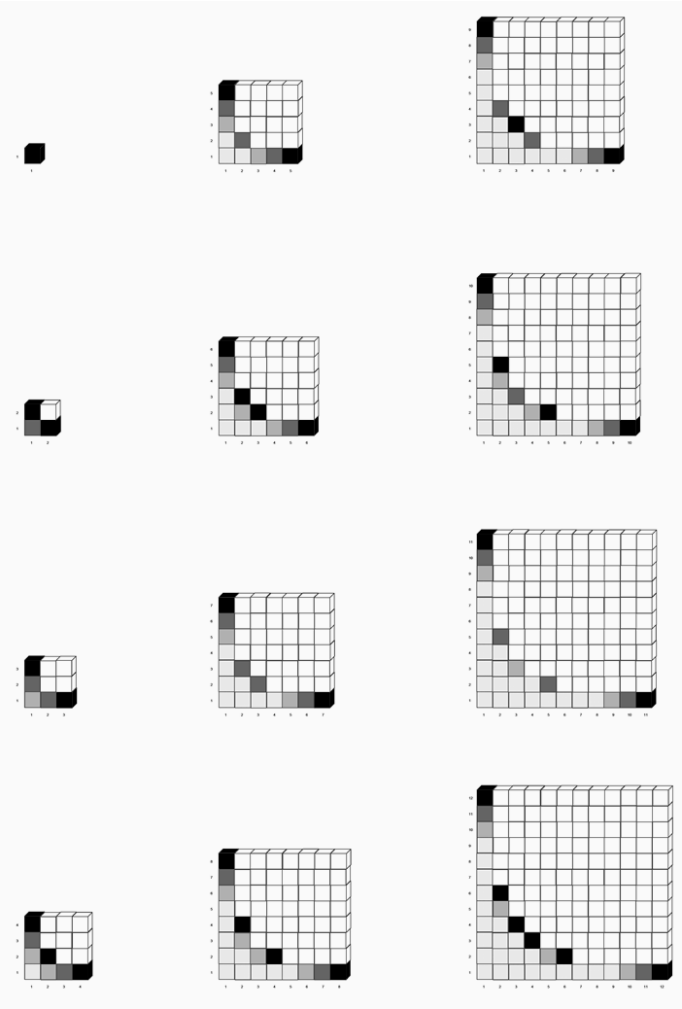
A 'positive' constructive and recursive definition for prime numbers would therefore be a number that, starting at 1, can arise by adding 1 to a lower number, and not by multiplication of the lower numbers. Or in analogous, but reverse terms: a number that, starting at a very large number, can only arise by removing one higher number, and not by removing a wider row or column (also in more than two dimensions).

Note that removing or adding a single block indicates a jump in the perspectivist space from somewhere in this space to the axes, resulting in a prime number (actually: a prime number of blocks). Contrarily, adding one block to a prime number, or removing one block from a prime number, indicates a jump from the axes to somewhere in the perspectivist space.

These kinds of jumps only change n by one, but they can be extremely erratic. They can cause a massive jump in the perspectivist space. They are the underlying cause for the fact that the incremental path is unsuitable for the improvement of societal practices, or for any other large-scale improvement. This, in turn, is the reason for the jerky course of human development (any development, actually).

The largest jumps increase or decrease n by 1, and at the same time, they change the underlying prime factorization of n of a prime number to a power of 2 (or vice versa). Take the step from 256 to 257, practically equal in size, a difference of less than 0.4%. But 256=(2 2 2 2 2 2 2 2) and 257=(257), a prime number. We can also see this in the corresponding harmonic improvement potentials: respectively $(1+1/2)^8$=25.62 and (1 + 1/2 + 1/3 + … + 1/257)=6.128, a difference of a factor 4. It is no wonder that Thales falls into the well, and that the Thracian maid would rather sit beside it.

These ones, these unity blocks, are only placed at the end of the developing x and y axes (in two dimensions, that is). If you were to neglect these blocks every now and then, gaps (vacancies) remain in the wall that is being constructed (the fundamental theorem of arithmetic displays gaps). These gaps do not just remain along the axes at the positions of the prime numbers, they propagate forward to all factorizations of numbers that should contain the missing prime number in the prime factorization. Places at higher isolines and iso(hyper)surfaces then stay vacant. The wall or the (hyper)space becomes a Swiss cheese (or an *inverse* sieve).



Quantized positions for increasing values of n fill the surface up to the line n = x·y, without doubling. (Three generations are depicted: the darker the squares, the more recently they were filled.)

The box on the next page illustrates how I create the number line from emerging prime numbers, in contrast to the idea that a number line was always there as an *a priori* phenomenon.

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The emergence (the rise) of prime numbers

Say that we have a large box of oranges. One by one, we remove the oranges from the box and line them up in a row. Now we wonder: when can we make the next row by merely adding a single orange, and not by taking a multiple of a previous row? In that case, the length of the row is a prime number. We do not express the
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length of a row in the number line; it does not yet exist. We address every subsequent row with a number from the alphabet, from a to z. We can get started with quite a large box of oranges this way (26 to be exact, were it not for the fact that we do not know that yet, we could make a numeral system with 26 numbers in this manner).

We start by putting one orange next to the box. That is a, and it is not yet a row (1 is not a prime number). Then we add one more (row b). Its length is a prime number, because it cannot be created by combining previous rows. We add another, resulting in row c. This row cannot be created from row b, and its length therefore represents a prime number. We add another one, row d. This can be created from two rows b. Say that we note this down as bb, it is therefore not a prime number. We add another row: row e, its length is a prime number again. And another: row f. This can be created from both row b and row c. I distinguish the two options with a vertical line: bbb | cc. The length is thus not a prime number. We move on to row g. Again, this cannot be created from a multiple of previous rows, so we are dealing with a prime number. The prime numbers fill in the vacancies.

I put it in a diagram, along with the notation that we use for what we call the number line in present times:

●	a		1
●●	b	prime number	2
●●●	c	prime number	3
●●●●	d	bb	4 = (2 2)
●●●●●	e	prime number	5
●●●●●●	f	bbb | cc	6 = (2 3)
●●●●●●●	g	prime number	7
●●●●●●●●	h	bbbb | dd	8 = (2 2 2)
●●●●●●●●●	i	cc	9 = (3 3)
●●●●●●●●●●	j	bbbbb | ee	10 = (2 5)

Thus, the vacancies for the prime numbers emerge automatically if we start creating longer rows from shorter rows. They arise in experience. In principle, if we use short rows that have a length that corresponds to prime numbers, we can empty any kind of box of oranges and arrange the oranges in rows, no matter how large the boxes are. The rise of prime numbers is thus essentially driven by the improvement desire to create the rows with larger building blocks.
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Although prime numbers never drew any attention of note from me as a formal mathematical concept (formal implies, or postulates, an *a priori* existence), they are definitely a prominent part of recursive perspectivism and multi-actor process management for pragmatic reasons. My dealings with them were not very 'mathematical',
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which you saw for yourself in the above section. Instead, I approached (prime) numbers in terms of constructivist entropy, identity, probability, and value. That is because I regard numbers to be connected to developing configurations of perspectives (composite experiences) instead of the other way around, so not as independent *a priori* entities.[429]

Make no mistake: as elements of the number line, numbers are essential to the understanding and comprehension of configurations of perspective. Those configurations correspond to positions in the discrete perspectivist space. *But first there is experience for mankind, first there are configurations of perspective, and only then is there number sense, and the notion of a number line.*[430] Humans as improvers create the first numbers and the first prime numbers while they are improving, they are not there *a priori*. I always found that obvious, really. Look at children growing up: they are far into their journey as little, experiencing humans, before any numbers arise in their experiential worlds, let alone a comprehensive number sense that involves multiplications and prime numbers. To view this in reverse is a pure fabrication in my opinion (look for example at the way in which developmental psychologist Jean Piaget regards the development of expertise). Two-year-old children may know the meaning of words such as one and two, they could ask for two pencils, for example. But they cannot really count yet. Three and four-year-olds can recognize quantities up to four or five, but reciting the number line can often prove to be problematic (they suddenly count like 1 4 2 3). Their number sense, their understanding of numbers, is growing slowly. However, children often have no problem finding the quickest route to the cookie jar, and these types of experiences are definitely composed of surprisingly many and versatile configured perspectives. Children already use enormously complex configurations of perspective, and they quickly do so in an effective and efficient manner, without distinguishing the underlying numbers. (We as adults do the same).

Naturally, once we possess number sense and many other 'intermediate' experiences (intermediate results), we deploy it intensively to garner more experiences and to structure them. Look at empirical and other sciences, for example. The fact that number sense persistently holds a central place in the manner in which we deal with our surroundings, as shown by numerous pattern laws, should indicate that it is also central to the inner workings of our consciousness. It was not for nothing that earlier in this book, I stated that experiences form themselves to the contours of the *a priori* recursive perspectivist landscape *subconsciously*, along perspectivist dimensions, because that works. But it would not surprise me if we lose our earliest memories of our youth *because* we did not yet possess adult, pragmatically adequate networks of perspective. Since our childhood, our earliest perspectivist networks-in-developments have adapted and expanded so radically, changed

[429] There is a fine paradox at play here. Number sense develops during the configurative experiencing of a perspectivist consciousness. At the same, the improvement seeking nature of a perspectivist consciousness allows perspectivist dimensions and discrete inverse proportionalities to be sought after and found. That is how a perspectivist consciousness, with experience, first comes to an understanding of numbers that then allows it to understand itself better. This is precisely the game that occupies me in this book.
[430] Aristotle wins from Plato at first, but Plato slowly stands back up during the process!

so extremely, that they would not be recognizable to us anymore; they have literally disappeared from our perspectivist consciousness.

Summarized, from this point of view, prime numbers arise pragmatically in some sort of subconscious self-organization, amelioratively experiencing and manipulating different numbers of perspectives n along different dimensions. We find prime gaps in our experience; we encounter them in a confronting manner and fill them up. Balance principles and desires for improvement are at the foundation of this. Prime numbers are not there *a priori*, but they arise *ex aequo*, in the process. (You may interpret that literally, as far as I am concerned: we humans are still looking for increasingly large *prime numbers*.) That is because a perspectivist consciousness, in its pragmatic search for value, will subconsciously always attempt to follow the inverse proportionality *in* an isosurface as accurately as possible, or attempt to cross over to *other* isosurfaces as efficiently as possible. That is how you employ perspective as effectively, efficiently, and organized as possible. And at a certain moment, we also become aware of the number line (as a young child), with prime numbers (as a young teenager) as vacancy fillers in a development and configuration process (as a middle-aged man). But in actuality, we discover prime numbers as a mathematical puzzle to be solved, so *a posteriori,* afterwards.

The broad subconscious presence of pattern laws within ourselves (Zipf in the process of writing a book) and around ourselves (Benford, bell curves in species) forms an empirically reasoned backdrop for this conception. Even in a box of oranges (the bell curve) and the shell of a snail, and a book, and salaries of CEOs (Zipf, the inverse proportionality), and in our integral societal development (*the path of humanity*), the perspectivist workings are present. You will not see it until you are aware of it. Numbers are not there at first, they do not exist *a priori* in a consciousness. But a perspectivist consciousness quickly develops a perspectivist space with many discrete inverse proportionalities and dimensions like space and time;[431] object and subject; pluriformity, similarity, and unity. Based on that, we soon develop a number sense. And because we humans are all improvers, sooner or later, we all have a basic understanding of numbers. Mathematics, as a prominent science, focuses on that.

This vision raises an interesting question regarding the Riemann hypothesis. Empirically, this hypothesis is unshakable, as evidenced by the many calculations of increasing numbers of zeros on the critical strip. The first hundreds of millions of zeros have been calculated and they all adhere to the Riemann hypothesis, neatly aligned on the critical strip. Blink with your eyes, and more have been tested. I believe that this is because we are improvers, looking for configurations of perspective that generate the most value in the fastest

[431] The temporary dimension keeps track of changing flux of perspectives in a consciousness, whereas the spatial dimension allows a return to the same experiences. For a perspectivist interpretation of space and time, see Part 1 of the series Society in perspective: *A philosophy of the societal practice*.

manner. In that process, we generate the prime numbers, we make sure that we can place our oranges quickly and effectively in long rows and reconfigure them in different ways.

I myself suspect that the fact that the non-trivial zeros of the Riemann hypothesis are located on the critical line is exactly the same as the fact that the factorizations of square-free integers neatly align with the corresponding discrete inverse proportionalities. If one of your requirements for a numeral system is the ability to allow for quick perspectivist reconfigurations, you may end up with inverse proportionalities automatically. A consciousness then subconsciously chooses perspectives that adhere to that (a structural desire), and create value (a desire in terms of content). Mathematics is then a process that makes us aware of our structural presuppositions of our consciousness, preoccupied content-wise as we humans generally are. Perhaps that is why many people call mathematics abstract. And it is: it explores the structural side of our presuppositions regarding content (structure versus content).

But can we *formally* prove something that arises pragmatically, in experience? How do you irrevocably prove the presence of a specific orange on a specific table, other than seeing or showing it, other than testing that you can do (and experience) things with it that you could 'normally' do with 'an' orange? How do you prove, other than illustrating it, that you can divide a row of oranges into an integer amount of smaller rows? And is a prime number that much different? *Can* you actually prove that 2 times 3 does not equal 5, or is *that* what we call a formal proof? This makes me think of the fact that in the *Principia Mathematica* by Whitehead and Russel, a few hundred pages are dedicated to proof that 1 + 1 equals 2. And then I have not even mentioned the name Kurt Gödel yet.

Two more central functions besides Zeta: Möbius and Mertens. In his book, Derbyshire expands on the relationships between three important functions regarding prime numbers and the Riemann hypothesis: the previously discussed zeta functions (see earlier), the Möbius function, and the Mertens function. The Möbius and the Mertens functions are purely involved with natural numbers, not complex numbers, just like recursive perspectivism, which is why Derbyshire attracted my great interest.

The Möbius function. The Möbius function μ(n), named after the German mathematician and astronomer Augustus Ferdinand Möbius (1790-1868), seems like a somewhat bizarre function at first glance. However, it stands right beside the zeta function in the heart of number theory. It revolves around prime factorizations and it is defined as follows:

- The domain of μ is all positive natural integers N (so 1, 2, 3, …)
- μ(1) = 1
- μ(n) = 0 if the factorization of n contains a square.[432]

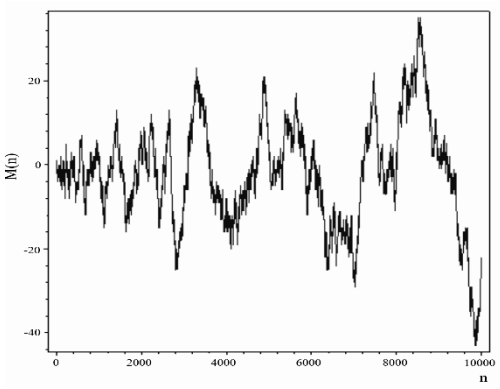
[432] One or more specific prime factors occur more than once, as in 12=(2 2 3), or 27=(3 3 3), or 300=(2 2 3 5 5). Note that this always involves – possibly combined – diagonal positions in the perspectivist space.

- $\mu(n) = -1$ if n is a prime number, or the product of an uneven number of different prime numbers.[433]
- $\mu(n) = +1$ if n is the product of an even number of different prime numbers.[434]

The Mertens function. The Mertens function M(m) is named after another German mathematician called Franz Mertens (1840-1927). It is defined as the cumulative Möbius function ('sigma Möbius') over all integers starting at 1 (inclusive) up to a certain numerical value m. In other words: you successively add the values of $\mu(n)$, all those zeros, ones, and minus ones, for a value of n that goes from 1 (inclusive) to m (inclusive):

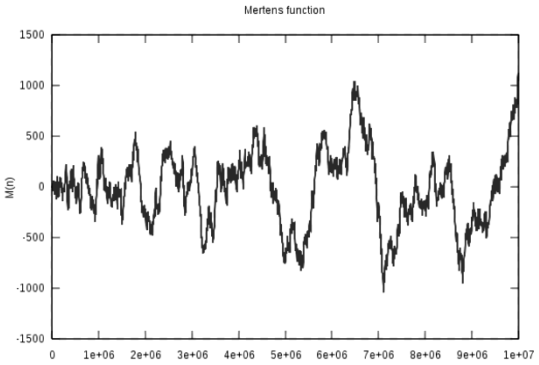
$$M(m) = \sum_{n=1}^{m} \mu(n)$$

As every Möbius step results in 1, 0, or -1, the Mertens function results in 0, or a positive or negative integer, and the Mertens function can never be larger than m or smaller than –m. The graph of M is mysterious and oscillates wildly. On the following page, you will find the figure of the Mertens function from Wikimedia for m=10000 and from Wikipedia for m=10000000 (so 1000 times as large):



Mertens function up to 10000. Source: Wikimedia

[433] In short, the prime factorization of the number is than square-free and p=uneven, so this does not refer to the regular uneven nature of a number itself, but the uneven nature of the number of prime factors p.
[434] The number is then quadratic and p=even.



Mertens function up to 10000000. Source: Wikipedia

I think I see a resemblance of a disturbed practical scale invariant wave pattern, a wave with increasing amplitude and decreasing frequency, but others mainly see noise. I will return to this in a moment.

The Denjoy interpretation and probability. There is a fascinating and deep relationship between the *Riemann hypothesis*, the *Mertens function*, and a *Bernoulli experiment.* That is because the Mertens function, according to *Denjoy's probabilistic interpretation* of the Riemann hypothesis, resembles the results of a Bernoulli experiment. A Bernoulli experiment is a binary *random walk,* a journey during which for every step, you have a choice between the same two options. An example is a long series of random results of coin tosses, heads or tails (a *coin toss sequence)*. If you graphically display this sequence of results, of which you have already seen some examples, and more will follow in a moment, you will see a special and characteristic path.

Arnaud Denjoy was a French mathematician who lived from 1884 to 1974. To get a better understanding of prime numbers, we enter the domain of probability with the Denjoy interpretation of the Riemann hypothesis: working with (un)certainties. It was Gauss, Riemann's mentor, who approximated the occurrence of prime numbers with coin tosses in a probabilistic manner, a century before Denjoy.

During the discussion of the Denjoy interpretation of the Riemann hypothesis, I will follow specific pages from the 1974 book of Howard M. Edwards, which is well known among number theoretical mathematicians.[435] In section 12.1, 'The Riemann Hypothesis and the growth of M(x)', Edwards proves (in line with the well-known British mathematician John Littlewood):

> *In order to prove the Riemann hypothesis, it would suffice to prove that M(x) grows less rapidly than* $x^{(1/2)+\varepsilon}$ *for all* $\varepsilon > 0$.

[435] Howard M. Edwards, Riemann's zeta function, Academic Press, 1974

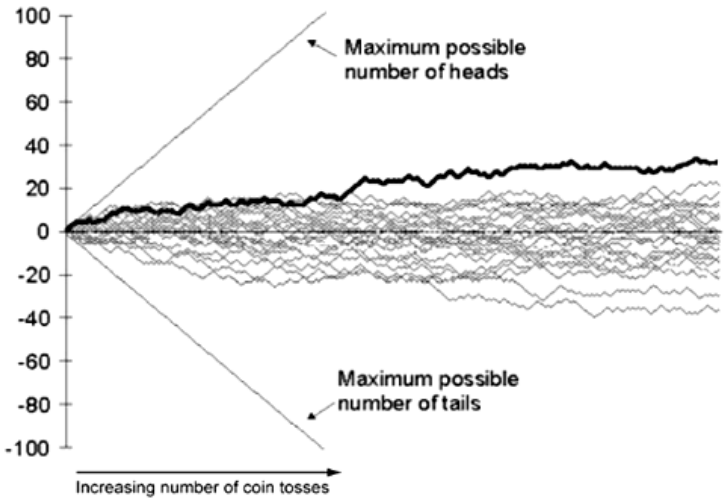
In section 12.3, he specifically comments on *'Denjoy's probabilistic interpretation of the Riemann hypothesis'*. He writes: *"One of the things which makes the Riemann hypothesis so difficult is the fact that there is no plausibility argument, no hint of a reason, however unrigorous, why it should be true"*.[436] According to Edwards, the Denjoy interpretation offers at least some kind of resemblance of a handle on the Riemann hypothesis, a handle that is probabilistic in nature. I describe and cite his reasoning (and indirectly that of Denjoy):

In a sequence of coin tosses (a Bernoulli experiment), *"with probability 1 the number of heads minus the number of tails grows less rapidly than* $N^{(1/2)+\varepsilon}$*."* Here, ε is a number that can become arbitrarily small, but no matter how small ε is, this limit must have a probability of 1, as long as you keep tossing coins for a long enough period of time (it applies asymptotically, see also the 'big O' notation: $M(x) = O(x^{(½ + \varepsilon)})$ in a moment, which expresses the exact same process).

On the next page, I repeat a graph of a number of coin toss sequences that illustrates this. Graphs of such *random walks* are quite similar to the Mertens function according to (some) mathematicians (see above), which I am not sure about, but more on that later. We do not see all the sequences progress more or less linearly, but they bend towards the horizontal balance axis as we progress, and the majority of the sequences stays within plus or minus $n^{½}$ (√n or 'square root of n').

[436] This may be true mathematically, but in strictly pragmatic terms, it is quite obvious that when configurations of improvement perspectives are employed, in which improvement perspectives generally represent a determined value, all possible perspectivist configurations are employed, and that due to the symmetries in the perspectivist space, the number of even and uneven prime factorizations in complex situations will become increasingly equal in the long term.

Figure 2. The balance of heads and tails over an increasing number of coin tosses.



The actual number of heads and tails does not converge towards the mean; rather, it diverges away from the mean.

Courtesy of Dr. Nigel Turner, Centre for Addiction and Mental Health, the Institute of Ontario.

Now take a very large square-free integer n. The Möbius value μ(n) of this number must be +1 or -1, as the number is square-free. The number n *probably* has a large number of prime factors. The larger the number n, the more *probable* it is (the larger the chance) that the number of prime factors is larger too. This is because the probability that we are dealing with a prime number decreases: prime numbers became sparser, the density of prime numbers 1/log x approaches 0 for increasing values of x (this follows from the *Prime Number Theorem*). Consequently, the products of two prime numbers, three prime numbers, etc., become sparser as well, but at a slower rate. The probability for a higher value of p thus increases (we saw the same in tables displayed earlier in this book).

According to Edwards, it is now a very reasonable probabilistic assumption that the probability of μ(n) = +1 is exactly equal to the probability of μ(n) = -1. After all, there are no arguments to assume that an even or uneven number of prime factors is more likely. Following that same principle, it is also a very reasonable assumption that subsequent values of μ(n) are independent of each other. Knowing a value of μ(n), +1 or -1, for one n seems to provide no information at all regarding the values of μ(n) for the next n.

Edwards then concludes – following Denjoy – that *the exact same probabilistic assumptions* apply to a Bernoulli experiment, such as a sequence of coin tosses. In short and concise terms: heads and tails are exactly equally probable, and subsequent values of heads and tails are independent of each other. I quote Edwards (made cursive below by me, the O stands

for the *big O notation*, a mathematical notation convention that is used to represent asymptotic convergence):

> "But then the evaluation of M(x) would be like flipping a coin once for each square-free integer less than x and subtracting the number of heads from the number of tails. It was shown above that for any given $\varepsilon > 0$ the outcome of this experiment for a large number of flips is, with probability nearly one, less than the number of flips raised to the power $½ + \varepsilon$ and *a fortiori* less than $x^{(½ + \varepsilon)}$. *Thus these probabilistic assumptions about the values of μ(n) lead to the conclusion, ludicrous as it seems, that* $M(x) = O(x^{(½ + \varepsilon)})$ *with probability one and hence that the Riemann hypothesis is true with probability one!*"

Edwards refers back to the possible proof for the Riemann hypothesis, which he discussed in paragraph 12.1 (see above the discussion regarding Edwards).

If you can prove that the probability of $\mu(n) = +1$ is exactly equal to the probability of $\mu(n) = -1$, and subsequent values of $\mu(n)$ behave independently from one another, or in other words, if you can prove the equality between the Mertens function and the probabilistic process of tossing a coin, you have proved that $M(x) = O(x^{(½ + \varepsilon)})$, and then you have proved the Riemann hypothesis, according to Edwards.

In his book *Unsolved problems in mathematics* (2015), Fredrick Kennard also comments on *Denjoy's probabilistic argument for the Riemann hypothesis* (p. 229, here he refers to Edwards, but it is good to read it again in other terms):

- Denjoy's probabilistic argument for the Riemann hypothesis (Edwards 1974) is based on the observation that if $\mu(x)$ is a random sequence of "1"s and "−1"s then, for every $\varepsilon > 0$, the partial sums

$$M(x) = \sum_{n \le x} \mu(n)$$

(the values of which are positions in a simple random walk) satisfy the bound

$$M(x) = O(x^{1/2+\varepsilon})$$

with probability 1. The Riemann hypothesis is equivalent to this bound for the Möbius function μ and the Mertens function M derived in the same way from it. In other words, the Riemann hypothesis is in some sense equivalent to saying that $\mu(x)$ behaves like a random sequence of coin tosses. When $\mu(x)$ is non-zero its sign gives the parity of the number of prime factors of x, so informally the Riemann hypothesis says that the parity of the number of prime factors of an integer behaves randomly. Such probabilistic arguments in number theory often give the right answer, but tend to be very hard to make rigorous, and occasionally give the wrong answer for some results, such as Maier's theorem.

Conform the Denjoy interpretation, the Riemann hypothesis is equivalent to the statement that the Möbius value μ(x) behaves (at least as good or even better[437]) than a coin toss sequence. The number of prime factors, even or uneven, of an increasing integer is then indistinguishable from the results of a random binary process (a binary random walk) such as coin tosses. The parity (even or uneven) of the number of prime factors of an integer behaves randomly and even and uneven prime factorizations of square-free numbers should be equal in asymptotic terms. Determinism and stochastics meet here in an intriguing fashion.

If you can actually and rigorously prove this equality, then you have proved the Riemann hypothesis based on the Mertens function. Proving this equality *formally*, however, has proven to be notoriously difficult.

Equivalent phrasings of the Riemann hypothesis. Based on the above, there are various equivalent phrasings of the Riemann hypothesis according to numerous authors:

[437] Why I put (at least as good) here will become clear further in the book. I will argue that the Mertens function is not at all like a random walk according to Bernoulli, but $M(x) = O(x^{(½ + \varepsilon)})$ still applies.

> 1: If $M(x) = O(x^{(½ + \varepsilon)})$ is true with probability one, the Riemann hypothesis is true with probability one (Edwards, Chapter 12.1).
>
> 2: The Riemann Hypothesis is true if and only if the numbers of positive and negative signs of M(n) are asymptotically equal.

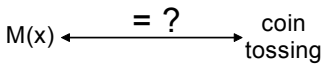
In his book *Prime Obsession*, chapter 20.VI, John Derbyshire presents the following phrasing (this was what drew my attention, and I paraphrase):[438]

> 3: If a square-free number has either an even or an odd number of prime factors with equal probability (50-50), the Riemann hypothesis is true.

Regarding this *third* equivalent phrasing, Derbyshire states bluntly: *"This does not seem particularly unlikely and might in fact be true. If you can prove that it* is *true, you will have proved the Riemann Hypothesis."*

Similarities and differences between coin tosses and prime numbers. The argumentation in favour of the Riemann hypothesis given by Edwards, in line with Denjoy, is still very flimsy, as he indicated himself too. As there are no good reasons to assume that an even or uneven prime factorization for numbers with a square-free prime factorization is more or less likely, and that their occurrence for subsequent numbers is independent of one another, we both abstain from doing so: they are equally probable and subsequent values are mutually independent.

At a first superficial investigation, this seems to be a nice application of *Ockham's razor*:[439] you should not make things needlessly complicated. According to this double argumentation, you should be able to assume that there exists a relationship of equality between μ(x) or M(x) on one hand, and tossing a coin on the other hand (see figure). The Riemann hypothesis is then true. But can this equality be proved?



The Denjoy interpretation of the Riemann hypothesis

[438] Derbyshire, regarding the equivalent phrasing 3, literally writes: "To put it another way, it says that a square-free number is either a head or a tail – has either an even or an odd number of prime factors – with 50-50 probability. This does not seem particularly unlikely, and might in fact be true. If you can prove that it *is* true, you will have proved the Riemann Hypothesis." His 'it' after the comma refers to the formula from Edwards, $M(x) = O(x^{(½ + \varepsilon)})$, see the equivalent phrasing 1.

[439] Named after the fourteenth-century Franciscan theologist and philosopher William of Ockham (1287–1347). You need to cut away all unnecessary parts of a statement, like a razor. In a later century, a co-Franciscan phrased it as *Non sunt multiplicanda entia sine necessitate* (entities are not to be multiplied without necessity), which is a strikingly fitting choice of words in the context of diagonal symmetries in the perspectivist space.

That is a difficult question, and rightfully so. To analyze this supposed equality between M(x) and tossing a coin, I will repeat some figures and tables that were shown earlier in this book. First of all, this is the table that provides *all* possible combinatory results for four coin tosses:

h	thhh	hththt	httt t
h	hthh	htthth	thtt t
h	hhth	ththht	ttht t
h	hhht	thhtth	ttth t

Four tosses have a single macro configuration with 100% h or t. There are four macro configurations with 25% h or 25% t. There are six macro configurations with 50% h and 50% t. The pattern: ***1:4:6:4:1.***

The assumption for a coin is that heads and tails are equally probable, and that the previous tosses do *not* influence subsequent tosses. That is precisely why the relative *number* of different micro configurations that can create a specific macro configuration corresponds to the *probability* of this macro configuration.

The probability (with four tosses) of four times heads is therefore 1/16, similar to the probability of four times tails. The probability of three times heads and one time tail as a final result is 4/16, similar to three times tail and one time heads. The probability of two times heads and two times tail has the largest final result: 6/16.

You can test this, for all rows of Pascal's triangle, which is the second figure I repeat here. The triangle describes binomial coefficients, combinatory possibilities, and (provided that there are equal probabilities and mutual independence) probability of occurrence. For four tosses we have 1:4:6:4:1 (row 4). This row 4 therefore neatly corresponds to the table for four coin tosses, shown above. On the next page, you will find Pascal's triangle up to row 8 (row 4 is printed in bold).

... 1 ... row 0
... 1 1 ... row 1
... 1 2 1 ... row 2
... 1 3 3 1 ... row 3
... 1 4 6 4 1 ... row 4
... 1 5 10 10 5 1 ... row 5
... 1 6 15 20 15 6 1 ... row 6
... 1 7 21 35 35 21 7 1 ... row 7
... 1 8 28 56 70 56 28 8 1 ... row 8

Pascal's triangle up to row 8.

Should we toss a coin four times, say 1000 times in a row, we would expect the previously mentioned ratio pattern 1 4 6 4 1 in the results, on average. For a thousand series of four tosses (a large number of series), around 50% will be heads and 50% will be tails.

But 1000 series of four tosses are also two thousand series of two tosses, or four thousand 'series' of a single toss. Or, going the other way: 500 series of 8 tosses, or 250 series of 16 tosses, or 125 of 32 tosses, or one long series of 4000 tosses. It is just a matter of perspective. Every whole factorization x·y=4000 with x=number of series and y=number of tosses per series will apply (here we see the discrete inverse proportionality again). The more you toss a coin with a series of 2, 3, 4, 5, 6, ..., the more perfect your average results will approximate the corresponding row of Pascal, thus the second, third, fourth, fifth, and sixth row.

This alternative interpretation of 4000 tosses in more or fewer sequences naturally does not change *anything* at all regarding the *factual results* of the *entire* series of 4000 tosses. The coin has no knowledge of series and tosses, as that is an almost completely subjective fact; it is in the eye of the beholder. That is intriguing. Say that an observed deviation of the perfect balance of 4000 actual tosses is 40 times heads. This total deviation, this excess of 40 heads, will always be the same, no matter which interpretation or which configuration of series we choose.

For different series, however, the average expected deviation is different on average: the shorter the series, the larger the relative deviation you will see regarding excesses in heads or tails (see also the example of the dice from before, repeated below). And the longer the series, the smaller the relative deviation. For increasingly large series, you can express this increasingly well as a standard deviation, because the binomial curve will start to look like the Gaussian curve more and more. The standard deviation, for a repeated Bernoulli experiment of n coin tosses, with an *average* excess of 0 (the balance value), is equal to √n (Jacob Bernoulli, a prominent member of a renowned family of mathematicians, concluded this long ago). Around 68% of the excesses will be located within a single standard deviation in both directions, and 95% of excesses will fall within two standard deviations in both directions. Shorter series require a larger number of Bernoulli experiments.

If we choose for 500 series of 8 tosses, the standard deviation per series is around √8=2√2, or 2.83. If we choose for 250 series of 16 tosses, the standard deviation per series is√16=4. The standard deviation for a series of 1000 is around √1000=32, and for a series of 4000, it is equal to √4000=63. We can see that the excesses, the deviations, cancel each other to a high degree. After all, 63 (for 4000 tosses) is nowhere near four times 32 (for 1000 tosses). Excesses in heads or tails of many short series apparently cancel each other out when you combine the tosses of short series into one long series. Or, in more physical terms: excesses of heads and tails *annihilate*[440] each other at a large scale, and it produces an identity (more balance) in return!

We have seen such an annihilation effect before, but with a dice in six dimensions, not in two dimensions. The coin tosses find more balance in two dimensions as the number of tosses increases, similarly to the throws of the dice, which do the same in six dimensions. I can also interpret 360 dice throws as 10 series of 36 throws, and the 10 deviations of the balance will annihilate each other substantially. Below, I repeat a segment of a previous table, which clearly illustrates this process, this draw towards a more *relative* balance. (In relative terms, the balance improves, but in absolute terms, excesses and shortages keep increasing).

Number of throws with a dice	Number of eyes
	1 2 3 4 5 6
6	(0 2 0 0 3 1)
12	(1 2 2 2 3 2)
18	(2 3 3 5 4 1)
24	(3 5 3 2 7 4)
36	(8 6 4 5 7 6)
360	(70 56 68 53 50 63)
3600	(627 559 615 620 578 601)
36000	(6030 5898 6010 6094 6067 5901)
360000	(60241 60058 59707 59867 60461 59666)

[440] In small particle physics, *annihilation* is the joining of a particle and its antiparticle. They both disappear in this process and deliver energy (in accordance with the energy = mass equivalence principle, Albert Einstein's most famous formula). A lot of energy, because all mass is converted into energy.
We again see intriguing parallels with recursive perspectivism.
As I was saying, particle and antiparticle: they share properties, and they are different regarding other properties. This applies to heads and tails, but also to even and uneven prime factorizations. During annihilation, the revenues are harvested in terms of a smaller standard deviation, in other words, a higher identity. This also applies to the six innovation directions (see Section 3: societal innovation): they share (in pairs, or in triplets) properties and are different regarding other properties. There, too, the parallel seems to apply and do we see annihilation: on the diagonal, six dimensions come together, disappear, and are converted into improvement.

As the number of coin tosses x increases, this annihilation effect will increase steadily, and the standard deviation will therefore increase in absolute terms as well, but it will decrease in relative terms (for a dice with two sides; a Bernoulli experiment) with √x, as Bernoulli already concluded.

This standard deviation √x essentially rests on the progression of f_p, the function that, as x grows, will have a larger probability of longer prime factorizations (higher values of p), and therefore starts resembling the normal bell curve, the Gaussian curve, increasingly well. The stochastic process of tossing a coin will conform to f_p for large values of p. It never does so perfectly, but *in the long term it becomes increasingly perfect*, and f_p, essentially a binomial approximation of the Gaussian bell curve, will conform increasingly well to the Gaussian bell curve. And eventually, a very small value for ε will no longer be surpassed. That is due to the fact that heads occur as frequently as tails, and the fact that the result of the next toss does not depend on the result of the current toss. Indeed, the same two properties that, according to Denjoy, if the Riemann hypothesis is true, should also hold for the Möbius values of +1 and -1 of the Mertens function.

For the excess of heads or tails, or for the excess in the number of heads or tails regarding the balance (the balance value with an excess of 0), it therefore holds that: deviation (or excess) = $O(x^{(½ + \varepsilon)})$. That concludes the coin toss.

We now move on from the coin toss to the Möbius and Mertens function. Does this also hold for the Mertens function? Does $M(x) = O(x^{(½ + \varepsilon)})$ apply? For starters, we need to note that the Mertens function up to x is something very different compared to a series of x coin tosses. Perhaps it is better to speak of a *relation* rather than an *equality*, and do so consistently. I will name two important differences between a Bernoulli experiment such as the repeated coin toss, and the Mertens function based on the Möbius values:

First of all, the Mertens function is deterministic, whereas a coin toss is stochastic. The results of M(x) are exactly the same for every time you move along the number line up to a certain x. The prime factors of every integer along the number line are set, once you have acquired the insight of number sense. The results of different series of x coin tosses are stochastic: we are dealing with a series of coincidental results, and although you cannot exclude identical series, every series of coin tosses generally has its own independent heads-tails progression. You can only make probabilistic statements: the standard deviation across many series is √x on average.

Secondly, the Mertens function also recognizes a Möbius value for *quadratic* prime factorizations, whereas such a 'third category' is not present when tossing a coin. Mertens has values such as -1, 0, and 1, and coin tosses merely have either heads or tails. With a superficial thought process, you might conclude that quadratic prime factorizations do not really change the Mertens function: the Möbius value of such numbers is 0. This has the effect that the Mertens function remains at the same value if the next number in the row is quadratic. For example, if you go from 7 to 8, then 8 is quadratic and the Mertens function

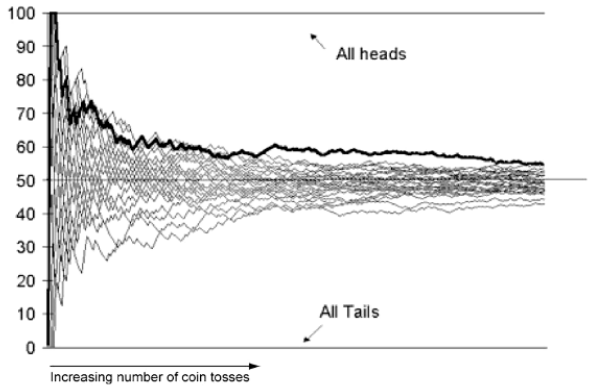
remains at the same value as it was at 7. That is impossible for a random walk with coin tosses: the result is either heads or tails.[441]

This is why, for convenience, quadratic numbers are often excluded when presenting the Mertens function, 'they do not alter it anyway'. Mertens is then calculated and illustrated for the square-free numbers. M(x) then transforms to a sigma Möbius over merely the square-free numbers up to x. The resulting graph now resembles a Bernoulli experiment even more, a superficial observer might think, because you have gotten rid of those meaningless numbers with a quadratic prime factorization. They do not matter anyway. (I do not call him superficial without reason: he is dead wrong!)

Empirical comparison of Mertens function with a Bernoulli random walk. I myself think that the Mertens function does not at all look like a typical series of coin tosses, as an example of a binary random walk (a Bernoulli experiment). If you take a close look at the progression of the Mertens function and compare it to the series of coin tosses, the difference can be observed in strictly empirical terms alone. I will display both of them again on the following page, but now below each other.

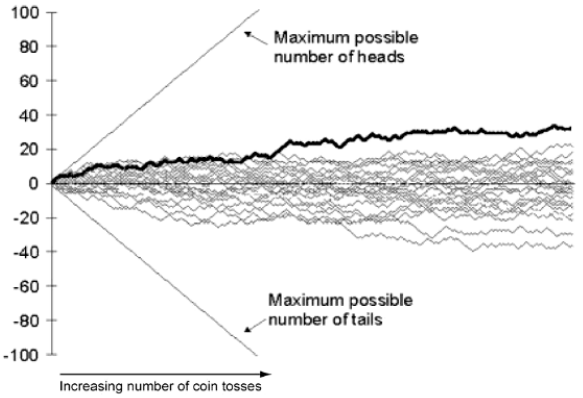
[441] The coin cannot land on its edge. That makes you think. Is that really impossible, or is the probability of it happening simply very small?

Figure 1. Percentage of heads and tails over an increasing number of coin tosses.

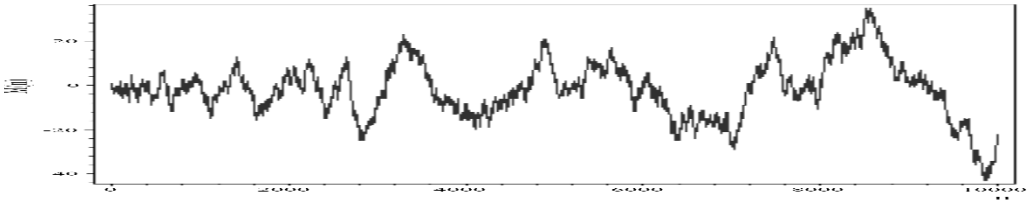


The percentage of heads and tails converges towards the mean.

Figure 2. The balance of heads and tails over an increasing number of coin tosses.



The actual number of heads and tails does not converge towards the mean; rather, it diverges away from the mean.



The Bernoulli random walks of a number of equally large series of coin tosses (centre figure), and the Mertens function (bottom figure), show a different pattern. The coin only searches for balance in relative terms; the longer the series, the better (top figure). Sources: Dr. Nigel Turner, Centre for Addiction and Mental Health, the Institute of Ontario (top two figures) and Wikipedia (bottom figure).

The centre figure depicts Bernoulli random walks of a coin. These do not show any tendency to move towards an absolute balance. It happens, but more as an exception to the rule. The excess of heads or tails, the imbalance only increases in absolute terms (heads and tails are independent). Series of coin tosses *can* pass through the balance, from an excess of heads to tails, or vice versa, multiple times even, but it is as if they have a tendency to linger on the side of the balance value where they have deviated. That coincides exactly with the idea that coin tosses are really independent of one another: if this were not the case, subsequent coin tosses would eventually have to compensate for the excesses of earlier tosses, or balance deviations (this resembles 'drawing without returning' in statistics). We would then see that the absolute excess approaches zero. In practice, however, we can see the standard deviation of the excess increase (increase in absolute terms, and decrease in relative terms) with √x, as previously explained. The top figure of the three above shows the average change of the excess with √x in relative terms (it becomes smaller: the balance improves). The centre figure shows the absolute progression of this change of excess (the absolute excess of heads or tails increases).

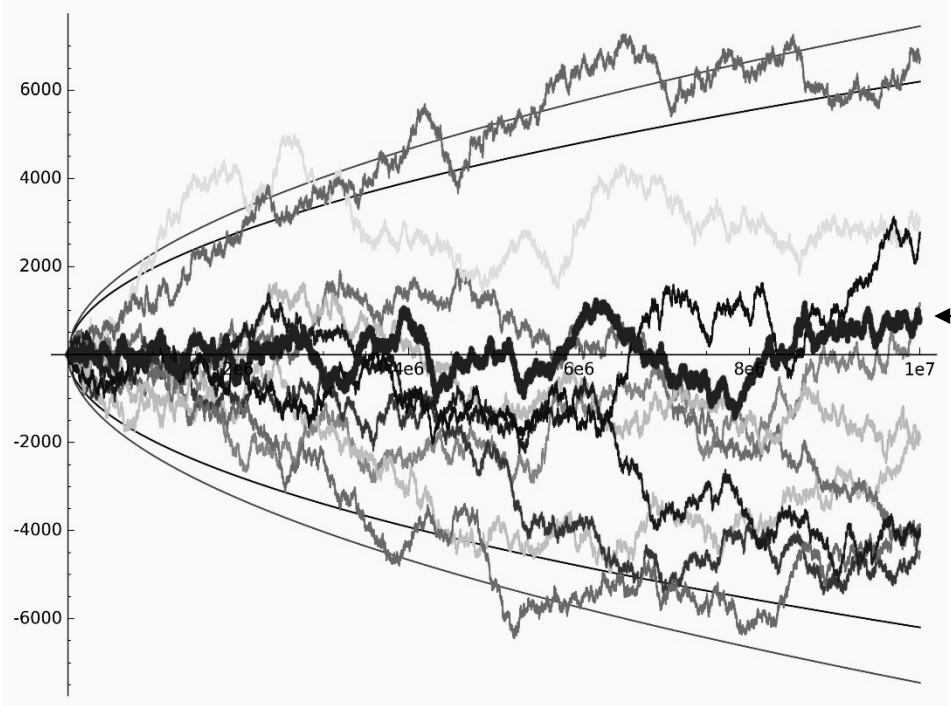
The bottom figure, the Mertens function, shows an entirely different picture than the centre figure. It oscillates further from the balance as x increases, but it never seems to forget to return to the balance, and to switch the excess around (heads or tails). This switching happens without hesitation in most cases; it regularly shoots through the balance, even though, on average, it seems to take longer before it does so.

I already mentioned that I think that the Mertens function is entirely different from a random walk of a Bernoulli experiment. The Mertens function appears to depict a special, but erratically disturbed scale invariant wave pattern of which the *amplitude* seems to increase (the oscillations become larger), and the *frequency* seems to decrease (the passes through the balance appear to become less frequent).[442]

If you were to place series of coin tosses and the Mertens function (the centre and bottom figure) in a single figure at the same scale, you would instantly see that the Mertens function is located much closer to the horizontal balance axis than many of the more adventurous random walks with the coin. Mertens function, at first sight, appears much better behaved than Bernoulli random walks (see the figure on the next page by Markus Shepherd). It is as if the Mertens function is unable to stray too far from the balance value before it has to return. The excess always returns to zero, as if the values are not completely independent from one another: subsequent values eventually compensate for the excesses of previous tosses, the balance deviations (this resembles 'drawing without returning' in statistics). The absolute excess tests new, larger values with lots of practice, and although this takes longer and longer, the excess finds its way to the balance every time, and it often

[442] The volatilities we observe in various economic cycles, such as pork cycles and the Kondratiev waves are closely related to this (see also Section 3 at the discussion of the law of diminishing returns).

shoots through it to the other side where the same game repeats itself. That is what the Mertens function shows me at this scale.



Different random walks with a coin and the Mertens function (the wider line that fluctuates around the balance) in a single figure. Source: Markus Shepherd, Understanding the Riemann hypothesis (www.riemannhypothesis.info, a nice website with information and figures).

Mathematicians do not take it seriously until something is formal, rather than empirical, as I have experienced many times. These visual comparisons therefore offer not a shred of mathematical proof. A mathematician will not be convinced at all by the above discussion. As long as there is no proof, there is only noise. And although I have some serious reservations regarding the possibility of formally proving experiential phenomena, I too would much rather have a deeper understanding of the differences that I believe are observable.

I went looking for that deeper understanding. And the fact that I claim to see a special yet disturbed wave function in the Mertens function is now no longer unsubstantiated. I will elaborate on that in the next theme, wave patterns, but I will touch upon it below. Those quadratic Möbius zeros do in fact play a vital part in the number line.

Introduction of sigma Möbius and the interleaving effect. Excluding numbers with quadratic prime factorizations, or the zeros from the Mertens functions, to better resemble a Bernoulli experiment (a series of coin tosses), is an unfortunate decision in my opinion.

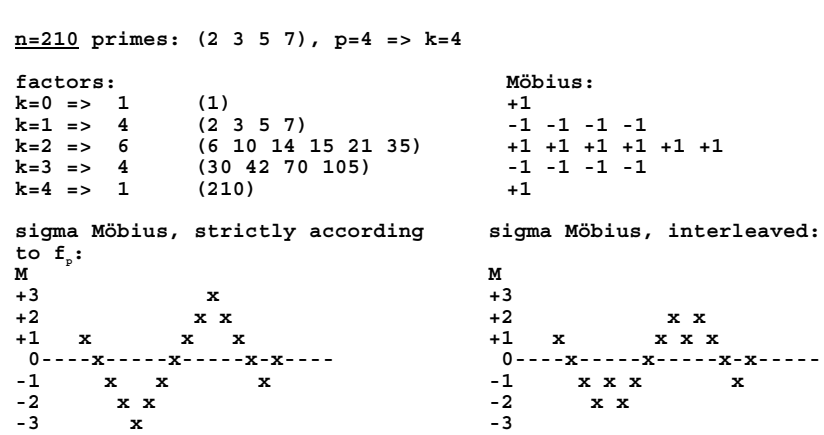
You cannot simply brush off those numbers with a quadratic prime factorization; there is a very large catch here. The Möbius zeros have a very specific and special effect that makes the Mertens function look nothing like a coin toss. You could even call it a treacherous effect. The Mertens function is sometimes called both stochastic and deterministic at the same time. That is impossible, a formalist would say, but the Denjoy interpretation applies here as well. I think that this hybrid designation rests on that very large catch.

The matter is as follows. The exact location of numbers with quadratic prime factorizations, in between the numbers with square-free prime factorizations, determines how far apart the numbers with square-free prime factorizations are. This also includes the prime numbers themselves, as these are square-free. The position of a prime number is determined by the position of the (square-free and quadratic) numbers up to this prime number. That is what I specifically explained for prime numbers in the section '**Prime numbers arise pragmatically by recursive perspectivism'**, a few pages ago: subsequent prime numbers enter the limelight, they arise, they emerge, as soon as a vacancy appears based on smaller prime numbers.

And it is for precisely this reason that numbers with quadratic prime factorizations indeed have a – possibly huge – effect on the progression of the Mertens function. That special effect is called the ***interleaving effect***. This interleaving effect *is* present in the Mertens function because of the third option involving the quadratic prime factorizations, and it is *not* present in Bernoulli experiments such as the coin toss.

I re-introduce the sigma Möbius. The sigma Möbius is a type of Mertens function, but it does not include all integers starting at 1 (inclusive) to x, but only specified numbers. Characteristic for a sigma Möbius is that it has a domain that only passes specified integers. From this point of view, the Mertens function is actually a specific sigma Möbius: the one that includes the entire number line starting at 1 (inclusive).

For example, my choice for specified integers for a sigma Möbius could involve the *factors* of a square-free value of n, *in the strict order of an increasing k*. See the example below for these numbers, for n=210 with p=4.



On the bottom left, you can see sigma Möbius taken strictly over the factors of the square-free p=4 number 210, for which the increasing pattern of the k values is followed. If you follow the number line instead, a symmetric and therefore regular disruption of this sawtooth-like pattern appears, resulting in the interleaved sigma Möbius (bottom right).

Sigma Möbius involving the factors of a number with a square-free prime factorization depicts a fine sawtooth-like pattern when it strictly follows the progressing k values (see the bottom left of the figure above). This sawtooth pattern follows the exact same pattern as the fourth row of Pascal's triangle: the combinatory probability pattern for four coin tosses (see the sequence 1 4 6 4 1 under *factors*). I will show more sawtooth figures in a moment for different values of p.

No problem, you would think. But if we strictly follow the subsequent values of k, see the numbers in the figure in the top left, at specific moments, we go directly against the order of the number line (I have printed these places in bold, cursive, and underlined them):

(1)(2 3 5 ***7***)(***6*** 10 14 15 21 ***35***)(***30*** 42 70 105)(210)

The numbers of different k values slide along each other (the stair steps overlap). That should be rectified, of course, and it is precisely this phenomenon that I call *interleaving*. This interleaving is relatively mild in the example above: the 7 of k=1 shifts between the 6 and 10 of k=2 (or in reverse: the 6 of k=2 shifts between the 5 and 7 of k=1). The same applies to the 35 of k=2, which shifts between the 30 and 42 of k=3 (or in reverse: the 30 of k=3 shifts between the 21 and 35 of k=2).

Interleaving therefore changes the sigma Möbius function, in the bottom left of the figure above, into the sigma Möbius function in the bottom right of the figure above. The shifts, the swaps, occur strictly symmetric due to the binomial character of the numbers at hand: if the fifth and sixth numbers from the left swap places, the fifth and sixth numbers from the right do so too. The main shape of the saw blade therefore remains reasonably intact. The symmetry remains, but the sharp teeth of the saw become blunt. That is because the

tops of the teeth of the saw experience the most interleaving: they represent the largest and smallest numbers for every value of k. The largest peaks wear down the fastest. (Would it be a coincidence that this also happens with an actual saw blade, or do we also observe the workings of a pattern law in a sawmill? A saw blade's strive for more balance?)

The degree to which interleaving occurs depends on the value of the prime factors at hand, or the prime factors that are multiplied with each other. Although numbers with quadratic prime factorizations do not contribute to the Mertens function *themselves*, because their Möbius value is 0, their position definitely has an effect on the Mertens function, because numbers with *square-free* prime factorizations are at entirely different locations on the number line because of it, at the other side of square-free numbers with a different value of k. This disrupts, or 'interleaves' the nice sawtooth pattern, and definitely changes the progression of the Mertens function. If you exclude the square-free numbers, you are left with these disrupted teeth of a saw, but you will have lost the information that caused it.

Whereas for a series of coin tosses the tosses are actually independent, a special, hidden dependence is revealed in the Mertens function. If 2 and 3 are prime numbers, with a Möbius value of -1, then 2 times 3 = 6 is a number with an even prime factorization ("even" in the number theoretical sense), and therefore has a Möbius value of +1. In this regard, the Mertens function is *not* equal to a series of coin tosses. With coin tosses, there is no *interleaving* whatsoever: a third category, such as landing on the edge, is not there.

From 1 to n, the sigma Möbius (the sum of the Möbius values) *taken strictly over the factors of n* may oscillate due to the changing values of k (they do not follow the row of Pascal's triangle, but they *interleave*. Keep reading for much more on interleaving in a moment). But at the end, in any case, this sum always returns to the starting value of zero. This applies to the factors of every square-free number n, no matter how large, no matter how many prime factors there are, and no matter how much interleaving there is.

Proof disruptors. If all square-free numbers <= n were also all factors of a square-free n, f_p would immediately prove the Riemann hypothesis: the number of even and uneven square-free numbers (prime factorizations) will then have to be equal. The increasingly distinct binomial Gaussian caused by f_p will make the pluses and minuses of Möbius adhere to the standard deviation of √x increasingly well. That is why $M(x) = O(x^{(½ + \varepsilon)})$ holds: the Riemann hypothesis is true. I suspect that you could simply equate ε to 0 in this situation. $|M(x) = x^{½}|$ would remain, better known as Mertens conjecture. But alas: Mertens conjecture is proven to be false.

That is because not all square-free numbers <= n are factors of this square-free n. And especially the square-free numbers smaller than a square-free n that are not factors of n, disrupt this shortcut to a proof: they cause the Mertens function to be unequal to 0 for square-free numbers. You guessed it already: these are the *interleavers* of higher square-free numbers. They are the cause of the wild and chaotic behaviour of the figures of the Mertens function.

But it is irrefutable that for the factors of a square-free number, it holds that the amount of numbers with an even prime factorization should be exactly equal to the amount of numbers with an uneven prime factorization. The sigma Möbius taken over the factors of a square-free number, interleaved or not, must result in zero.

For a binomial pattern of a square-free number with two peaks (an uneven number of prime factors), this is instantly visible. Every even amount goes hand in hand with an equally large uneven amount. You cross them off, one pair at a time, and eventually you are left with a difference of zero.

```
n=510510 primes: (2 3 5 7 11 13 17), p=7 => k=7

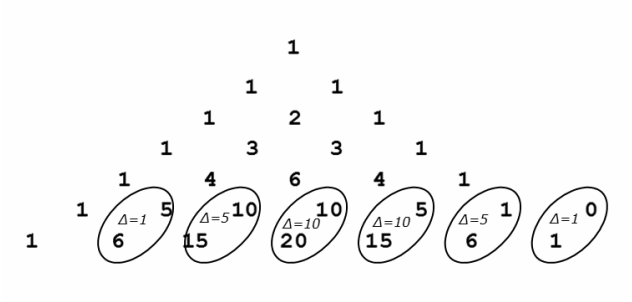
number of factors:
_____________________from Comb (7 0)
k=0 =>  1       | x
k=1 =>  7       | xxxxxxx
k=2 =>  21      | xxxxxxxxxxxxxxxxxxxxx
k=3 =>  35      | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=4 =>  35      | xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
k=5 =>  21      | xxxxxxxxxxxxxxxxxxxxx
k=6 =>  7       | xxxxxxx
k=7 =>  1       | x
_____________________till Comb (7 7)
 top value 35
 sum value 128
 one x is  1
```

For a binomial Gaussian pattern of a square-free number with a single peak (an uneven number of prime factors) we merely have to shift one row in Pascal's triangle to see that the number of factors with an even number of prime factors should be exactly equal to the number of factors with an uneven number of prime factors. The doubling of the number of factors, when moving down a row in Pascal's triangle, will always be distributed analogically but 'shifted' among even and uneven factors relative to the row of departure. The exiting row is copied, in a sense: the copy shifts one to the side, and then gets added to the exiting row, maintaining the symmetry of the triangle.[443]

```
n=30030 primes: (2 3 5 7 11 13), p=6 => k=6

number of factors:
_____________________from Comb (6 0)
k=0 =>  1       | x
k=1 =>  6       | xxxxxx
k=2 =>  15      | xxxxxxxxxxxxxxx
k=3 =>  20      | xxxxxxxxxxxxxxxxxxx
k=4 =>  15      | xxxxxxxxxxxxxxx
k=5 =>  6       | xxxxxx
k=6 =>  1       | x
_____________________till Comb (6 6)
 top value 20
 sum value 64
 one x is  1
```

[443] This is a binomial procedure, not an empirical observation, and applies to every row. That is how you can construct Pascal's triangle.



Three categories of numbers. The factors of a square-free number are special, because they follow f_p for k from 1 to p, and therefore adhere to $M(x) = O(x^{(½ + \varepsilon)})$. That puts them in a special category of numbers, from the point of view of a specific square-free n.

Now we can also name other interesting categories, from a specific square-free n's point of view. All individual integers, from 1 (inclusive) to a square-free n, must belong to one of the following three categories of numbers:

> Category 1: *Factors of n*.[444] Factors of a square-free number must be square-free themselves too. For these factors, it holds (see above) that they either have an even or uneven number of prime factors p with a probability distribution of exactly 50%-50%.
>
> Category 2: Numbers with a *quadratic* prime factorization. These are not factors of n (the prime factorization of n is square-free, after all). Their stacking blocks are located on a diagonal (or multiple diagonals) of a multi-dimensional perspectivist space: the dimensionality of this diagonal is determined by the number of times the double prime factor(s) occur(s). For category 2 numbers, the Möbius value is zero, they have no *direct* influence on the Mertens function. However, they do cause *interleaving*, and in this regard, they have a great *indirect* influence on the Mertens function (there is no such *interleaving* with a coin toss).
>
> Category 3: Numbers smaller than n with a *square-free* prime factorization that are not factors of n.

I call category 3 numbers *strange* numbers: they are square-free, but their prime factorization contains at least one strange prime number that is not a prime factor of n. That is also why I call those prime numbers, in line with strange numbers, strange prime numbers. Category 3 numbers thus contain at least one strange prime factor, which is not present in the prime factorization of n.

[444] Simply all factors, all denominators, including the prime factors and the two trivial factors. I use factors as a synonym for denominators.

It is precisely this third category of numbers that disrupts the equal probability distribution of 50%-50% for even and uneven square-free number *up to n*, therefore preventing us from access to a direct proof of the Riemann hypothesis. And disrupting is all that category 3 numbers do, which is why I call them proof disruptors. They cause apparent chaos in the Mertens function (I will come back to this in the next theme, wave patterns).

Primorial steps and the price of completeness. Whether a number has an even or uneven prime factorization has nothing to do with which n you choose to start with, or the corresponding number categories 1 to 3. Numbers simply possess their own unique prime factorization, and that is that.

The good news is that you can now simply add strange square-free numbers to existing sets of factors, by adding their strange prime numbers to the existing prime factorization of n (the number that determines the factors). You then transport the numbers from category 3 to category 1 by stepping towards a larger square-free number n. The new, expanded prime factorization of the resulting larger number n will remain square-free, otherwise the prime number cannot be strange.

Disrupting the 50% - 50% balance and this transport from category 3 of a smaller square-free number to category 1 of a larger square-free number can be visualized with primorial products (primorial numbers): the multiplication of *all* prime numbers between 1 and a highest chosen prime number (including this highest prime number). By definition, primorial products (primorial numbers) are square-free. They form a sequence. The first numbers in a sequence of primorial numbers are (in a primorial sequence, you constantly add one prime number, the next one in the number line):

```
6 = (2 3)              because 2·3 = 6
30 = (2 3 5)           because 2·3·5 = 30
210 = (2 3 5 7)        because 2·3·5·7 = 210
2310 =(2 3 5 7 11)     because 2·3·5·7·11 = 2310          Etc.
```

To illustrate the primorial work with numbers and categories, I will first use the primorial product n=30=(2 3 5).

For n=30, there are *eight category 1 numbers*,[445] the (necessarily square-free) factors: exactly half has an even number of prime factors, the other half an uneven number of prime factors, as should be the case:

[445] Moving to the next primorial product, with one prime factor extra, will double this number (in line with Pascal's triangle).

```
factors:
k=0 =>  1     (1)
k=1 =>  3     (2 3 5)
k=2 =>  3     (6 10 15)
k=3 =>  1     (30)
```

For n=30, there are *eleven category 2 numbers*: the numbers with squares and therefore with a Möbius value of zero. By definition, they are no factors of n, which is square-free. These numbers are 4=(2 2), 8=(2 2 2), 9=(3 3), 12=(2 2 3), 16=(2 2 2 2), 18=(2 3 3), 20=(2 2 5), 24=(2 2 2 3), 25=(5 5), 27=(3 3 3), and 28=(2 2 7).

For n=30, there are *eleven category 3 numbers*: the square-free numbers <=30 that are *not a factor of 30, and therefore have at least one prime factor other than (2 3 5).*

- For k=1: 7 11 13 17 19 23 29: seven 'strange' prime numbers between 5 and 30, so seven uneven prime factorizations.
- For k=2: 14=(2 7), 21=(3 7), 22=(2 11), and 26=(2 13): four products of two prime numbers, so four even prime factorizations. These are products of the lowest category 3 prime numbers (7, 11, and 13) and the lowest category 1 prime numbers (2 and 3); they must be <30.

Category 3 numbers are the vacancies between 1 and 30, the open gaps that remain because they cannot be filled based on square-free prime factorizations with only 2, 3, and 5 as the prime factors (of the primorial product 30).

We could also wonder which prime factors allow us to combine *all* category 1 and 2 numbers up to a primorial, so without category 3, as a product. Every prime number from the primorial factorization must now be repeated as often as it takes to allow us to create the highest 'square' (the highest power) smaller than this primorial number. For 30, this is the prime factorization (2 2 2 2 3 3 3 5 5): every prime number from the primorial factorization: 2, 3, and 5, has been repeated so often that we created the highest 'square' (the highest power) that is smaller than 30. For 2, this is 2^4=16, for 3, this is 3^3=27, and for 5, this is 5^2=25, resulting together in (2 2 2 2 3 3 3 5 5). This prime factorization corresponds to the number 10800. This process for higher primorial numbers is analogous to this, but naturally, the number of twos increases faster than the number of threes, etc. In our mind, we can see the multi-dimensional prime factorizations with twos win the competition.

The prime factorization with which we can create *all* numbers up to a primorial number is even larger: we now simply add all remaining prime numbers that exist up to the primorial number at hand (this primorial number is of course never a prime number itself). For 30, we get the total prime factorization (2 2 2 2 3 3 3 5 5 7 11 13 17 19 23 29), an enormous number with (therefore) a quadratic prime factorization.

With this prime factorization (2 2 2 2 3 3 3 5 5 7 11 13 17 19 23 29), we can create all category 1, 2 and 3 numbers up to 30, but the price for this completeness is a large redundancy. There are now numerous identical and indistinguishable micro ways to create macro states such as 4=(2 2), 6=(2 3), 8=(2 2 2), 9=(3 3), and 1972=(2 2 17 29). This is described neatly by the

combinatory formulas and ratios of Pascal's triangle, even though they become huge (too large for my computer to keep up). This shines a special, entropic light on the high improvement potential of low balance positions, or low positions on high-dimensional diagonals. This is explained by the simple fact that these can be created in multiple ways (see the reasoning behind the Societal Balance model earlier in this book). You could also refer to an increasing redundancy as a growing entropic probability. Boltzmann knew how to deal with this.

First proposal for a proof of the Riemann hypothesis

The use of increasing primorial products has a consequence that we will not miss intermediate prime numbers in a developing prime factorization. Another consequence of working with primorial steps, is that when you let the primorial sequence progress further and further, more and more smaller numbers with a square-free prime factorization (including prime numbers) will move from category 3 to category 1, and therefore be added to the list of factors of the new primorial number. And, according to the binomial construction of f_p, for category 1, the amount of numbers with an even number of prime factorization always equals the amount of numbers with an uneven prime factorization.

Therefore, every primorial step causes its own transport from category 3 to category 1, introducing their own new proof disruptors in category 3. Then something trivial becomes apparent, which now becomes very special:

Every square-free number that you encounter as you move along the line of integers will, *together* with *all square-free numbers that have been passed already*, be a part of the *set of square-free factors of a much larger square-free number.*

This is a giant recursive game. For example, it can be proven in a Euclidian manner (by contradiction). I am starting with one square-free number, n_{small}:

1. Say that there is a square-free number n_{small} that is *not* a factor of a random larger square-free number n_{large}:
2. This number n_{small} would be a strange number relative to $n_{large.}$ At least one of the prime factors of this smaller square-free number n_{small} (possible the number itself, if it is a prime number) does not correspond to the prime factors of n_{large}, because it is not a factor.
3. That is why it is possible to construct a new square-free number n_{large} by multiplying the prime factors of the smaller square-free number n_{small} with the prime factors of the original square-free number n_{large}, where *primes that occur twice* can only participate in the product once. (You could also say that you only multiply n_{large} with the prime factors of n_{small} that do not yet occur in the prime factorization of n_{large}.) This procedure guarantees the new resulting number n_{large} to be bigger than the original $n_{large,}$ and square-free. This procedure also guarantees that n_{small} is now indeed a factor in the new $n_{large.}$

4. The square-free number n_{small} is therefore a factor of a larger square-free number n_{large}.
5. This contradicts the statement we started with (point 1). With this, the reverse statement, that *every* square-free number is a factor of a larger square-free number, has been proven.

This also applies to a larger number of square-free numbers. Take all prime numbers up to x: you repeatedly apply this procedure for every square-free number. The smallest large number for which all prime numbers up to x are a factor, is then the product of these prime numbers: the prime factorization of a primorial number. Essentially, you are now constructing a primorial sequence. Take x=11:

> For 2 and 3, the smallest larger number for which both are a factor is 2·3=6.
> For 2, 3, and 5, the smallest larger number for which all are a factor is 2·3·5=30
> For 2, 3, 5, and 7, the smallest larger number for which all are a factor is 2·3·5·7=210
> For 2, 3, 5, 7, and 11, the smallest larger number for which all are a factor is 2·3·5·7·11=2310

For the total collection of square-free factors of this much larger square-free number 2310, it must also hold that the amount of numbers with an even prime factorization is exactly equal to the amount of numbers with an uneven prime factorization. This equality is based on the summation of f_p conform the corresponding row of Pascal's triangle (row 5). All factors (trivial factors, prime factors, and higher factors) of the resulting primorial product together form this row of Pascal's triangle and, for square-free numbers with increasing values of p, an increasingly distinct bell curve, that is, if you sort the numbers by their values of k (and suppress interleaving).

We can phrase the above as follows:

> *All* category 3 numbers up to a square-free n_1 can *always* be transported to category 1 of a higher square-free n_2, no matter how large your pick for n_1 is.

After all, you are simply adding strange primes of category 3 numbers once to the prime factorization of n_1.

The fact that this is *always* possible, without exceptions, no matter how high we get, must mean that half of the reservoir of square-free numbers that have not yet been transported to category 1 must consist of even prime factorizations, while the other half consists of uneven prime factorizations. This square-free reservoir is filled with category 3 square-free numbers and the square-free numbers larger than n_1 combined. The ratio of numbers with even and uneven prime factorizations in this reservoir must be exactly 50%-50%. Otherwise, category 3 numbers would not be able to be transported to category 1 every single time. The ship would have to strand somewhere, but it does not.

Because exactly half of category 1 numbers of a square-free n consist of numbers with an even prime factorization, and the other half of numbers with an uneven prime factorization, the *total* number of square-free numbers with an even prime factorization and the *total* number of square-free numbers with an uneven prime factorization must be equal as well.

I believe that this proves the previously mentioned third phrasing of the Riemann hypothesis, the one by Derbyshire. I repeat: *"If a square-free number has either an even or an odd number of prime factors with equal probability (50-50), the Riemann hypothesis is true."*

Or the second: *"The Riemann Hypothesis is true if and only if the numbers of positive and negative signs of M(n) are asymptotically equal."*

Based on the evidence above, inspired by Euclides, in combination with the function f_p and Pascal's triangle, I therefore say that the third equivalent phrasing of the Riemann hypothesis by Derbyshire that I referred to, is true.

I like how this proposal for a proof of the Riemann hypothesis is based on the earliest mathematical traditions of the Greek Euclides, one of the first mathematicians, who proved around 500 years before our calendar starts that there are infinitely many prime numbers. We do not have to know what prime numbers are, or have knowledge regarding their position, to know that the third phrasing of the Riemann hypothesis makes sense. This completes the circle in a special manner.

A conversation with a number theoretical mathematician taught me that Derbyshire's phrasing of the Riemann hypothesis (the third equivalent phrasing I mentioned) does not comply with all mathematical requirements, according to various mathematicians.[446] Whether my above proposition for a proof of the Riemann hypothesis, or in other words Derbyshire's equivalent phrasing (the third I mentioned) is truly equivalent to the Riemann hypothesis, is a problem for professional mathematicians to grapple with. My mathematical knowledge simply fails me in that regard.

Based on my explorations of the Riemann hypothesis, I have written a report and presentation on this topic specifically, based on this book.[447]

As a reflective pragmatist, I am not done yet. The first equivalent phrasing by Edwards *is* acceptable to professional mathematicians. I can do something extra with that from my recursive perspectivist angle. Wave patterns, see the following theme, offer a fresh insight into this.

[446] I thank professor Frits Beukers of Utrecht University for an enlightening conversation.
[447] Presentation: Relations between societal innovation and number theory: possible proofs for the Riemann Hypothesis. Report: A dicey proof of the Riemann Hypothesis inspired by societal innovation.

13: Wave patterns and the Riemann hypothesis

Wave particle hybrids

Under specific circumstances, particles behave like waves, and under specific circumstances, waves behave like particles. This physical insight first emerged in the context of light: the famous dualist wave–particle character of light. Newton already employed some early particle theories regarding light. The famous interference experiments by Thomas Young at the start of the 1900s (the two-slit experiment, during which a bundle of sunlight created interference patterns on a plate behind these two slits) demonstrated that light acts as a wave phenomenon.[448] The photoelectric effect (Albert Einstein wrote about this insight in his golden year 1905, and was later awarded the Nobel prize for it) must be understood from the nature of particles. Nowadays, the wave–particle dualism is broadly accepted among scientists.

Quantum mechanics does not describe the position of a particle with an 'exact' three-dimensional spatial position in time (x y z t), but it describes a particle with a complex wave function (the Schrödinger equation). The square of this equation provides probabilities of encountering the particle in space–time (this is called the probability density; it reminds me of the probability distribution with four coin tosses, which is 1 4 6 4 1 according to Pascal's triangle). Particles are 'delocalized' in this manner.

In quantum mechanics, a subatomic particle is therefore no longer characterized by an exact place (an exact location, position, exact coordinates). People assume that a particle is not localized exactly, but delocalized (delocation: probability of occurrence/encounters distributed in time-space). At some places, the probability of encounter is high, at others it is small. That is represented by orbitals, for example. Orbitals are spatial contours[449] (simple ones are spherical, but entirely different forms exist too), in which the particle can be encountered with a certain probability. A 90% orbital designates the space in which the probability of encountering the particle is 90%.

Perhaps this all sounds a bit abstract to you. I will use an analogy to clarify these orbitals. Say that you have a couple of teenage sons who like to go out. You generally know their habits when they go out. In other words, you do not know exactly where they are at night, but if you were to sketch a 90% probability area (a 90% orbital) on a map of your own city,

[448] The fascinating character of quantum mechanics became apparent during more advanced repetitions of the two-slit experiment in the 60s, 70s, and 80s of last century by numerous scientists, but now with electrons (particles) instead of sunlight: even if the electrons are fired at the double slit slowly, one by one, an interference pattern emerges behind the slits. Even though a single electron at a time, a particle, has nothing to interfere with! The interference patterns is now constructed as the sum of many individual electrons that successively hit the plate behind the slits. Still, the combined pattern of the successive hits on the (now photographic) plate looks like an interference pattern, not like a particle. The miraculous fact now is that when you determine through which slit the individual electrons passed, the wave function 'collapses': the path of the electron is then known exactly again.

[449] Or time spatial.

you could create a two-dimensional contour line. One is set in his ways. You place a very small circle around his favourite bar, that is his 90% orbital; he is bound to be there. But you are not entirely sure, because he is not always there, he might still be on his way, hence the 90%. You place a larger circle around the street where his favourite bar is located, around the smaller one (it does not have to be concentric or round). That is the 98% orbital of this son. The other son is less predictable. His 90% and 98% orbitals for this Saturday night are larger.

Of course, your children have not literally been smeared out, spread, delocalized – 'in real life' they find themselves at a single place – but the probability of encountering them somewhere is. Those probabilities are based on what you know (or, in more perspectivist terms: what you have experienced previously). It is not until your son lets you know exactly where he is, or until you visit him, that you know *exactly* where he is. At that moment, the entire orbital becomes irrelevant. One ***actual*** situation arises from the probability (the possibilities, the expectations).

The same applies to subatomic particles: pieces of matter placed in space, which is how we usually envision them. You do not know exactly where they are, but you know where you can expect to find them. It is not until a measurement or observation that you know where the particle is located. That 'collapses' the wave function, which is how the Copenhagen school of quantum mechanics called it, and the location is known. It is not until you open the box that you know whether Schrödinger's cat is alive or dead.[450] Not until the electron hits the plate behind the slits do you know where it is. Not until you grab a beer with your son do you know exactly where he is. Not until you the moment you dive into the actor configuration do you know how the multi-actor practice functions.

I believe that the same principle applies to perspectivist configurations, because subatomic particles, your children, and societies can be interpreted excellently as perspectivist configurations (there are many other examples). According to recursive perspectivism, you experience in terms of coherent and compounded perspective. Subatomic particles in quantum mechanics are delocalized and are described by a wave function. The same can be done with societal configurations. They are characterized by a number of perspectives n. That determines their *possible* configurations, their *possible* positions in the perspectivist space, through prime numbers. But we do not know their exact configuration beforehand. And perspectivist configurations are also subject to impressive wave patterns, based on prime numbers (I will illustrate them later on).

The probability of possible configurations, in terms of structure and in terms of content, is described by the expansive perspectivist analyses, provided earlier. For every square-free number n with an increasingly large value of p (an increasingly large number of different prime factors), the function f_p provides an increasingly distinct binomial bell curve for the

[450] See the internet for 'Schrödinger's cat'. It comes down to the idea that the state of the cat can be both alive and dead: it is undetermined, until you look inside.

progressive values of k. For p=3, you might need a little imagination, but it does start to form:

```
n=30 =(2 3 5), p=3 => k=3

k=0 =>  1 (1)
k=1 =>  3 (2 3 5)
k=2 =>  3 (6 10 15)
k=3 =>  1 (30)

Factor list: (1 2 3 5 6 10 15 30) = 8
```

The factors form the x coordinate of a discrete inverse proportionality in two dimensions (the stacking blocks or stepping stones). The factors place the stacking blocks exactly on the inversely proportional line corresponding to n: If the factors progressively form the x coordinate, the inverse row of factors forms the y coordinate, because x·y=n. The *possible* configurations in two dimensions for 30 perspectives, the black blocks on the discrete inverse proportionality for n=30, are therefore:

(1 30) (2 15) (3 10) (5 6) (6 5) (10 3) (15 2) (30 1)

These are all two-dimensional *possibilities* for n=30, but we do not know which one it is beforehand, or in which of the possible configurations these 30 perspectives are located. The improvement potential gives a probabilistic idea of this. The stairs, explained earlier, provides a combined visual image of structure and content for a specific number of perspectives n.

```
k=3                                                          x
k=2              x       x         x
k=1     x x   x
k=0   x
k//f  1 2 3   5 6       10        15                         30
```

The stairs with the factors for n=30=(2 3 5). The factors (f) for k=1 are the prime factors. The stacking blocks on the inverse proportionality are (1,30) (2,15) (3,10) (5,6) (6,5) (10,3) (15,2), and (30,1), they form the discrete inverse proportionality for n=30 perspectives.

The structure determines how many k levels there are (how many steps) and how many possible positions there are at every k level. The content places them on the exact positions of the number line that correspond to these k levels. As soon as steps of these stairs overlap, there is *interleaving*. For n=30=(2 3 5), no such interleaving takes place, as evidenced by the above stairs and the progression of f_p.

This is true for perspectivist configurations like multi-actor practices and possible societal forms, but in essence, it applies to all perspectivist configurations (and thus also for all recursive experiences compounded from perspectives, including partying sons and subatomic particles). Recursive perspectivism is therefore a far-reaching unification methodology: it expands to everything that can be experienced by a perspectivist

consciousness. It does not matter if we are dealing with alpha (philology, Zipf patterns in books like Ulysses), beta (subatomic particles), gamma (actors, experiential worlds, societal configurations and societal developments), or mixed experiences.

Physicists often wonder what subatomic particles have to do with prime numbers, and how these domains are related. With recursive perspectivism, I propose a unifying substrate. I think that perspectivist configurations are forced to conform to the regularity and possibilities of discrete inverse proportionalities due to the quantum-theoretical nature of perspectives. This, in turn, makes prime numbers arise as discussed earlier, and in this way, experiences conform to recursive perspectivist laws and patterns (pattern laws). These then imply the quantum-theoretical effects and relativistic phenomena, among others. In these perspectivist terms, subatomic particles are therefore directly related to societal configurations: they are both experienced by perspectivist consciousness, they are both based on prime numbers, and they both consist of (experience in) recursive perspective. Recursive perspectivism, with its balance seeking prime numbers that emerge from reconfigurations, offers a methodological substrate with unifying potentials for everything that is experienced: subatomic particles, societal forms, and everything in between. Does this truly include all experiences? That is a question for fundamentalists, and I stay far away from them. There are many, in any case. It is quite a search, a fascinating journey of discovery through uncharted terrain, but with this book, I lift the veil ever so slightly that covers a structural understanding of our experience (see also my dissertations and other volumes of the Society in Perspective series).

Sawtooth patterns

If we were to sum the value of the Möbius function for numbers with square-free prime factorizations over the *factors* (a sigma Möbius), and strictly follow the regularly oscillating patterns of the corresponding row of Pascal's triangle while doing so, the result up to a square-free n would be a regular 'sawtooth pattern'. To clarify: this summation of Möbius values resembles the Mertens function a little, but it is not the same. First, we only sum over the *factors* of a square-free n. Secondly, we strictly follow the binomial pattern of the corresponding row of Pascal's triangle, where *interleaving* may occur when there are large differences between prime numbers (see below). If interleave were to occur, I could simply suppress it by finishing the current value of k before starting with the next k, resulting in perfect sawtooth patterns.

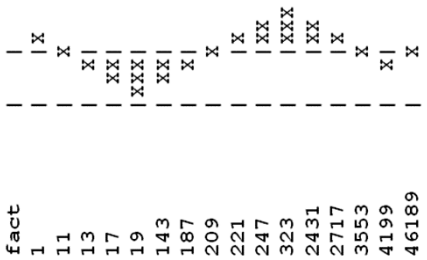
For example, take the factors of the square-free number 46189, a number with a prime factorization of p=4: (11 13 17 19), because 11·13·17·19=46189:

```
n=46189 primes: (11 13 17 19), p=4 => k=4

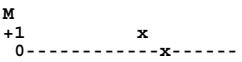

factors:
k=0 =>  1     (1)
k=1 =>  4     (   11 13 17 19)
k=2 =>  6     (                 143 187 209 221 247 323)
k=3 =>  4     (                                         2431 2717 3553 4199)
k=4 =>  1     (
46189)
```

Now we sum the Möbius values over the factors, strictly from left to right and from top to bottom. The corresponding row of Pascal for p=4 is 1 4 6 4 1. The Möbius function gives +1 for 1, -1 for a prime number and all prime factorizations with an uneven number of prime factors, and +1 for all prime factorizations with an even number of prime factors. We first have Möbius +1 for the 1, this is the first, trivial factor. This is followed by four -1s for the four k=1 prime numbers 11, 13, 17, and 19. Then six times a +1 for the k=2 numbers 143, 187, 209, 221, 247, and 323. Then there are another four -1s for the four k=3 numbers 2431, 2717, 3553, and 4199. The sequence is concluded with a +1 for the k=4 number 46189.

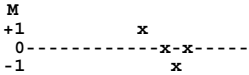
The result is a distinct pattern that neatly follows the binomial pattern of the corresponding row of Pascal's triangle: 1 4 6 4 1 for p=4 (see the figure below): a sawtooth pattern. It describes the binomial 'Gaussian curve' calculated with f_p. You can interpret (understand) the pattern as a type of Mertens function, or a cumulative Möbius value (sigma Möbius), but strictly over the 16 factors of 46189:



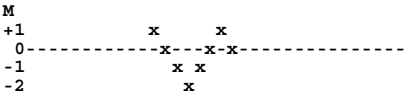
For p=2, p=3, p=4, p=5, and p=6 (square-free), the saw teeth patterns are depicted below. The sawtooth patterns for higher values of p have more teeth at their disposal, one tooth per prime factor (the first and last peek count as well), but the principle is the same. If we follow Pascal's triangle, we can see a distinct development pattern emerge. For example, for p=6, we can see the row 1 6 15 20 15 6 1. We can also see the characteristic alternation between single and double peaks in the centre of the binomial Gaussian curve (this is inherent to Pascal's triangle). This is not an empirical fact, but a direct consequence of the binomial construction of Pascal's triangle. The p^{th} row of Pascal applies to *every* number n with p *different* prime factors (n is therefore square-free).



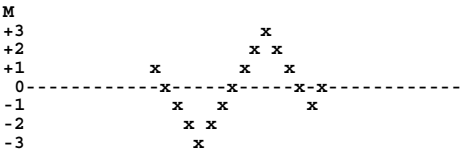
Sigma Möbius for p=1 without intermediate values (2 square-free factors)



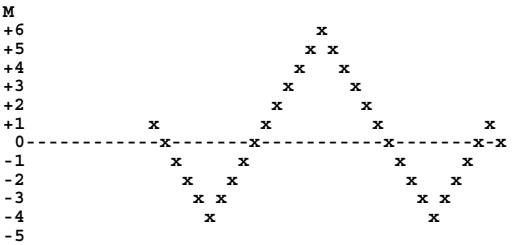
Sigma Möbius for p=2 without intermediate values (4 square-free factors)



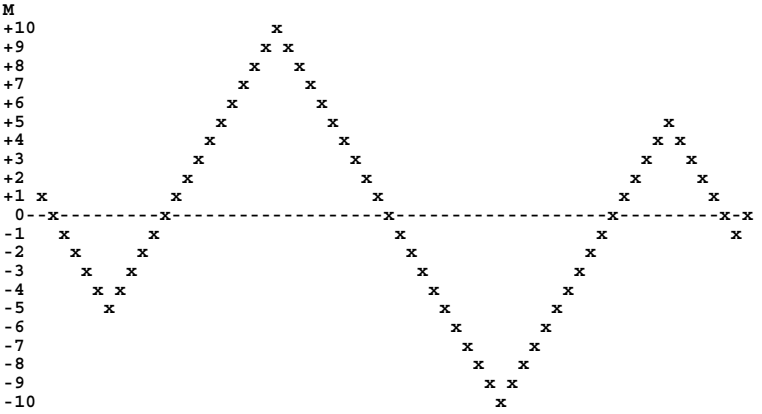
Sigma Möbius for p=3 without intermediate values (8 square-free factors)



Sigma Möbius for p=4 without intermediate values (16 square-free factors)

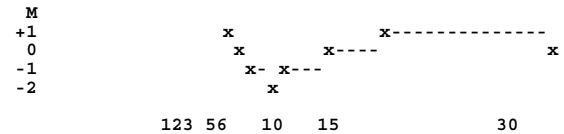


Sigma Möbius for p=5 without intermediate values (32 square-free factors)



Sigma Möbius for p=6 without intermediate values (64 square-free factors)

These regular saw teeth patterns apply to every square-free number with the same value of p. For example, for p=3, take 30=(2 3 5), 105=(3 5 7), or 1885=(5 13 29). They purely emphasize the combinatory ***structure***, the underlying binomial pattern of f_p. They strictly follow the row of Pascal's triangle, and have no influence on the ***position*** of the numbers on the number line (content: if interleaving occurs, I ignore it). But the distribution along and position on the number line is different for other numbers, other prime factorizations with an equal value for p, because other prime factors are multiplied to determine the factors. Below, find the pattern for n=30, where the values are placed on the correct positions along the number line. This causes the sawtooth to stretch further to the right:



The Möbius sum for the factors of n=30=(2 3 5): 1 2 3 5 6 10 15 30

Interleaving

The sigma Möbius over the factors of a square-free number, of which the prime factors are approximated to be around the same value, strictly follows the (combinatorial and binomial) structural sawtooth pattern of the increasing value of k for the corresponding row of Pascal.

But the numerical values corresponding to different values of k can overlap, *interleave*, quite drastically, if the underlying prime factors differ a lot in size. That causes a disruption of the characteristic sawtooth pattern of the rows of Pascal's triangle. I believe that this *interleaving* explains why the Mertens function behaves better than a Bernoulli experiment: it remains closer to the balance, closer to the balance axis than the more active Bernoulli sequences, and it will have a tendency to cross this balance more often than Bernoulli sequences. I discuss this further in the book.

To get more insight into the *interleaving* phenomenon, we focus on the category 1 numbers: the factors of a number with a square-free prime factorization. Category 2 numbers (quadratic prime factorizations, with Möbius value 0) have no effect on the value of the Mertens function. They do influence the ratios between the remaining square-free numbers, which can be seen in the interleaving process. Furthermore, we ignore the category 3 numbers, which causes the volatility due to the square-free non-factors (by now we call them vacancies for higher interleaving processes) to disappear. As explained previously, we therefore sum the Möbius values over the factors of a square-free n, and not over all numbers up to an arbitrary value of n. This sigma Möbius can be interpreted as some sort of targeted (or domain-limited) Mertens function (but it is *not* a Mertens function).

Below you can first see the factors for 210, then those for 462, both of which are square-free numbers with p=4. We can now view the interleaving of factors of a single number as the

mutual 'intrusion' of k values into each other's domains (or *ranges)*. The k=1 and the k=3 ranges intrude the k=2 range from both sides, and the centre k=2 range intrudes the k=1 and k=3 ranges on the top and bottom. This causes the sum of the Möbius values over the factors (the sigma Möbius) to assume a pattern with smaller peaks and gaps than the sawtooth pattern (they are depicted a bit further on). The number 462 displays twice as much interleaving as 210, see the stripes and underlining in the f_p factor tables below:

```
Factors 210=(2 3 5 7):
k=0 =>  1     (1)
k=1 =>  4     (2 3 5 7)
k=2 =>  6     (6 - 10 14 15 21 - 35)
k=3 =>  4     (30 42 70 105)
k=4 =>  1     (210)
k=5 =>  1     (1)

Factors 462=(2 3 7 11):
k=0 =>  1     (1)
k=1 =>  4     (2 3 7 11)
k=2 =>  6     (6 - - 14 21 22 33 - - 77)
k=3 =>  4     (42 66 154 231)
k=4 =>  1     (462)
k=5 =>  1     (1)
```

Interleaving effects now emerge because factors of square-free numbers with more, but smaller prime factors (higher value of k), nest themselves *between* the factors of square-free numbers with fewer but larger prime factors (lower value of k) on the number line. And vice versa: factors of square-free numbers with fewer but larger prime factors (a lower value of k) nest themselves *between* the factors of square-free numbers with more but smaller prime factors (a higher value of) on the number line. In terms of the earlier mentioned stairs: the steps of the different values of k overlap each other.

For n=210=(2 3 5 7), the number 6 interleaves with respect to 7, because they are both factors, around the same size, but 6 is a k=2 number, whereas 7 is a k=1 number. Keeping the sawtooth pattern of the corresponding row of Pascal's triangle in mind, the 6, as a k=2 number, intrudes the k=1 numbers. And similarly: for 462=(2 3 7 11), the number 6 interleaves with respect to 7 and 11, because they are all factors, but the 6 is a k=2 number, and 7 and 11 are k=1 numbers.

The very first number from 1 (the left) that interleaves is therefore a k=2 product of the two smallest prime numbers, 2 and 3. As soon as this is embedded on the left of a k=1 number (a prime number), we speak of interleaving.

These *interleaving* processes are always *exactly symmetrical* due to the binomial construction of the factors from the prime factors and the position of factors on the discrete inverse proportionality. Look at the f_p factor table above for 210: If the 6 intrudes between the 5 and 7, the 35 will intrude between the 30 and 42. When the 7 intrudes between the 6 and 10, the 30 will intrude between the 21 and 35. That is how they change the regular binomial sawtooth patterns in a perfectly symmetric manner, as shown above.[451]

[451] Quadratic numbers *interleave* as well, but they display other effects due to their Möbius value of zero.

More examples, all involving a square-free number with p=4, clarifies this even further:

```
No interleaving
---------------
n=8756100193 primes: (293 307 311 313), p=4 => k=4

factors:
k=0 =>  1     (1)
k=1 =>  4     (293 307 311 313)
k=2 =>  6     (89951 91123 91709 95477 96091 97343)
k=3 =>  4     (27974761 28154663 28521499 29884301)
k=4 =>  1     (8756100193)

factors:
k=0 =>  1     (1)
k=1 =>  4     (293 307 311 313)
k=2 =>  6     (                 89951 91123 91709 95477 96091 97343)
k=3 =>  4     (                           >> 27974761 28154663 28521499 29884301)
k=4 =>  1     (                                                       >> 8756100193)

 fact        |    |
 1           |    |X
 293         |   X
 307         |  X|
 311         |  XX|
 313         | XXX|
 89951       |  XX|
 91123       |  X|
 91709       |   X
 95477       |   |X
 96091       |   |XX
 97343       |   |XXX
 27974761    |   |XX
 28154663    |   |X
 28521499    |   X
 29884301    |  X|
```

```
No interleaving
--------------
n=46189 primes: (11 13 17 19), p=4 => k=4

factors:
k=0 =>  1     (1)
k=1 =>  4     (11 13 17 19)
k=2 =>  6     (143 187 209 221 247 323)
k=3 =>  4     (2431 2717 3553 4199)
k=4 =>  1     (46189)

factors:
k=0 =>  1     (1)
k=1 =>  4     (11 13 17 19)
k=2 =>  6     (            143 187 209 221 247 323)
k=3 =>  4     (                                    2431 2717 3553 4199)
k=4 =>  1     (                                                         46189)

 fact        |    |
 1           |    |X
 11          |   X
 13          |  X|
 17          | XX|
 19          |XXX|
 143         |  XX|
 187         |  X|
 209         |   X
 221         |    |X
 247         |    |XX
 323         |    |XXX
 2431        |    |XX
 2717        |    |X
 3553        |   X
 4199        |  X|
 46189       |   X


Interleaving:
--------------
n=1938 primes: (2 3 17 19), p=4 => k=4

factors:
k=0 =>  1     (1)
k=1 =>  4     (2 3 17 19)
k=2 =>  6     (6 34 38 51 57 323)
k=3 =>  4     (102 114 646 969)
k=4 =>  1     (1938)

factors:
k=0 =>  1     (1)
k=1 =>  4     (2 3   17 19)
k=2 =>  6     (    6        34 38 51 57          323)
k=3 =>  4     (                          102 114      646 969)
k=4 =>  1     (                                                1938)

 fact        |    |
 1           |    |X
 2           |   X
 3           |  X|
 6           |   X
 17          |  X|
 19          | XX|
 34          |  X|
 38          |   X
 51          |    |X
 57          |    |XX
 102         |    |X
 114         |   X
 323         |    |X
 646         |   X
 969         |  X|
 1938        |   X
```

```
Interleaving
--------------
n=462 primes: (2 3 7 11), p=4 => k=4

factors:
k=0 =>  1     (1)
k=1 =>  4     (2 3 7 11)
k=2 =>  6     (6 14 21 22 33 77)
k=3 =>  4     (42 66 154 231)
k=4 =>  1     (462)

factors:
k=0 =>  1     (1)
k=1 =>  4     (2 3   7 11)
k=2 =>  6     (    6      14 21 22 33          77)
k=3 =>  4     (                        42 66       154 231)
k=4 =>  1     (                                              462)
```

```
 fact        |    |
 1           |    |X
 2           |   X
 3           |  X|
 6           |   X
 7           |  X|
 11          | XX|
 14          |  X|
 21          |   X
 22          |    |X
 33          |    |XX
 42          |    |X
 66          |   X
 77          |    |X
 154         |   X
 231         |  X|
 462         |   X
```

```
Interleaving
--------------
n=210 primes: (2 3 5 7), p=4 => k=4

factors:
k=0 =>  1     (1)
k=1 =>  4     (2 3 5 7)
k=2 =>  6     (6 10 14 15 21 35)
k=3 =>  4     (30 42 70 105)
k=4 =>  1     (210)
factors:
k=0 =>  1     (1)
k=1 =>  4     (  2 3 5   7)
k=2 =>  6     (         6   10 14 15 21    35)
k=3 =>  4     (                        30      42 70 105)
k=4 =>  1     (                                           210)
```

```
 fact        |    |
 1           |    |X
 2           |   X
 3           |  X|
 5           | XX|
 6           |  X|
 7           | XX|
 10          |  X|
 14          |   X
 15          |    |X
 21          |    |XX
 30          |    |X
 35          |    |XX
 42          |    |X
 70          |   X
 105         |  X|
 210         |   X
```

The basic structural pattern 1 4 6 4 1 over the progressing k values (the structural values, the fourth row of Pascal's triangle) remains intact in any case, but the degree of interleaving

depends on the *specific content values* of the corresponding prime numbers, or more specifically, their products.

The square-free p=4 numbers with prime factors that best approximate a four-dimensional symmetry (best approximate a 'four-dimensional' square), namely n=8756100193=(293 307 311 313) and n=46189=(11 13 17 19), are numbers with a sigma Möbius pattern that follow the row of Pascal's triangle without any interleaving: +1 -4 +6 -4 +1.

The primorial prime factorization, which assumes the *lowest* square-free prime factorizations for a value of p, in this case 210=(2 3 5 7) with p=4 (the last figure, shown above), displays the calmest interleaving. It already shows a very reasonable approximation of a wave function, despite the fact that p only has a value of 4. In a moment, I will also illustrate this wave pattern for primorial numbers with larger values of p, which makes the pattern much more distinct.

The numbers n=1938=(2 3 17 19) and n=462=(2 3 7 11) are furthest apart in terms of ratios between the prime factors. That is why the interleaving process appears somewhat messy.

The interleaving process is stronger for square-free numbers with p prime factors, where the prime factors relate to each other in stronger deviating ratios. If the prime factors are more or less alike, the sawtooth order of the row of Pascal remains intact. Look back at the two examples above: 210=(2 3 5 7) and 462=(2 3 7 11): for 462, the mutual ratios between the prime factors are larger, and we see more interleaving. As k increases, the products are relatively spread across a larger range (the width of the step of the stairs becomes wider). As soon as the stair steps of various values of k overlap, there is interleaving.

How can we gain a better understanding of this regarding the previously discussed stacking of blocks? I like to remind you now of the image of the stepping stones over a river. The factors of a number n correspond to the x coordinates of black blocks that are located exactly on the discrete inverse proportionality n=x·y. Due to this relationship, they are the exact mirror image of the y coordinates. Keeping this in mind, we can instantly see that the primorial prime factorization 2120=(2 3 5 7) optimally spreads the 16 p=4 black blocks across the discrete inverse proportionality for 210. The practically symmetric prime factorization of 8756100193 (symmetric in the sense that the four prime factors are around the same size), on the other hand, places 14 intermediate blocks (so apart from the 2 embankment stones 1 and 8756100193) in groups close to the black blocks on this discrete inverse proportionality. I will present them below:

```
Factors 210:
k=0 =>  1     (1)
k=1 =>  4     (  2 3 5   7)
k=2 =>  6     (         6   10 14 15 21    35)
k=3 =>  4     (                          30     42 70 105)
k=4 =>  1     (                                            210)

Factors 8756100193:
k=0 =>  1     (1)
k=1 =>  4     (293 307 311 313)
k=2 =>  6     (                  89951 91123 91709 95477 96091 97343)
k=3 =>  4     (                              >> 27974761 28154663 28521499 29884301)
k=4 =>  1     (                                                                  >> 8756100193)
```

We can see that the factors of the primorial number 210 are nicely spread across the entire inverse proportionality due to (limited) interleaving (for every factor, you can think of the complementary number, for example (1 210)(2 105)(3 70)(5 42), etc.). However, the factors of 8756100193 are positioned closely together in small clusters that strictly follow Pascal: 1 4 6 4 1. The clusters are far apart: the four k=1 numbers are located around the 300, the six k=2 numbers around the 90000, the four k=3 numbers around the 28000000, and k=4, of course, is 8756100193.
Steps are a metaphor for reconfigurations; the ability to step represents configurability: a better spread of the stepping stones makes the potential deployment of perspectives much more versatile and flexible. Primorial numbers (primorial products) provide an excellent spread of stepping stones, without blocks going to waste, as is the case for quadratic prime factorizations. Which relative spread of stepping stones would have your preference?

The examples below for the progressing *primorial products*[452] of p=2 up to p=6 clarify how interleaving works. For every primorial step, one new prime number p_n, the next one, is added to the prime factorization of the previous primorial number n. This increases n by a factor p_n, doubling the total number of factors of this new primorial number relative to the previous number (all original factors are added, but they are multiplied by p_n). The total number of factors then doubles in accordance with f_p for every step, and we go down a row in Pascal's triangle.

Newly added factors (the underlined numbers in the factor lists below, printed in bold) are not simply added to the end, but from p=3 onwards, they fall *in between* the existing factors. This *interleaving* can be seen in both a single primorial product between the different values of k, and the progressing primorial products. In recursive terms, this is the exact same phenomenon: interleaving within a single primorial product displays the interleaving effects of previous primorial steps.[453]

[452] A primorial (or primorial number, or primorial product) is the product of all prime numbers small or equal than a number. I refer to the primorial sequence as the progressive sequence of primorial products (2) (2 3) (2 3 5) (2 3 5 7) (2 3 5 7 11) (2 3 5 7 11 13), etc. The next prime number is added very time. If you follow a primorial sequence, you will be certain that you included all prime numbers up to the last one in the prime factorization (you will not miss a single one).
[453] Note that 30 does not display any interleaving in terms of overlapping steps, but the 5 of the third primorial step does position itself before the 6 of the second primorial step.

```
n=2 =(2), p=1 => k=1
k=0 =>  1 (1)
k=1 =>  2 (2)
Factor list: (1 2) => 2

+ 1 1 = 2


n=6 =(2 3), p=2 => k=2
k=0 =>  1 (1)
k=1 =>  3 (2 3)
k=2 =>  3 (6)
Factor list: (1 2 3 6) => 4

+ 1 2 1 = 4


n=30 =(2 3 5), p=3 => k=3
k=0 =>  1 (1)
k=1 =>  3 (2 3 5)
k=2 =>  3 (6 10 15)
k=3 =>  1 (30)
Factor list: (1 2 3 5 6 10 15 30) => 8

+ 1 3 3 1 = 8


n=210 primes: (2 3 5 7), p=4 => k=4
k=0 =>  1     (1)
k=1 =>  4     (2 3 5 7)
k=2 =>  6     (6 10 14 15 21 35)
k=3 =>  4     (30 42 70 105)
k=4 =>  1     (210)
Factor list: (1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210) => 16

+ 1 4 6 4 1 = 16


n=2310 primes: (2 3 5 7 11), p=5 => k=5
k=0 =>  1      (1)
k=1 =>  5      (2 3 5 7 11)
k=2 =>  10     (6 10 14 15 21 22 33 35 55 77)
k=3 =>  10     (30 42 66 70 105 110 154 165 231 385)
k=4 =>  5      (210 330 462 770 1155)
k=5 =>  1      (2310)
Factor list: (1 2 3 5 6 7 10 11 14 15 21 22 30 33 35 42 55 66 70 77 105 110
154 165 210 231 330 385 462 770 1155 2310) => 32

+ 1 5 10 10 5 1 = 32


n=30030 primes: (2 3 5 7 11 13), p=6 => k=6

k=0 =>  1     (1)
k=1 =>  6     (2 3 5 7 11 13)
k=2 =>  15    (6 10 14 15 21 22 26 33 35 39 55 65 77 91 143)
k=3 =>  20    (30 42 66 70 78 105 110 130 154 165 182 195 231 273 286
                          385 429 455 715 1001)
k=4 =>  15    (210 330 390 462 546 770 858 910 1155 1365 1430 2002
                   2145 3003 5005)
k=5 =>  6     (2310 2730 4290 6006 10010 15015)
k=6 =>  1     (30030)

Factor list: (1 2 3 5 6 7 10 11 13 14 15 21 22 26 30 33 35 39 42 55 65 66 70
77 78 91 105 110 130 143 154 165 182 195 210 231 273 286 330 385 390 429 455
462 546 715 770 858 910 1001 1155 1365 1430 2002 2145 2310 2730 3003 4290
5005 6006 10010 15015 30030) => 64
```

The interleaving process itself is not chaotic at all *per primorial step*, on the contrary. If we look at the interleaving in the list of factors of the progressive primorial sequence 2=(2), 6=(2 3), 30=(2 3 5), 210=(2 3 5 7), 2310=(2 3 5 7 11), 30030=(2 3 5 7 11 13), etc., we can see an ironclad regularity.

For the step from 6=(2 3) to 30=(2 3 5), this works as follows. The presence of four factors 1, 2, 3, and 6 leads to four new factors (the structural doubling). In terms of numerical values, these are exactly the fivefold of the present factors (because 5 is the newly added prime number): 5 10 15 30. In terms of number of prime factors, they are all exactly one larger than their predecessor (you multiply an extra time by the new prime number 5). The ratio between the row 1 2 3 6 and 5 10 15 30 is therefore exactly a factor 5 (the last added prime number), and in terms of prime factors, the row of Pascal shifts one to the side.

The existing factors and the newly added factors *now shift alongside each other in an exact mirror image*, due to the binomial multiplication process and the position of the factors on the discrete inverse proportionality. For example, take k=1: here the five is added as the third number. Consequently, for k=2, after the number 6, two numbers are added: 10 and 15. A similar consideration applies to k=0 with 1, and k=3 with 30: the 30 is added because the 1 is already there. The example below will clarify the primorial step from 6=(2 3) with p=2 to 30=(2 3 5) with p=3 (the added numbers are underlined and printed in bold):

```
(1 2 3     | 6          )     4 factors n=6
(      5   |   10 15 30)     extra 4 factors n=30

(1 2 3 5   | 6 10 15 30)     all 8 factors n=30, mirror interleaved
    mirror line
```

The same applies to the next primorial step from 30=(2 3 5) to 210=(2 3 5 7). We add the sixfold of the eight present factors: 7 14 21 35 42 70 105 and 210 to the eight original factors: 1 2 3 5 6 10 15 30, resulting in 16 factors: 1 2 3 5 6 10 15 30 and 7 14 21 35 42 70 105 210. The 7, 14, and 21 then shift to the lift, while the 10, 15 and 30 shift to the right, neatly mirrored.

```
210=(2 3 5 7) =>   (1 2 3 5 6 7 10 14   |  15 21 30 35 42 70 105 210)
                                        mirror line
```

This sliding process for the first numbers of the progressive primorial product sequence is placed below, 2, 6, 30, 210, 2310, 30030:

```
2=(2) =>
(1 2)

6=(2 3) =>
(1 2 | 3 6)

30=(2 3 5) =>
(1 2 3 5 | 6 10 15 30)

210=(2 3 5 7) =>
(1 2 3 5 6 7 10 14  |  15 21 30 35 42 70 105 210)

2310=(2 3 5 7 11) =>
(1 2 3 5 6 7 10 11 14 15 21 22 30 33 35 42  |  55 66 70 77 105 110 154 165 210 231
330 385 462 770 1155 2310)

30030=(2 3 5 7 11 13) =>
(1 2 3 5 6 7 10 11 13 14 15 21 22 26 30 33 35 39 42 55 65 66 70 77 78 91 105 110 130
143 154 165  |  182 195 210 231 273 286 330 385 390 429 455 462 546 715 770 858 910
1001 1155 1365 1430 2002 2145 2310 2730 3003 4290 5005 6006 10010 15015 30030)
```

In the examples above, we can also see that the two numbers directly to the right and left of the mirror line (the vertical bar in the middle: |) each approximate the square root of n as accurately as possible. There is no better approximation of the root, or the 'actual root', in the discrete primorial world. The product of these two numbers on the left and right of the mirror line is n, and that also applies to the other mirror pairs further away from the mirror line, due to the discrete inverse proportionality. Take the example from above: the middle part, directly around the mirror line, is:

```
110 130 143 154 165  |  182 195 210 231 273
```

As expected, we can see that 165·182 = 30030. But this also applies to the other symmetric pairs relative to the mirror line: 154·195 = 143·210 = 130·231 = 110·273 = 30030.

The consistent doubling of factors per primorial step is a neat symmetric process and inverse. If we look from left to right, we can see how new factors, that correspond exactly to the old factors times the new prime factor (the last added, the largest prime number of the new primorial product) will partly place themselves *in between* the existing factors, and partly add themselves *to* the end. Take the primorial step from 2310=(2 3 5 7 11) to 30030=(2 3 5 7 11 13). If 13 is added to the end of k=1, resulting in 6 factors for k=1, this will result in an addition of five numbers at the end of k=5 due to symmetry: 2730, 4290, 6006, 10010, and 15015, resulting in 6 factors for k=5. Only 2310=(2 3 5 7 11) was already present.

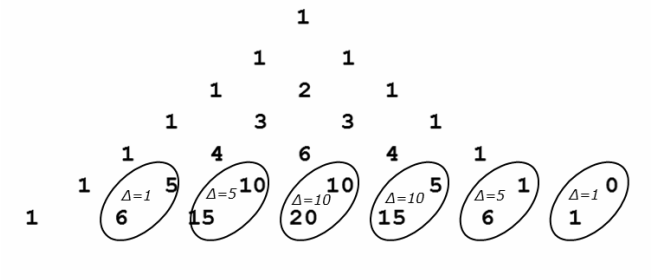
```
n=30030 primes: (2 3 5 7 11 13), p=6 => k=6

k=0 =>  1     (1)
k=1 =>  6     (2 3 5 7 11 13)
k=2 =>  15    (6 10 14 15 21 22 26 33 35 39 55 65 77 91 143)
k=3 =>  20    (30 42 66 70 78 105 110 130 154 165 182 195 231 273 286
                        385 429 455 715 1001)
k=4 =>  15    (210 330 390 462 546 770 858 910 1155 1365 1430 2002
                  2145 3003 5005)
k=5 =>  6     (2310 2730 4290 6006 10010 15015)
k=6 =>  1     (30030)
```

Continuing along this line of thought, the addition of 12 to k=1 must result in the addition of five factors to k=2: 26=(2 13), 39=(3 13), 65=(5 13), 91=(7 13), and 143=(11 13). These numbers partly position themselves in between the present k=2 numbers, because the k=1 sequence 2 3 5 7 11 and the added k=2 sequence 26 39 65 91 143 are completely identical in terms of underlying ratios: there is a perfect scale factor of 13. The numbers for k=4 progress in mirrored symmetry relative to the numbers for k=2L whereas k=2 displays the pattern 601n201n101n102n, the reverse is true for k=4: 201n101n102n106n (with o for old and n for new). There can never be the same numbers, because 13 is a new prime factor (30030 is square-free).

Continuing even further along this line of thought, the addition of 13 to k=1 must result in the addition of 10 factors to k=3: 26=(2 3 13), 130=(2 5 13), 182=(2 7 13), 286=(2 11 13), 195=(3 5 13), 273=(3 7 13), 429=(3 11 13), 455=(5 7 13), 715=(5 11 13), and 1001=(7 11 13). K=3 is the centre k, which is why it is exactly symmetrically mirrored: 401n201n202n102n104n.

Here we recognize the doubling step from row 5 to row 6 of Pascal's triangle, which can be derived by 'skewed addition' (see the figure):



On average over the factors of a square-free number, the sum of the Möbius values is not influenced by the prime factors that are in the prime factorization: the sum is zero in any case. But it does influence the specific sigma Möbius pattern that is followed along the way, due to the interleaving that occurs for specific prime factors. The less symmetry in the prime factors (as in: the less they display equal ratios), the larger the probability of interleaving. For square-free numbers, the primorial numbers have the most stepping stones, distributed in a balanced manner along the corresponding discrete inverse proportionality. That is because prime numbers in the prime factorization of n specifically fill the vacancies that make a maximally filled discrete inverse proportionality possible.

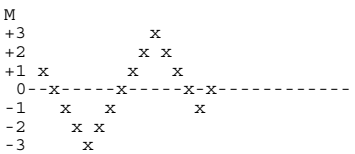
*'**Quantum entanglement** is a physical phenomenon that occurs when pairs or groups of particles are generated or interact in ways such that the quantum state of each particle cannot be described independently of the others, even when the particles are separated by a large distance—instead, a quantum state must be described for the system as a whole.'*
Wikipedia

'Gentlemen, we do not have time for Gaussian rigor.'
Carl Jacobi (1804-1851)

How sawtooth patterns become wave patterns

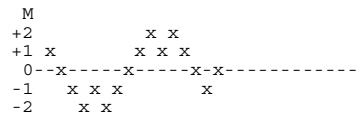
The Mertens function itself does not behave as well as the regularly edged sawtooth patterns, or the interleaved sigma Möbius of square-free numbers, as previous figures from Wikipedia and Wikimedia already demonstrated: the image of the Mertens function is capricious and fickle. While I was wrestling with square-free numbers with prime factors of similar and different sizes to better understand these volatilities – searching for wave patterns in the Mertens function – I discovered that under specific conditions, intriguing wave patterns do indeed emerge. When I saw them for the first time, I was instantly reminded of the Frenchman (Jean-Baptise) Joseph Fourier (1768-1830) and the Austrian Erwin Schrödinger (1887-1961). Fourier, who also discovered the greenhouse effect, is mainly known for his Fourier analysis: every function, continuous or discontinuous, of a variable, can be described by a summation of sine waves based on this variable.[454] Schrödinger made an appearance due to his Schrödinger equation, and more specific, his images of *wavepacket localization*. (See also the two-slit experiment, performed with single electrons.) My knowledge of mathematics and quantum mechanics is insufficient at the moment to really address these equations, but I did find it striking. These wave patterns offer a special insight into the behaviour of the Mertens function, the sigma Möbius (the summed Möbius values over specified numbers, and whether the Riemann hypothesis is true or false. I will address this in the next paragraph. Now I will first discuss the wave patterns themselves.

If we let the sigma Möbius progress strictly over the factors of *primorial* products like 210=(2 3 5 7) and 2310=(2 3 5 7 11), while considering interleaving, the characteristic sawtooth pattern is transformed into a special *wave pattern* due to this interleaving. We already saw it emerge previously, but quite angular, for n=210=(2 3 5 7). The characteristic sawtooth is reshaped into a discrete approximation of a special wave function, due to the specific symmetric repositioning caused by interleaving:

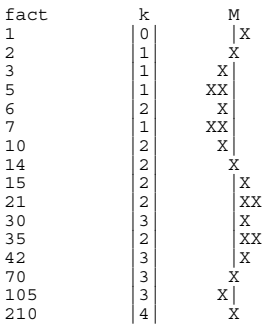


Sigma Möbius for p=4 without intermediate values and without interleaving (1 4 6 4 1, 16 square-free factors).

[454] His assumptions were later improved upon by the German mathematician (Johann) Peter Gustav Lejeune Dirichlet (1805-1859), successor of Gauss and good friend to Bernhard Riemann. A nice historical trail.



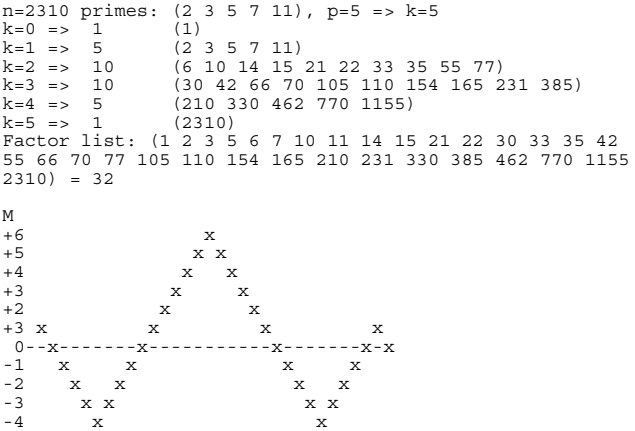
Sigma Möbius for the factors of the primorial p=4, so for 210=(2 3 5 7), without intermediate values and without interleaving (16 square-free factors).



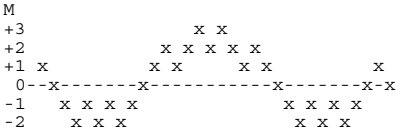
Sigma Möbius over the factors, flipped on its side, with the factors now named.

The wearing of the sawteeth is caused by the intermediate addition of the 6=(2 3) as a k=2 factor between the k=1 numbers 5 and 7. This repositioning disturbs the original sequence of four -1 Möbius steps in a row. Reversely, the 30=(2 3 5) as a k=3 factor embeds itself between the 21=(3 7) and the 35=(5 7) as k=2 factors, wearing down the second large sawtooth. This repositioning disturbs the original sequence of four +1 steps in a row. This *interleaving* damps the oscillations, the swinging from and to large positive and negative Mertens values. 'The saw blade wears down'. Neatly mirrored.

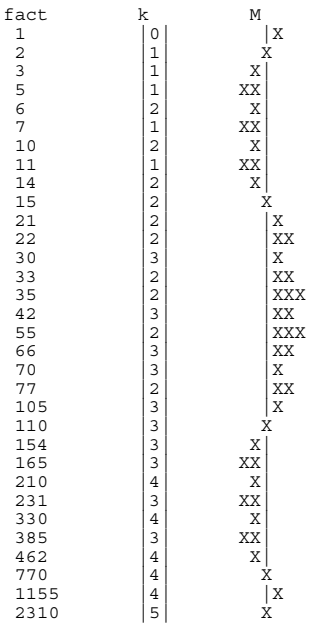
For 2310=(2 3 5 7 11), the following image is presented:



Sigma Möbius for p=5 without intermediate values and without interleaving (1 5 10 10 5 1, 32 square-free factors)



Sigma Möbius for the factors of the primorial p=5, so for 2310=(2 3 5 7 11), without intermediate values and without interleaving (32 square-free factors)



Sigma Möbius for the factors of the primorial p=5, so for 2310=(2 3 5 7 11), without intermediate values and with interleaving (32 square-free factors). The factors are named.

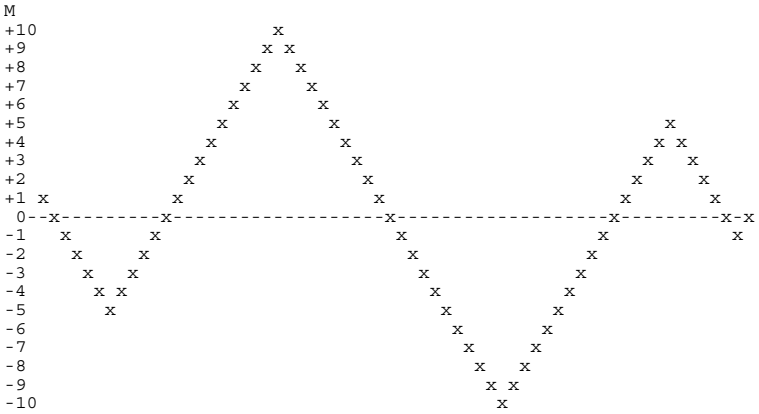
Above we can see how the 6 and the 10 disrupt the series of five (k=1) prime numbers. Due to symmetry considerations, there will also be two numbers that interrupt the k=4 series: these are the k=3 numbers 231 and 358. The series k=2 and k=3 are also heavily disrupted. The result is a symmetric 'wave pattern with noise'. On the next page, you will find the wave patterns for the primorial numbers with p = 6, 7, and 8.

For 30030=(2 3 5 7 11 13) the following figure emerges:

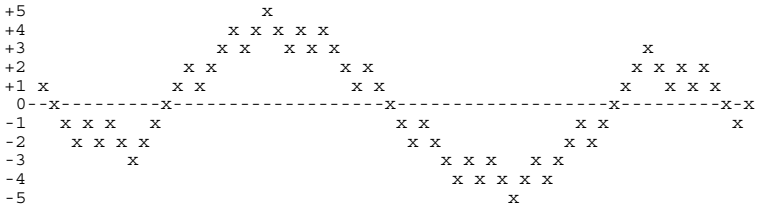
n=30030 primes: (2 3 5 7 11 13), p=6 => k=6

k=0 => 1 (1)
k=1 => 6 (2 3 5 7 11 13)
k=2 => 15 (6 10 14 15 21 22 26 33 35 39 55 65 77 91 143)
k=3 => 20 (30 42 66 70 78 105 110 130 154 165 182 195 231 273 286 385 429 455 715 1001)
k=4 => 15 (210 330 390 462 546 770 858 910 1155 1365 1430 2002 2145 3003 5005)
k=5 => 6 (2310 2730 4290 6006 10010 15015)
k=6 => 1 (30030)

Factor list: (1 2 3 5 6 7 10 11 **13** 14 15 21 22 **26** 30 33 35 **39** 42 55 **65** 66 70 77 **78** **91** 105 110 **130** **143** 154 165 **182** **195** 210 231 **273** **286** 330 385 **390** **429** **455** 462 **546** **715** 770 **858** **910** **1001** 1155 **1365** **1430** **2002** **2145** 2310 **2730** **3003** **4290** **5005** **6006** **10010** **15015** **30030**) = 64



Sigma Möbius for p=6 without intermediate values and without interleaving (1 6 15 20 15 6 1, 64 square-free factors)



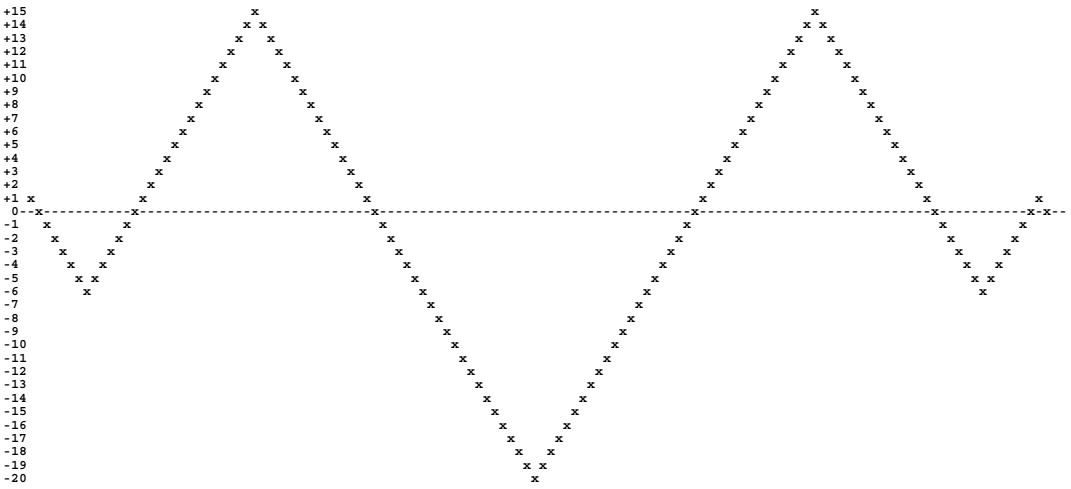
Sigma Möbius for the factors of the primorial p=6, so for 30030=(2 3 5 7 11 13), without intermediate values and with interleaving (64 square-free factors)

```
fact        k           M

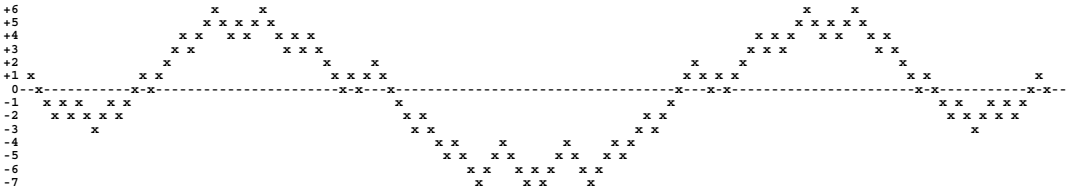
 1          |0|          |X
 2          |1|          X
 3          |1|          X|
 5          |1|         XX|
 6          |2|          X|
 7          |1|         XX|
 10         |2|          X|
 11         |1|         XX|
 13         |1|        XXX|
 14         |2|         XX|
 15         |2|          X|
 21         |2|           X
 22         |2|           |X
 26         |2|           |XX
 30         |3|           |X
 33         |2|           |XX
 35         |2|           |XXX
 39         |2|           |XXXX
 42         |3|           |XXX
 55         |2|           |XXXX
 65         |2|           |XXXXX
 66         |3|           |XXXX
 70         |3|           |XXX
 77         |2|           |XXXX
 78         |3|           |XXX
 91         |2|           |XXXX
 105        |3|           |XXX
 110        |3|           |XX
 130        |3|           |X
 143        |2|           |XX
 154        |3|           |X
 165        |3|           X
 182        |3|          X|
 195        |3|         XX|
 210        |4|          X|
 231        |3|         XX|
 273        |3|        XXX|
 286        |3|       XXXX|
 330        |4|        XXX|
 385        |3|       XXXX|
 390        |4|        XXX|
 429        |3|       XXXX|
 455        |3|      XXXXX|
 462        |4|       XXXX|
 546        |4|        XXX|
 715        |3|       XXXX|
 770        |4|        XXX|
 858        |4|         XX|
 910        |4|          X|
 1001       |3|         XX|
 1155       |4|          X|
 1365       |4|           X
 1430       |4|           |X
 2002       |4|           |XX
 2145       |4|           |XXX
 2310       |5|           |XX
 2730       |5|           |X
 3003       |4|           |XX
 4290       |5|           |X
 5005       |4|           |XX
 6006       |5|           |X
 10010      |5|           X
 15015      |5|          X|
 30030      |6|           X
```

```
For 510510=(2 3 5 7 11 13 17) with p=7, it looks as follows:

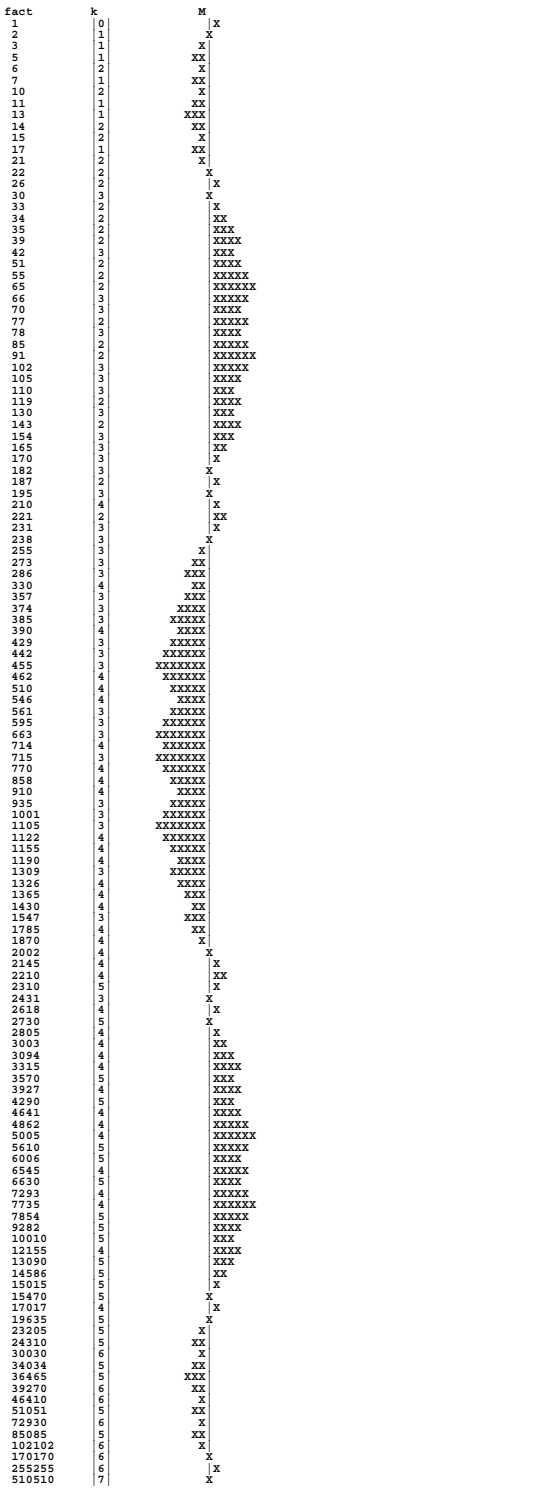
factors:
k=0 =>  1     (1)
k=1 =>  7     (2 3 5 7 11 13 17)
k=2 =>  21    (6 10 14 15 21 22 26 33 34 35 39 51 55 65 77 85 91 119 143 187 221)
k=3 =>  35    (30 42 66 70 78 102 105 110 130 154 165 170 182 195 231 238 255 273
               286 357 374 385 429 442 455 561 595 663 715 935 1001 1105 1309 1547
               2431)
k=4 =>  35    (210 330 390 462 510 546 714 770 858 910 1122 1155 1190 1326 1365
               1430 1785 1870 2002 2145 2210 2618 2805 3003 3094 3315 3927 4641 4862
               5005 6545 7293 7735 12155 17017)
k=5 =>  21    (2310 2730 3570 4290 5610 6006 6630 7854 9282 10010 13090 14586 15015
               15470 19635 23205 24310 34034 36465 51051 85085)
k=6 =>  7     (30030 39270 46410 72930 102102 170170 255255)
k=7 =>  1     (510510)
k=8 =>  1     (1)
```



Sigma Möbius for p=7 without intermediate values and without interleaving (1 7 21 35 35 21 7 1, 128 square-free factors)

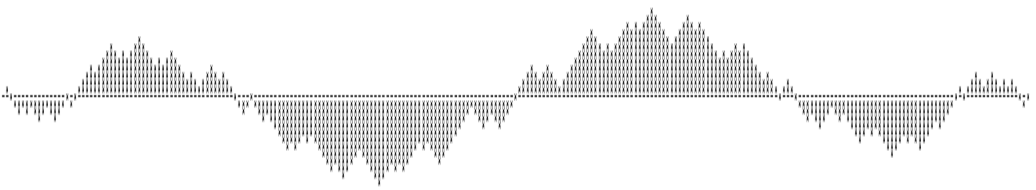


Sigma Möbius for the factors of the primorial p=7, so for 510510=(2 3 5 7 11 13 17), without intermediate values and without interleaving (128 square-free factors)


fact
k
M

And finally 9699690=(2 3 5 7 11 13 17 19), with p=8 (the sawtooth function, the vertical version, and the factors-after-interleaving are excluded here):

```
factors:
k=0 =>  1     (1)
k=1 =>  8     (2 3 5 7 11 13 17 19)
k=2 =>  28    (6 10 14 15 21 22 26 33 34 35 38 39 51 55 57 65 77 85 91 95 119 133
               143 187 209 221 247 323)
k=3 =>  56    (30 42 66 70 78 102 105 110 114 130 154 165 170 182 190 195 231 238
               255 266 273 285 286 357 374 385 399 418 429 442 455 494 561 595 627
               646 663 665 715 741 935 969 1001 1045 1105 1235 1309 1463 1547 1615
               1729 2261 2431 2717 3553 4199)
k=4 =>  70    (210 330 390 462 510 546 570 714 770 798 858 910 1122 1155 1190 1254
               1326 1330 1365 1430 1482 1785 1870 1938 1995 2002 2090 2145 2210 2470
               2618 2805 2926 3003 3094 3135 3230 3315 3458 3705 3927 4389 4522 4641
               4845 4862 5005 5187 5434 6545 6783 7106 7293 7315 7735 8151 8398 8645
               10659 11305 12155 12597 13585 17017 17765 19019 20995 24871 29393
               46189)
k=5 =>  56    (2310 2730 3570 3990 4290 5610 6006 6270 6630 7410 7854 8778 9282 9690
               10010 10374 13090 13566 14586 14630 15015 15470 16302 17290 19635
               21318 21945 22610 23205 24310 25194 25935 27170 33915 34034 35530
               36465 38038 40755 41990 49742 51051 53295 57057 58786 62985 74613
               85085 88179 92378 95095 124355 138567 146965 230945 323323)
k=6 =>  28    (30030 39270 43890 46410 51870 67830 72930 81510 102102 106590 114114
               125970 149226 170170 176358 190190 248710 255255 277134 285285 293930
               373065 440895 461890 646646 692835 969969 1616615)
k=7 =>  8     (510510 570570 746130 881790 1385670 1939938 3233230 4849845)
k=8 =>  1     (9699690)
```



This effect for primorial products is that the pure binomial sharply pointed sawtooth patterns, each neatly following a horizontal row of Pascal's triangle, start to approximate a special symmetric *wave function after interleaving*, in which the sawtooth is still recognizable, but it now contains small fluctuations and 'worn teeth' (the grinding effect of interleaving). This wave pattern is excellently hidden: you do not find it until you take the sum of the Möbius values over the factors of primorial products. As stair steps of different values of k (see earlier) overlap at specific deterministic manners, the binomial sawtooth spikes are neatly cut and trimmed. The shifts (swaps) are bound to specific limits determined by the nature of the overlaps, resulting in the rise of these special discrete wave patterns. The number of occurrences of Möbius +1 and 01 over the factors of a square-free number, such as a primorial, remains exactly the same after the mutual shifts. There are no *net* changes from e.g. plus to minus. The wave pattern starts with a low amplitude and high frequency, then the amplitude increases and the frequency decreases, after which this process reverses symmetrically (mirrored). This is only visible because of the exclusion of the intermediate vacancies of the number line (the Mertens function itself is much more volatile). But if you do this, the shifts (changes) at the front of the wave pattern must have knowledge of their

counterpart, or their inverse, depending on whether p is even or uneven, at the back of the pattern: they cannot be interpreted as two separate entities.[455]

The different positions on this wave pattern are thus connected in an intriguing fashion, even though they are far apart. This again reminds of a related phenomenon from quantum mechanics: *entanglement*. Entanglement (quantum entanglement, see the quote above this paragraph) implies that two entangled particles, even at large distances from one another, are deeply connected. When two members of an entangled pair or measured, for example their spin (a quantum physical property of subatomic particles), one will always have an upwards spin, and the other a downwards spin. The distance between the two particles is irrelevant. Although I lack detailed knowledge in the area of quantum physics, another parallel emerges between prime numbers and quantum physics. The sigma Möbius of numbers also depicts a distant dependence. From the point of view that experiences are shaped by perspectivist configurations, a possible conclusion could be that *quantum entanglement* also rests on the structure of the number line in terms of their prime factorizations, and the manner in which a perspectivist consciousness deals with perspectivist configurations. This will require further investigation.

For the even rows[456] of Pascal's triangle (with an even value of p, as is the case for the wave pattern of p=8 above), there is a rotational symmetry of 180 degrees around the midpoint for the wave pattern: the sigma Möbius here is 0, and when you turn the wave pattern by half a circle to the left or right, you get the same result. For the uneven rows of Pascal's triangle (with an uneven p) there is a simple mirrored symmetry in the centre: flip the wave pattern to the left or right along the mirror line in the centre, and you get the exact same image.

The number of pluses and minuses of Möbius (the number of square-free factors with even and uneven primes) is, according to f_p, exactly equal for the factors of every square-free number. This then also applies to every primorial number (primorial product), take for example 210 or 2310 or the product of the first 100000000 prime numbers (a truly massive number). No amount of interleaving has an influence on this. The start and end point of a pattern that has not been interleaved yet (purely binomial) and an interleaved pattern, are at the exact same position. That is because interleaving must occur between these boundaries: the lower bound is 1, the upper bound is the primorial product, and within these bounds, factors are strictly being shifted back and forth.

[455] This is a possible explanation for the mysterious quantum-theoretical phenomenon of *entanglement:* entities are large distances from one another can still be closely connected. The crux of the story is that you cannot interpret parts of a spectrum as separate pieces, but as connected parts of one larger whole, in this case the possible configurations for a given total number of perspectives.

[456] It depends on your counting method with Pascal's triangle. Do you count the top row as 0 or as 1? That is why I include the value of p.

This wave pattern is discrete. The wave pattern owes its basic structure to the rows of Pascal's triangle, and therefore starts with a low amplitude and a high frequency, then gets a higher amplitude and lower frequency, and then follows the inverse path. It appears to display some type of noise, a measurement error. But the binomial factors of Newton, Pascal's triangle, and interleaving (occupying positions on the discrete inverse proportionality) completely define this wave pattern.

Three new visions for a proof of the Riemann hypothesis

As I mentioned during my first proposition for a proof of the Riemann hypothesis (see earlier in this book), numerous mathematicians have varying opinions regarding the second and third equivalent phrasings of the Riemann hypothesis that I quoted. According to some, the second and third phrasings are equivalent, and according to others, they are too loosely defined and therefore incomplete. The previously mentioned *first* equivalent phrasing of the Riemann hypothesis by Edwards, on the other hands, *is* broadly accepted by professional mathematicians (I will repeat them here for clarity) :

> 1: If $M(x) = O(x^{(½ + \varepsilon)})$ is true with probability one, the Riemann hypothesis is true with probability one (Edwards, Howard, Riemann's Zeta function, Chapter 12.1).
>
> 2: The Riemann Hypothesis is true if and only if the numbers of positive and negative signs of M(n) are asymptotically equal.
>
> 3: If a square-free number has either an even or an odd number of prime factors with equal probability (50-50), the Riemann hypothesis is true (Derbyshire, Prime Obsession", Chapter 20.VI).

Whether the second and third phrasings are completely valid equivalents for the Riemann hypothesis is hard to determine for a non-mathematician such as myself. A Bernoulli experiment with a coin can produce any random series of heads and tails. Edwards taught us that: "… for any given $\varepsilon > 0$ the outcome (the excess of heads or tails) of this experiment for a large number of flips is, with probability nearly one, less than the number of flips raised to the power $½ + \varepsilon$ and *a fortiori* less than $x^{(½ + \varepsilon)}$." Is the probability for even or uneven number of prime factors for a random number equally large (phrasing 3), or is the number of positive and negative Mertens values asymptotically equal (phrasing 2), then phrasings 2 and 3 imply the first equivalent phrasing, due to the relationship with a Bernoulli experiment. That was Denjoy's reasoning, and following him, I proposed my first proof earlier in this book. Professional mathematicians will have to cast the final judgement on this first proposal for a proof.

But primorial steps, interleaving, and the resulting wave patterns also offer further pathways to look at the Riemann hypothesis defined in terms of the Mertens function. That is why I will tackle the Riemann hypothesis again below. I will do so from three different viewpoints: First (1) from a thorough comparison between the Mertens function and a Bernoulli experiment (such as tossing a coin, this is the Denjoy route). Then (2) from the primorial development of the three previously recognized categories of numbers. Finally (3)

from the viewpoint of 'condensation' of an interleaving sigma Möbius at primorial steps (I will explain this further once we get there). Based on these three approaches I will then propose a second proof of the Riemann hypothesis, directly targeted at the above first equivalent phrasing.

Viewpoint 1: the Denjoy route.

We know that for a Bernoulli experiment (such as a series of coin tosses) "*with probability 1 the number of heads minus the number of tails grows less rapidly than* $N^{(1/2)+\varepsilon}$" (Edwards). Here, ε (epsilon) is a number that can become arbitrarily small, but no matter how small ε is, this limit should apply to a probability approaching 1, as long as you toss a coin long enough (you let the number of tosses N increase, it applies asymptotically).

You can also look at this in terms of Pascal's triangle. This triangle is based on both combinatorial and binomial fundaments. The n^{th} row of this triangle provides the possible combinations for n coin tosses. For four coin tosses, for example (for this I am using the fourth row of Pascal's triangle), this results in the combinatorial and binomial pattern 1 4 6 4 1 (the 'discrete bell curve for 4).[457] The table with all possible combinatorial results for *four* coin tosses shows the pattern 1 4 6 4 1 nicely:

```
h     t h h h     h t h t h t     h t t t     t
h     h t h h     h t t h t h     t h t t     t
h     h h t h     t h t h h t     t t h t     t
h     h h h t     t h h t t h     t t t h     t
1        4           6           4           1
```

For four coin tosses, the ratio 1 4 6 4 1 is approximated increasingly perfect as the number of series of 4 over which the average is taken increases. That is a matter of entropy. The fact that this underlying pattern becomes increasingly distinct for a long series of repeats is because a) per toss, the *probability* for heads is exactly the same as the *probability* for tails, and b) subsequent tosses are *in no way* dependent on previous tosses (the two Denjoy criteria).[458] An increasingly large series of repeated Bernoulli experiments with a set amount of tosses (corresponding to a row of Pascal's triangle) therefore approximates, *on average*, the corresponding discrete binomial bell-curved pattern of the matching row of Pascal's triangle increasingly well (an asymptotic approach). We are dealing with annihilative averaging:[459] excesses and shortages of the same type in different series are eliminated.

[457] For increasingly large values of p (an increasingly large number of tosses per series) the binomial pattern of Pascal's triangle will resemble the well-known continuous Gaussian bell curve from statistics increasingly well.

[458] The longer I think about these two criteria, the more I am of the opinion that these two criteria state the same thing.

[459] In physics, annihilation is the process in which a particle and its antiparticle meet, and destroy each other. In physics, this provides a lot of energy, because mass is converted into energy (according to the formula $E=mc^2$). In this context, annihilation refers to the process in which an excess of heads and an excess of tails

You can also imagine this as a wheel of fortune with 16 equally large pie slices (or a dice with 16 faces). You reserve one slice (or face) for 4 times heads, 4 slices (or faces) for the four different orders of 3 times heads and 1 time tails, 6 slices faces) for the six different orders of 2 times cross and 2 times tails, four slices (faces) for the four different orders of 1 time heads and 3 times tails, and 1 slice (face) for 4 times tails. If you now spin the wheel, in the long term, the results spread across the five options will adhere further to the ratio 1 4 6 4 1, and corrected for the number of series of 4 that you have spun, and converge further to the direct pattern 1 4 6 4 1 (also think of the previously mentioned example of the repeated throw of a regular dice).

But naturally, we can also interpret many series of 4 subsequent throws as a single long sequence. That is 'merely' a matter of interpretation. It thus comes down to the fact that the following two descriptions are based on the same underlying entropic principle, and should therefore be asymptotically equal:

> 1: A growing number of short series of a set number of coin tosses will, in annihilative averaging terms, approximate the binomial ratio pattern that corresponds to the row of Pascal that belongs to this number of tosses increasingly well

and:

> 2: For an increasingly large series of tosses, it should hold that: '*with probability 1 the number of heads minus the number of tails grows less rapidly than* $N^{(1/2)+\varepsilon}$ ' (Edwards)."

There does exist a small difference between 1 and 2. The total of the number of tosses that description 1 refers to is always an integer multiple of the length of the short series of tosses that is repeated (4 in the example above). An m-fold repetition of series of a set number of tosses n must provide a total number of tosses of m times n. For description 2, there is no such limitation. If we repeat series of n tosses, the difference in length between 1 and will therefore be n/2 at the most.

For n=4 tosses, the difference in length between 1 and 2 will be 4/2=2 tosses at the most. But if we repeat this series of 4 tosses more often, say m=1000, 1000000, and 1000000000 times, this maximum discrepancy of n/2 tosses becomes negligible for a total number of tosses of m times n = 4000, 4000000, and 4000000000. Therefore, I equate 1 and 2 *asymptotically*, in a sense that this holds increasingly well as m (the number of repetitions of the series) becomes larger than n (the number of tosses per series).

The only difference between both phrasings is in the observer, who first sees a large number of short series of an equal number (say 4) of tosses (thus converging to a ratio of 1 4

---

cancel each other out. This annihilation provides an (entropic) identity: the knowledge that after repeated tosses, the balance position becomes increasingly probable.

6 4 1), and then sees one long series of tosses (of which the excess of heads or tails does not grow as fast as $N^{(1/2)+\varepsilon}$). Naturally, that does not change anything at all regarding the factual series of tosses and the corresponding deviation from the ratio 1 4 6 4 1 or the resulting net (annihilated) excess of heads or tails.[460] *It is a different interpretation of the same principle.*

Viewpoint 2: The three categories of numbers for primorial numbers.
I now also put the entire number line and Mertens function M(x) in my sights. We know if $M(x) = O(x^{(½ + \varepsilon)})$ holds, *the Riemann hypothesis is true* (Edwards).

Based on his comparison of the Mertens function with a Bernoulli experiment (a coin toss), Denjoy states this requires even and uneven prime factorizations to have equal probabilities of occurrence, and that their occurrence is completely independent of one another (the two preconditions for a Bernoulli experiment that are based on the Denjoy interpretation of the Riemann hypothesis).

I already determined that even and uneven prime factorizations occur equally frequently in my first proposition for a proof of the Riemann hypothesis, see the third phrasing of the Riemann hypothesis by Derbyshire and my previously presented Euclidian and recursive proof. This requirement is covered.

But the second requirement, which requires independence regarding the frequency of even and uneven square-free prime factorizations, does ***not*** hold: the occurrences of even and uneven square-free prime factorizations do *not* seem to be completely independent of one another. The discussions above regarding primorial steps and predictable symmetrical interleaving effects (see the three categories of numbers as well) clearly show this.

That is why I think that the two criteria of Denjoy (equal probability and independence) offer no relief in proving the Riemann hypothesis. The second criterion interferes: the occurrences of even and uneven square-free prime factorizations *are* demonstrably dependent on each other, in multiple and complex manners, including the previously presented primorial steps and wave patterns.

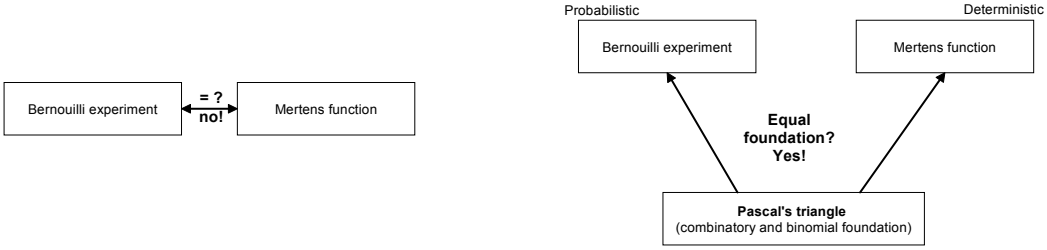
Have I wasted a lot of time for nothing? No, I do not believe so, on the contrary. Independence leads to equal probabilities in a Bernoulli experiment, but that does not mean that independence on the entire number line could not lead to equal probabilities asymptotically for square-free numbers with an even or uneven prime factorization.

Because naturally, the Mertens function does not equal a Bernoulli experiment. Above, I already showed quite easily that they differ strongly. That applies to their nature: deterministic (Mertens) versus probabilistic (Bernoulli). That also applies to their possible values: Möbius (and therefore Mertens) can have three possible values: -1, 0, and 1, and a Bernoulli experiment only has two values per toss: heads or tails. The Mertens function also

[460] A statement of ergodic stature!

attributes a Möbius value to *quadratic* prime factorizations, namely 0 (zero). These zeros might not influence the sigma Möbius, but they definitely have an effect on the underlying position of the Möbius pluses and minuses (the interleaving), whereas such a 'third category' next to heads or tails as a disruptor at coin tosses is not present at all.

The Mertens function and a Bernoulli experiment are therefore *not* the same. But they *are* deeply related to each other. Both the Mertens function and a Bernoulli experiment are based on Pascal's triangle. This triangle has both a *combinatorial* (see also f_p) and a *binomial* foundation, and it has chance-oriented implications. The Mertens function and a Bernoulli experiment are thus not the same, but they definitely share an equal foundation, and in this sense, they are closely related (see the figure).



The Mertens function is not equal to a Bernoulli experiment, but they are related, because they both rest on Pascal's triangle.

For $M(x) = O(x^{(½ + \varepsilon)})$ to hold true, the second criterion of Denjoy, mutual independence in the occurrences of even and uneven prime factorizations, is actually not a necessary requirement at all. That is a property of Bernoulli experiments, of probability. *It suffices for the alternation of even and uneven square-free prime factorizations, influenced by the present dependencies, to remain within equivalent boundaries as the alternation between heads and tails during a Bernoulli experiment.* It is all about $M(x) = O(x^{(½ + \varepsilon)})$, it has to apply asymptotically, no matter how small you wish to make the epsilon. *If this holds, the Riemann hypothesis is true.* Can I say something about that?

Yes, I can. Before I can, though, I must gain a better understanding of how the alternation of even and uneven square-free prime factorizations behaves, compared to the two options (heads and tails) in Bernoulli experiments. This involves a complex game revolving around numbers with quadratic and square-free prime factorizations, and factors and non-factors alike. I can gain that better understanding by using the three categories of numbers when making primorial steps.

In this paragraph, I will therefore regard the Riemann hypothesis from the viewpoint of the three previously recognized categories of numbers, to get more grip on the dependence patterns between integers and even and uneven prime factorizations. These categories gain structure and content from a specifically chosen integer n with a square-free prime

factorization (in short: a square-free number n): the anchor number. I will briefly repeat the categories:

> Category 1: *Factors* of a square-free anchor number n.[461] They have, conform f_p, an even or uneven number of prime factors p with a probability distribution of exactly 50%-50%.
>
> Category 2: Numbers smaller than this anchor number n with a *quadratic* prime factorization. These are not factors of n (the prime factorization is square-free).
>
> Category 3: Numbers smaller than this anchor number n with a *square-free* prime factorization that are not factors of n.

The integers up to this square-free anchor number are thus category 1, category 2, or category 3. I refer to *vacancies* when I am talking about positions on the integer number line, they will be categorized. Positions on the entire number line are 'vacancies' that must be 'filled' with numbers from category 1, 2, or 3. Category 2 is set, for example, four is always two times two, but whether a category is 1 or 3 depends on the anchor number at hand. Seven is category 3 from the viewpoint of the primorial anchor number 30=(2 3 5), and category 1 from the viewpoint of the primorial anchor number 210=(2 3 5 7).

Category 1: the factors of a square-free anchor number. Strictly progressing over the *factors* of a square-free number and without interleaving,[462] and based on the discussion in viewpoint 1, it should hold that sigma Möbius without interleaving = $O(x^{1/2})$. That is because when sigma Möbius is strictly taken over the factors of a square-free number and without interleaving, it follows the sawtooth pattern of the corresponding row of Pascal's triangle exactly and perfectly. And this is precisely the ratio pattern that a repeated series of tosses will converge towards. As explained in viewpoint 1, a repetition of a series of coin tosses (take a length of 4) will, on average, approximate the sawtooth pattern (for 4 this is 1 4 6 4 1) increasingly well as the number of repetitions increases. But the sigma Möbius over the factors of a square-free anchor number follows this sawtooth pattern directly, perfectly, and without further ado. Consequently, the ε from $O(x^{(½+\varepsilon)})$ *no longer applies* (there is no deviation to speak of). As the progression of the sigma Möbius over the factors is completely deterministic, it is $O(x^{½})$. When you achieve this square-free anchor number, the sigma Möbius over the factors is exactly 0 (zero).

This reminded me of 'Mertens conjecture'. This conjecture from the year 1897, named after the Mertens function in honour of its inventor Franz Mertens, states the expectation that

[461] Simply all factors, all denominators, so including the prime factors and the two trivial factors. I use factors as a synonym for denominators.

[462] For example, interleaving will not take place when the prime numbers that make up the prime factorization are relatively close together. But you can also simply ignore or suppress interleaving. The purpose is to follow the sawtooth pattern perfectly, there can be no deviations.

the Mertens function will always remain within the bounds of plus or minus √x. In short and concise terms: $|M(x)| < \sqrt{x}$. If this is true, the Riemann hypothesis is proven. In 1985, however, Andrew Odlyzko and Herman te Riele disproved Mertens conjecture, based on expansive numerical calculations (empirics), as far as I can understand and assess. I will come back to this later.

The Mertens function is the sigma Möbius over *all* integers from 1 (inclusive) to an anchor number (so it does not only include the factors of a square-free anchor number). If the Mertens function were to follow the f_p pattern of factors of a number with a square-free prime factorization, or a sawtooth pattern without interleaving, then $M(x) = O(x^{½})$ would hold, and even $|M(x)| < \sqrt{x}$ (Mertens conjecture). The ε would be irrelevant, because we are now working in a deterministic manner as opposed to a probabilistic manner. The sawtooth pattern is exactly equal to an 'ideal Bernoulli process', so without deviations (the coin would know in advance how to fall down to realize the corresponding row of Pascal perfectly, or so to speak). The Riemann hypothesis would then be proven (and I believe Mertens conjecture would be too).

But alas, the Mertens function for numbers with a square-free prime factorization does not only include category 1 (the factors), but all numbers from 1 (inclusive) up to the anchor number, so category 1, 2, and 3 numbers up to a square-free anchor number. And the category 3 numbers are preventing us from proving the Riemann hypothesis (see below). They are proof disruptors. You will encounter plenty of category 3 numbers on the segment from 1 up to a large anchor number with a square-free prime factorization.

Category 2: the quadratic prime factorizations. Numbers with quadratic prime factorizations have a Möbius value of 0, and therefore do not influence the Mertens function in direct terms. They do position themselves on the number line, (indirectly) influencing the Mertens function with interleaving patterns.

Furthermore, it is a known fact in number theory that the *share* of quadratic prime factorizations (the *share* of category 2) for integers up to an increasingly large integer n converges to a set value, namely $6/\pi^2$, the value of $1/\zeta(2)$, one divided by the value of the zeta function of 2. This asymptotic share is 60.7927…%.

Category 3 as vacancies for interleaving. Category 3 numbers are *strange* numbers: they are square-free, just like category 1 numbers, and smaller than the anchor number n, but their prime factorization contains at least one strange prime factor (a prime factor < n that is not a prime factor of n). I therefore also refer to those prime numbers, in line with strange numbers, as strange prime numbers.

We recognize category 3 numbers of a specific primorial n as *those* specific places (vacancies) along the number line, that are to be filled by interleaving factors of *subsequent* (higher) primorial steps. Those numbers will be the k=1, k=2, etc., factors of higher primorial numbers, for which the last added prime factors in the prime factorizations of

the filled in numbers will play an important role. The amount of category 3 numbers roughly diminishes from low values of k to higher values of k, based on the natural logarithmic pattern in the occurrence of prime numbers (the Prime Number Theorem).
Category 3 and the Riemann hypothesis. Essentially, it is this interleaving by numbers with strange prime factors (factors lower than n of higher primorials) that blocks our path to proving the Riemann hypothesis. The Mertens function does not follow the f_p sawtooth pattern (including interleaving), due to the presence of category 3 numbers. The category 3 numbers disrupt a simple conclusion that $M(x) = O(x^{(½ + \varepsilon)})$, and that the Riemann hypothesis is therefore true. It's mainly the category 3 numbers that are also responsible for the wild and volatile figure of the Mertens function up to a square-free n.

Category 3 -> category 1 transport. As we take more primorial steps upwards, specific category 3 numbers of the current primorial anchor number will be steadily converted into category 1 numbers of increasingly large primorial anchor numbers.

With every *subsequent* primorial step, specific vacancies (gaps) filled by category 3 numbers will be transformed into new category 1 numbers. These are specifically *those* former category 3 vacancies that were only strange due to the *newly* added prime number in the last primorial step.

The *first* category 3 vacancy to be filled with a factor of the *subsequent* primorial product is always the *new* prime number of this subsequent primorial product. Previous vacancies are filled with numbers with quadratic prime factorizations.

For example, if you take the primorial step from 30=(2 3 5) to 210=(2 3 5 7), the 7 is added as a new prime number. Consequently, the present factors of 30 are now expanded upon by the exact same factors that are now multiplied by 7 as well. These factors are: (7), 14=(2 7), 21=(3 7), 35=(5 7), 42=(2 3 7), 70=(2 5 7), 105=(3 5 7), and 210=(2 3 5 7). The numbers 7, 14, and 21 are smaller than 30, the previous primorial product. These former category 3 numbers of 30 are thus transformed into category 1 numbers of 210. And 7, the most recently added primorial prime number, is the first.

If you then take the subsequent primorial step from 210=(2 3 5 7) to 2310=(2 3 5 7 11), the next prime number in line, namely 11, is added as a new prime number. Consequently, the present factors of 210, (1 2 3 5 6 10 15 30) are now expanded upon by the exact same factors of 210, but they are now multiplied by 11. These factors are (11), (2 11), (3 11), … (2 3 11), … (2 3 5 7 11). The factors that are smaller than 210 are former category 3 numbers of 210 that are now transformed into category 1 numbers of the subsequent primorial, 2310.

In total, a primorial step *doubles* the number of factors (see also the doubling of the total of a row of Pascal's triangle when moving down a row). These extra factors, exactly as many as there already were, follow the exact same mutual ratio pattern as the factors that were already present. The only difference is the scale factor due to the newly added prime

number, which in the examples above is 7 and 11, respectively (the mutual patterns are ***completely*** (perfectly) scale invariant, so not just practically, or nearly scale invariant).

The new prime number, say, 11 for the step from 210=(2 3 5 7) to 2310=(2 3 5 7 11) ensures that the complete set of all factors neatly fills the new primorial product according to the discrete inverse proportionality. The first half was already there, 210=(2 3 5 7), and now they all are, 2310=(2 3 5 7 11). The number 2310 is the *first* square-free number that can be created from all prime numbers of the previous primorial number, plus one extra prime number (11: a potential dimension is added). That is what makes prime numbers special: they allow us to use specific discrete inverse proportionalities, such as those corresponding to 210 or 2310, as effectively and efficiently as possible. They are necessary and sufficient to fill the exact vacancies on the discrete inverse proportionalities.

I will address the above again, because it is quite a lot to process. Similarly to perspectives, categories – especially 1 and 3 – resemble pieces of soap in a full bathtub. Summarizing, a primorial step works as follows (see also the table of f_p factors on the next page). The first prime number in line (the most recently added prime number) will fill the first vacancy that *cannot* arise with the prime numbers that are available up to that point (this includes prime factorizations). For the primorial step from n=30=(2 3 5) to the next number, this new prime number is 7, because the first vacancy (the first candidate), four, *can* be filled based on the prime number 2 that was already present: 4=(2 2). Subsequently, all factors of 30 that were already present, namely (1 2 3 5 6 10 15 30) are multiplied by the new prime number 7, resulting in (7 14 21 35 42 70 105 210), which is the exact same sequence of numbers, save a scale factor of 7. After all, the next primorial number is 210=(2 3 5 7). We shift the factors alongside each other and we get a new list of factors, exactly twice as long in terms of factors compared to the previous list of factors: (1 2 3 5 6 10 15 30) and (7 14 21 35 42 70 105 210), when combined, result in (1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210), a total of two times eight equals sixteen factors. When we regard this primorial step from the binomial origin and with an *a priori* understanding of the number line, we can instantly see that the numbers 7, 14, and 21 change from category 3 numbers of 30 to category 1 numbers of 210. These are the interleaving numbers that come from the right side of the number line and embed themselves to the left. When we take the next primorial step, the factors (1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210) multiplied by the new prime number 11, which are perfectly scale-invariant between 11 and 2310, will play the same game over again. Former category 3 numbers will embed themselves *in between* existing category 1 numbers as new category 1 numbers, and due to the perfect scale invariance, the share of category 1 numbers on the left side increases.

```
+ 1 3 3 1 = 8

n=210 primes: (2 3 5 7), p=4 => k=4
k=0 =>  1     (1)
k=1 =>  4     (2 3 5 7)
k=2 =>  6     (6 10 14 15 21 35)
k=3 =>  4     (30 42 70 105)
k=4 =>  1     (210)
Factor list: (1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210) = 16

+ 1 4 6 4 1 = 16
```

Looking at the list of factors (category 1) that results from this primorial step, the first *vacancies* are 4, 8, 9, 11, 12, 13, etc. This list of factors solely consists of numbers with a square-free prime factorization: primorial numbers are square-free. We can see the first *square-free* vacancy on the position of the next prime number, the prime number what will be utilized in the next primorial step. In the *factor list* above, 4, 8, and 9 can already be created from filled in (existing) prime numbers. These 'vacancies' can easily be filled quadratically with (2 2), (2 2 2), and (3 3). However, 11 cannot be created by multiplying the prime numbers available at that time, namely 2, 3, 5, and 7. It is therefore a vacancy that can only be filled by a new prime number. Thus, 11 is the next prime number, and (2 3 5 7 11) is the next primorial number (product). Starting from this position and this number (11), the factors of the current primorial product, each multiplied by this subsequent prime number 11, are added. While interleaving, they will always fall onto the vacancies (open gaps), because prime numbers are positioned (chosen) in that exact constructivist manner that allows for this.

Mathematicians handily prove this with the *fundamental theorem of arithmetic*: every integer larger than 1 can be described as the product of prime numbers in exactly one manner (disregarding the order of the prime numbers). Reversely, I also think that the following pragmatic (intuitive) point of view holds: we position and use prime numbers to allow vacancies to be filled progressively, and that is why the fundamental theorem of arithmetic is true. This implies a constructivist definition of prime numbers (see previously).

This way, we transport specific category 3 numbers of the current primorial product (number) to category 1 of the next primorial product (number), with every primorial step. As we take more primorial steps, the square-free vacancies[463] from the left are filled more and more by category 1 numbers. The number line is always completely covered up until the vacancy (exclusive), which is where the next prime number has to be placed. No category 3 numbers are left, no 'gaps' remain.[464]

For the number line up to a specific primorial anchor number, take for example 30=(2 3 5), the entire story for all three categories of numbers looks as follows:

> Category 1 numbers of 30 fill the vacancies with *factors* of 30. There are 8 for row 3 of Pascal, namely: 1 2 3 5 10 15 and 30.
>
> Category 2 numbers of 30 fill the vacancies with quadratic prime factorizations up to 30. There are 11 in this case: 4=(2 2), 8=(2 2 2), 9=(3 3), 12=(2 2 3), 16=(2 2 2 2), 18=(2 3 3), 20=(2 2 5), 24=(2 2 2 3), 25=(5 5), 27=(3 3 3) and 28=(2 2 7).

[463] With primorial steps, we are not interested in the quadratic vacancies, but they too are filled in better from left to right.

[464] And that is why there is something, as opposed to nothing. (Leibniz.)

Category 3 contains the square-free numbers <= 30 that are not a factor of 30, and therefore do not have at least one prime factor in common with (2 3 5). Category 3 numbers therefore fill the square-free vacancies along the number line up until the primorial anchor number (in this case: 30), which leaves the combinatory pattern of prime numbers of this primorial number (2, 3, and 5), open.[465] There are 11 numbers in this example:

- For k=1: 7 11 13 17 19 23 29: 'strange' prime numbers between 5 and 30, so 7 times an uneven prime factorization, together a sigma Möbius of minus 7.

- For k=2: 14=(2 7) and 21=(3 7) and 22=(2 11) and 26=(2 13): four products of two prime numbers, so four times an even prime factorization, together a sigma Möbius of plus 4. These are products of the lowest category 3 prime numbers (7, 11, and 13) and the lowest category 1 prime numbers (2 and 3), because the product should be < 30.

As the value of k increases, the number of category 3 numbers decreases, as I stated earlier, based on the natural logarithmic pattern in the occurrence of prime numbers (the Prime Number Theorem).

Minus 7 plus 4 results in a net sigma Möbius of -3. As category 1 has to result in a sigma Möbius of 0 for the primorial segment, and category 2 numbers have a Möbius value of 0, the total result of the Mertens function up to 30 should be -3 as well.

For a primorial number, it thus holds that the value of the Mertens function is completely determined by category 3 numbers.

The number line up to 30 is depicted in the table on the next page in row 1, with the three categories named in row 2, and the Mertens function in row 3.[466] The Mertens function M(30), see the underlined position to the right in the third row, neatly results in -3, as explained above.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1	1	2	1	1	3	2	2	1	3	2	3	3	1	2	3	2	3	2	3	3	3	2	2	3	2	2	3	1
1	0	-1	-1	-2	-1	-2	-2	-2	-1	-2	-2	-3	-2	-1	-1	-2	-2	-3	-3	-2	-1	-2	-2	-2	-1	-1	-1	-2	-3

Top row: 1 to 30, middle row: categories 1 to 3, bottom row: Mertens function, M(30)=-3.

The category 1 numbers (the factors) of the primorial sequence shift further and further to the right of the number line as the number of prime factors p increases. In other words, the

[465] This is very analogous to the way in which prime numbers fill vacancies that are not covered by the combinatory pattern of the smaller numbers.

[466] Note here that the 11 k=1 and k=2 category 3 numbers strongly interleave, but their centre of gravity is positioned to the right of the number line up to 30. Of the 11 numbers, there are 7 to the right of 15 (15 is exactly half way).

primorial segment (from 1 to the primorial number) contains an increasingly large share of the start of the number line. The covered segment of the number sequence increases by a factor that is equal to the most recently added prime number (of the most recent primorial step). This segment goes from 1 (inclusive) to the next primorial product (inclusive). That is how we go from 2 to 6=(2 3) to 30=(2 3 5) to 210=(2 3 5 7) to 2310=(2 3 5 7 11) to 30030=(2 3 5 7 11 13) etc.

Factor gaps. As we take more primorial steps, from (2) via (2 3) and (2 3 5) and (2 3 5 7) and (2 3 5 7 11) to (2 3 5 7 11 13), etc., we shift more category 3 numbers to category 1, namely the numbers smaller than the most recent primorial number, which were only strange due to the newly added prime number in the new primorial step. From the point of view of segment 1 to the anchor number, these numbers are therefore positioned more to the left of the entire number line, due to the nature of the growth of factors of primorial products.

However, for every primorial step, we also create new category 3 numbers, namely those square-free numbers with one or multiple strange prime numbers in their prime factorization. The centre of gravity of these numbers is shifted more to the right on the entire number line, from the point of view of the segment from 1 to the anchor number.

We can see that the number line on a primorial segment to the left (a primorial segment goes from 1, inclusive, up to the primorial number at hand) is quickly filled with factors (category 1), and the further we look to the right, the more vacancies, or gaps, we can see.

I refer to a consecutive series of category 2 and 3 vacancies (with a minimum of 1 position) as a *factor gap*. A factor gap is located in between the two nearest factors (which are category 1). The factor gaps can be illustrated by the steps of subsequent primorial numbers. On the following page, I will repeat the stairs of 30=(2 3 5). The factor gaps are the unfilled numbers on the bottom row of the stairs depicted below, between 3 and 5, between 6 and 10, between 10 and 15, and between 15 and 30.

```
k=3                                                                 x
k=2              x        x          x
k=1     x x    x
k=0   x
k//f  1 2 3    5 6        10         15                              30
```

The stairs with the factors for n=30=(2 3 5). The factors (f) for k=1 are the prime factors. The stacking blacks on the inverse proportionality are (1,30) (2,15) (3,10) (5,6) (6,5) (10,3) (15,2) and (30,1). They form the discrete inverse proportionality for n=30 perspectives.

No factor whatsoever can be found on the large section between 15 and 30 (the last number for n=30) of the stairs of 30 depicted above. Only category 2 and 3 numbers are present on this right half of the stairs. Here, we are dealing with a massive *factor gap*. That is generally true for primorial numbers (factually all numbers with prime factor 2): there is a massive factor gap of (n - 1/2n - 1) numbers between n/2 and n/1, immediately to the left of the primorial anchor number n.

Looking at it from the right (the primorial number) to the left (1), the factor gaps are located neatly in between the factors, if there are available positions (in other words, as soon as integers are positioned in these segments, as soon as the factors are not located directly next to each other). We always see a typical pattern that starts high, and then quickly drops and stops before the 1 is reached. Here are some examples.

The largest factor gaps (from right to left, with their lengths depicted in between brackets) of 30=(2 3 5) with p=3 and factors (1 2 3 **5** | 6 **10** **15** **30**):

Between 15 and 30	(14)
Between 10 and 15	(4)
Between 6 and 10	(3)
Between 3 and 5	(1)

The largest factor gaps of 210=(2 3 5 7) with p=4 and factors (1 2 3 5 6 **7** 10 **14** | 15 **21** 30 **35** **42** **70** **105** **210**):

Between 105 and 210	(104)
Between 70 and 105	(34)
Between 42 and 70	(28)
Between 35 and 42	(6)
Between 30 and 35	(4)
Between 21 and 30	(9)
Between 15 and 21	(5)
Between 10 and 14	(3)
Between 7 and 10	(2)

The global picture is as follows. To the left on a primorial segment (near the 1), there are many category 1 numbers (factors) to be found. *All the way to the left, all vacancies are filled by category 1 numbers.* But as we move to the right, towards the primorial number, it becomes less crowded. There are more and more positions, subsequent positions too, that need to be filled with category 2 and 3 numbers (the non-factors) of n. You can also look at it reversely: the further you move to the left, the more category 1 numbers, and the fewer category 2 and 3 numbers. The process progresses in a characteristic pattern.

When we only look at the three right-most factor gaps of primorial numbers, which are always neatly positioned between n/5 and n/3, between n/3 and n/2, and between n/2 and n/1, we can see a reduction in the number of factors when moving to the right, and an increase when moving to the left:

For n=30=(2 3 5) with p=3 and factors (1 2 3 5 6 10 15 30):

1: Between 15 and 30	(30 – 15 – 1 = 14)
2: Between 10 and 15	(15 – 10 – 1 = 4)
3: Between 6 and 10	(10 – 6 – 1 = 3)

For n=210=(2 3 5 7) with p=4 and factors(1 2 3 5 6 **7** 10 **14** | 15 **21** 30 **35** **42** **70** **105** **210**) this gives:

1: Between 105 and 210	(104)
2: Between 70 and 105	(34)
3: Between 42 and 70	(28)

For n=2310=(2 3 5 7 11) with p=5 this gives:

1: Between 1155 and 2310	(1154)
2: Between 770 and 1155	(384)
3: Between 462 and 770	(307)

The balance position of √n. Based on f_p and symmetry considerations, we know that exactly half of the factors of a primorial number is located to the left of √n, and the other half to the right. The balance point, where there are exactly as many factors to the left as there are to the right (in continuous terms[467]) is therefore √n. This balance point is positioned exactly on the diagonal of the discrete inverse proportionality x·y=n. As a primorial has a square-free prime factorization, this square root is never an integer. Take 30, for example, √30=5.477. The numbers to the left of √30: 1, 2, 3, and 5 together provide 4 factors, which is exactly equal to the amount of numbers to the right of √30: 6, 10, 15, and 30 (also 4 factors). Interleaving does not change this fact, that is a symmetric process. We also know that, as a primorial number n becomes larger, √n becomes *relatively* smaller (√30≈5.5; √210≈14.5; √2310≈48.1; √30030≈173.3, etc.) For n=30, the best possible approximations of the square root are the numbers 5 and 6 (the first one is too small, the second too large, because √30=5.477…). Multiplying these factors results in exactly 30, and the same is true for all mirror pairs (5 and 6, 3 and 10, and 15, 1 and 30 are the mirror pairs for n=30). This is no different for n=210 and subsequent primorials. As we take more primorial steps, the share of factors (category 1) decreases on the right half of a primorial segment, and increases on the left half.

Primorial somersaults in short. Primorial steps are the cause of a dazzling recursive development game with three categories of numbers. I will summarize and add to this:

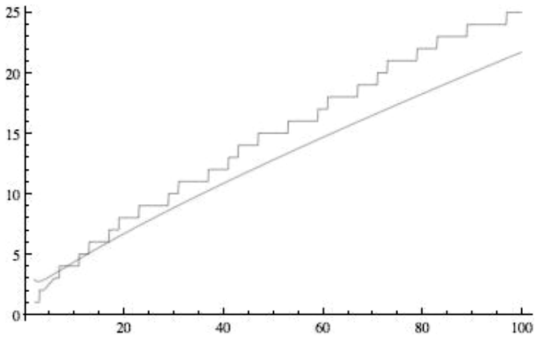
1. First of all, the *total* number of vacancies along the number line starting from 1 (inclusive) up to a primorial number, so the sum of category 1, 2, and 3 numbers together, increases with every step. This is increased by a *factor* that is equal to the *most recently added prime number*.

If, for example, we go from 6=(2 3) to 30=(2 3 5), the total number of vacancies increases by a factor of 5 (the most recently added prime number) compared to 6 (the number of paces of the most recent primorial number), because 5 times 6 is thirty. When we move on from

[467]This root does not exist in the world of primorial numbers.

30=(2 3 5) to 210=(2 3 5 7), the total number of vacancies increases by a factor of 7 relative to 30 (the number of vacancies of the most recent primorial number). As we progress further, this occurs with an increasingly large factor: every *subsequent* prime number is *larger* than the previous prime number.

There is a logarithmic relation at play.[468] According to the *Prime Number Theorem*, proposed by Gauss and proven by Hadamard and de la Vallée-Poussin in 1896 (independently from one another, using the zeta function), the number of prime numbers up to n is given by: $\Pi(n) \sim n/\ln(n)$.



The Prime Number Theorem: $\Pi(n) \sim n/\ln(n)$: the continuous line versus the actual amount of prime numbers: the step function.

The amount of prime numbers diminishes, their density approaches 0, and this happens in a more or less logarithmic fashion (but not really, these natural logarithms never seem up for the task). The fact that prime numbers keep popping up was already proven years before our calendar by Euclides, followed by many others, in many different ways.

As n increases, the equation n/ln(n) becomes more accurate (the relative error of the approximation roughly becomes smaller as n increases). When n is large enough, 1/ln(n) represents the probability that a number <= n is a prime number. An integer with twice as many digits is then half as likely to be prime number. The average gap between two subsequent prime numbers up to n is thus around ln(n). Gauss also derived the following formula for the number of prime numbers up to n: $\Pi(n) \sim 1/\ln(2) + 1/\ln(3) + \ldots + 1/\ln(n)$. The terms in this formula become smaller and smaller.

2: With every step of a primorial number to the next primorial number, the number of factors (category 1) *doubles*. There is an increase with a factor 2, see also the development in the sum of the rows of Pascal's triangle whenever you move one row down at a time. There is an exponent. The number of factors is 2^p, to be exact, where p represents the number of prime factors of the primorial number. For 2, the number of factors is $2^1=2$. For 6=(2 3), the

[468] But I believe that logarithms approximate a more fundamental discrete inverse proportionality.

number of factors is 2^2=4. For 30=(2 3 5), the number of factors is 2^3=8. For 210=(2 3 5 7), the number of factors is 2^4=16, etc.

3: The factors (that cause the doubling) added to a primorial step are *exactly (perfectly) scale invariant* relative to the factors that are already present – they differ precisely by a scale factor equal to the most recently added prime number. Therefore, some factors will embed themselves neatly *between* the factors that are already present (category 3 numbers of the previous primorial number transform into category 1 numbers of the new primorial number), and some factors will line up at the end (here, they immediately form new, 'fresh', category 1 numbers). No positional conflicts can occur during this partial zipper procedure, because we are dealing with a primorial development: the newly added factors are strange relative to the factors that are already present. The old and new factors will thus neatly fill the discrete inverse proportionality x·y=n as x values with n as the new primorial number. (The values of y can be found by following the exact reverse order of factors). Together, due to interleaving (transforming), they cause characteristic wave patterns, shown previously.

For example, the step from 30=(2 3 5) to 210=(2 3 5 7) adds the factors seven times (1 2 3 5 6 10 15 30) = (7 14 21 35 42 70 105 210) to the present factors (1 2 3 5 6 10 15 30), resulting in (1 2 3 5 6 7 10 14 15 21 30 35 42 70 105 210). We can see how the numbers 7, 14, and 21, category 3 numbers of primorial 30, are filled in. The stacking blocks on the discrete inverse proportionality in two dimensions for 210 are: (1 210), (2 105), (3 70), (5 42), (6 35), (7 30), (10 21), (14 15), (15 14), (21 10), (30 7), (35 6), (42 5), (70 3), (105, 2), (210 1), 16 factors in total, which corresponds to 4 prime factors, because 2^4=16.

4: Number theory mathematicians found out[469] that the *share* of numbers with a square-free prime factorization for increasingly large values of x (for subsequent primorial numbers: the share of category 1 numbers and the share of category 3 numbers combined) converges to $6/\pi^2$, the value of $1/\zeta(2)$, one divided by the value of the zeta function of 2. This share is 60.7927…%. (This observation landed me in the world of the Riemann hypothesis, see earlier in this book).

5: The numbers up until x consist of numbers with a quadratic prime factorization (category 2) and numbers with a square-free prime factorization (category 1 and 3 combined). If the share of category 1 *plus* category 3 numbers together converges to $6/\pi^2$ for increasing values of x, the share of category 2 numbers should therefore converge to $1 - 6/\pi^2$ (the total adds up to 1, or 100%), this is around 39.2073…%.

[469] http://mathworld.wolfram.com/Squarefree.html states: 'The asymptotic number Q(n) of square-free numbers <= n is given by $Q(n)= 6n/\Pi^2 + O(\sqrt{n})$' (They refer to Landau 1974, pp. 604-609; Nagell 1951, p. 130; Hardy and Wright 1979, pp. 269-270; Hardy 1999, p. 65). They continue: 'The asymptotic density is therefore $1/\zeta(2)=6/\Pi^2 \approx 0.607927...$ (OEIS A059956; Wells 1986, p. 28; Borwein and Bailey 2003, p. 139), where $\zeta(n)$ is the Riemann zeta function. The values of Q(n) for n=10, 100, 1000, … are 7, 61, 608, 6083, 60794, 607926, 6079291, 60792694, 607927124, 6079270942, … (OEIS A071172).

6: As you move further to the left on a primorial segment, category 1 becomes more concentrated. (A primorial segment covers the range between 1 (inclusive) and a primorial number). Although this process is not monotonous, see the examples of the shrinking factor gaps to the left, for numbers 30 and 210 above, the process is asymptotic. Eventually, the share of category 1 numbers inevitably becomes 100% as you move further to the left. Reversely, the share of category 2 and 3 numbers increases as you move further to the right on this segment.

The behaviour of logarithms and exponents. This might also become clear when looking at the different behaviours of logarithms and exponents. The behaviour of logarithms is completely different from the behaviour of exponents (and a square root is an exponent: $\sqrt{n} = n^{½}$). Eventually, an exponent will always defeat a natural logarithm. In *Prime Obsession*, chapter 5.IV, Derbyshire addresses this further. In short, he states that ln(x) will eventually increase slower than any power of x. To put it in even stronger terms: every random power of ln(x), no matter how large, will eventually increase more slowly than any random power of x.

A graph of $(\ln x)^N$ will thus eventually end up below the graph of x^ε, no matter how large N is, or how small ε is. That can take an incredibly long time. Derbyshire gave an impressive example of $(\ln x)^{100}$, which does not end up below the graph of $x^{0.1}$ until $7.9414 \cdot 10^{3959}$. In the end, the exponent will defeat the natural logarithm. Always. That is interesting, because we know that prime numbers have a rough logarithmic progression (the Prime Number Theorem), and that the next primorial number has double the amount of factors, and that half this number of factors ends up to the left of the square root of this next primorial number. This also indicates that category 1 numbers (the factors) become more concentrated to the left, and that the category 1 numbers to the left eventually defeat the category 3 numbers. As a matter of fact, no category 3 numbers will remain behind a charging frontline from left to right on the number line (I will illustrate this specifically in a moment).

How the three categories of numbers develop. The global pattern that emerges is that factors (category 1 numbers) on the left side of the increasingly large primorial segments of subsequent primorial steps increase in density, and decrease in density on the right. Reversely, category 3 numbers diminish on the left side, and increase on the right. The share of category 2 numbers converges.

A fascinating game unveils itself when we focus on these broad, general observations. In the following pages, I will depict a number of graphs that illustrate, step-by-step, the hidden and extreme game that goes on between these three categories. It comes down to the fact that when taking primorial steps, the share of category 1 numbers towards a primorial number is quickly suppressed by category 3, but simultaneously, the share of category 1 numbers on a small segment at the start of the primorial segment becomes more dominant. On a relatively tiny, but growing segment starting from 1, category 3 numbers are completely wiped out by category 1 numbers. You need to have a very keen eye to

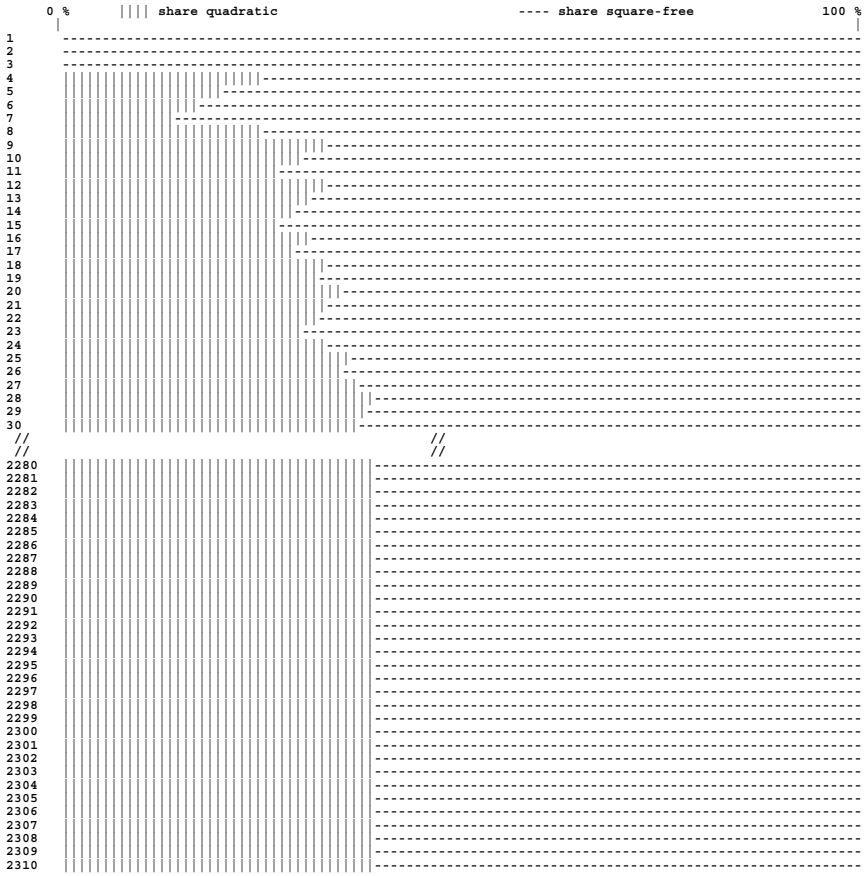
observe this: take, for example, the number n_{13} = (2 3 5 7 11 13 17 19 23 29 31 37 41) = 304250263527210. Category 3 numbers are only absent in the range from 1 to 42 (I will address this in a moment). This is merely 42/304250263527210 = $1.3804425 \cdot 10^{-11}$% of the entire primorial segment from 1 up to n_{13}. You really need to know where to look if you wish to observe this.

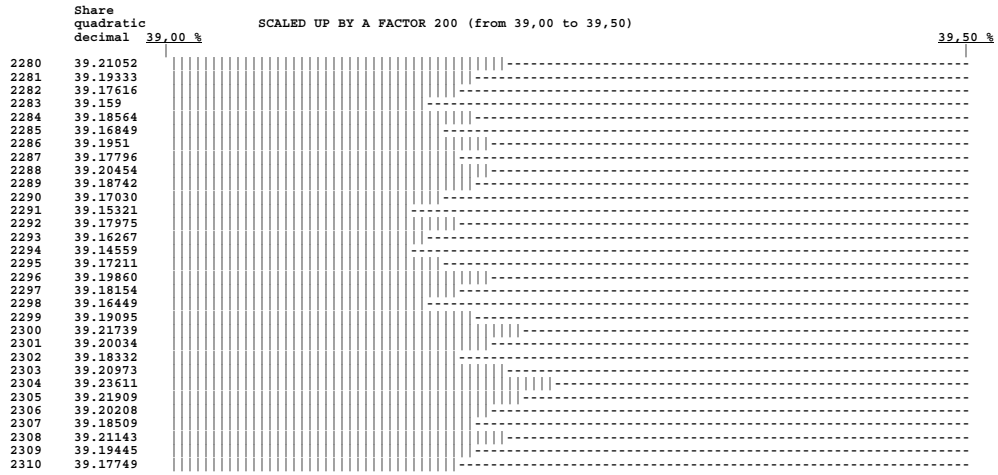
The first tables and graphs below depict how the share of numbers with a quadratic prime factorization (the share of category 2, on the left), and the share of numbers with a square-free prime factorization (the share of category 1 plus category 3 numbers combined, to the right) develop along the number line for the primorial n_5=2310=(2 3 5 7 11). The table shows two segments of 30 numbers of the complete number line from 1 to 2310: the first part of the table, the beginning, covers the numbers 1 to 30, and the second part shows the numbers 2280 to 2310, the *last* 30 numbers up to the primorial anchor number 2310. In the tables, I present both the rational number and the decimal number (the percentage), to stress the fact that the perspectivist world is, in principle, rational, even though the decimal numbers provide us with approximations that are easier to grasp.

N	share quadratic rational	share quadratic decimal	share square-free rational	share square-free decimal
1	0	0.0	1	100.0
2	0	0.0	1	100.0
3	0	0.0	1	100.0
4	1/4	25.0	3/4	75.0
5	1/5	20.0	4/5	80.0
6	1/6	16.66666	5/6	83.33333
7	1/7	14.28571	6/7	85.71429
8	1/4	25.0	3/4	75.0
9	1/3	33.33333	2/3	66.66666
10	3/10	30.0	7/10	70.0
11	3/11	27.27272	8/11	72.72727
12	1/3	33.33333	2/3	66.66666
13	4/13	30.76923	9/13	69.23077
14	2/7	28.57142	5/7	71.42857
15	4/15	26.66666	11/15	73.33333
16	5/16	31.25	11/16	68.75
17	5/17	29.41176	12/17	70.58823
18	1/3	33.33333	2/3	66.66666
19	6/19	31.57894	13/19	68.42105
20	7/20	35.0	13/20	65.0
21	1/3	33.33333	2/3	66.66666
22	7/22	31.81818	15/22	68.18181
23	7/23	30.43478	16/23	69.56521
24	1/3	33.33333	2/3	66.66666
25	9/25	36.0	16/25	64.0
26	9/26	34.61538	17/26	65.38461
27	10/27	37.03703	17/27	62.96296
28	11/28	39.28571	17/28	60.71428
29	11/29	37.93103	18/29	62.06896
30	11/30	36.66666	19/30	63.33333
//				
//				
2280	149/380	39.21052	231/380	60.78947
2281	894/2281	39.19333	1387/2281	60.80666
2282	447/1141	39.17616	694/1141	60.82383
2283	298/761	39.159	463/761	60.841
2284	895/2284	39.18564	1389/2284	60.81436
2285	179/457	39.16849	278/457	60.83151
2286	448/1143	39.1951	695/1143	60.8049
2287	896/2287	39.17796	1391/2287	60.82203
2288	69/176	39.20454	107/176	60.79545
2289	299/763	39.18742	464/763	60.81258
2290	897/2290	39.17030	1393/2290	60.82969
2291	897/2291	39.15321	1394/2291	60.84679
2292	449/1146	39.17975	697/1146	60.82024
2293	898/2293	39.16267	1395/2293	60.83733
2294	449/1147	39.14559	698/1147	60.85440
2295	899/2295	39.17211	1396/2295	60.82789
2296	225/574	39.19860	349/574	60.80139
2297	900/2297	39.18154	1397/2297	60.81846
2298	150/383	39.16449	233/383	60.83551
2299	901/2299	39.19095	1398/2299	60.80904
2300	451/1150	39.21739	699/1150	60.78260
2301	902/2301	39.20034	1399/2301	60.79965
2302	451/1151	39.18332	700/1151	60.81668
2303	129/329	39.20973	200/329	60.79027
2304	113/288	39.23611	175/288	60.76389
2305	904/2305	39.21909	1401/2305	60.78091
2306	452/1153	39.20208	701/1153	60.79792
2307	904/2307	39.18509	1403/2307	60.81491
2308	905/2308	39.21143	1403/2308	60.78856
2309	905/2309	39.19445	1404/2309	60.80554
2310	181/462	39.17749	281/462	60.82251

The graphs depict the same numbers as the tables, so from 1 to 30 and from 2280 to 2310, but now graphically, scaled to 100%.

Subsequently, you will find another graph of the last 30 numbers, from 2280 to 2310, but this time, scaled up by a factor of 200 (the y scale ranges from 39.0 to 39.5 instead of 0 to 100). This will put the typically chaotic pattern in full view: it disappears on a larger scale, but on a small scale, it is definitely present.





The graphs above show how both the share of numbers with quadratic prime factorizations (category 2, left) and the share of numbers with square-free prime factorizations (category 1 and 3 combined, right) converge. In the long term, the share of category 2 has to approach 39.2…%, and the share of category 1 plus 3 has to approach the remaining 60.8…% (the convergence values). But it takes some time for both category 2 and category 1 and 3 to approach their convergence values; this only occurs for relatively large primorials (like 2310). The percentages for 2310 are 39.17749 and 60.82251, which are practically the convergence values.

However, when dealing with primorial steps, there are *three* categories of numbers, not *two*. In turn, the share of numbers up to a primorial number with square-free prime factorizations consists of the sum of the share of factors (category 1 numbers) and the share of square-free non-factors (category 3 numbers). In short:

> Numbers with a quadratic (squared) prime factorization = category 2
> Numbers with a square-free prime factorization = category 1 + category 3 *combined*

We know that the share of numbers with a quadratic prime factorization converges. The same goes for the share of category 1 and category 3 *together*, the numbers with a square-free prime factorization. But the share of category 1, 2, and 3 numbers behave completely different relative to each other when taking primorial steps.

With *every* primorial step, the number of factors doubles, thereby doubling the amount of *numbers* in category 1. According to the *Prime Number Theorem*, every subsequent prime number is positioned along the number line in a more or less inversely logarithmic

fashion.[470] Because of this, the speed at which the number of factors increases asymptotically for every primorial step slows down faster than the total number of positions along the number line (the amount of numbers up to the next primorial number n). Category 1 and 3 combined converge to the value of $1 / \zeta(2)$, namely $6/\pi^2$, or around 60.8%. However, in the long term, we can also see that category 1 increases much slower than category 3, and percentage-wise, category 3 quickly and completely defeats category 1.

When defining p, the primorial number n_p is set in stone, because I know which prime factors are involved, and they progress neatly. For example, n_1=(2)=2 and n_3=(2 3 5)=30 and n_5=(2 3 5 7 11)=2310.

As we progress upwards on a primorial segment of the number line, integer by integer – so starting at 1 (inclusive) up to a primorial number n_p (inclusive) – the share of category 1 numbers *roughly* decreases. This might not happen monotonously (not consistently), but you can generally see it. We are dealing with a characteristic descending pattern with upward jumps on the positions where category 1 numbers are added. The share of category 1 numbers (factors of primorial numbers) starts with 1 with a share of 1/1 (100%), because 1 is a trivial factor. It continues on to $2^p/n_p$ for the primorial number n_p. I will now dive into the example of n_3=(2 3 5)=30. The share of category 1 from 1 to primorial n=30=(2 3 5) now goes from 100% to $2^p/n_p=2^3/30=8/30\approx0.267$ (26.7%). The increase in the amount of category 1 numbers then progresses as follows (we can see the factor gaps in the third row).

```
1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1  1  1  2  1  1  3  2  2  1  3  2  3  3  1  2  3  2  3  2  3  3  3  2  2  3  2  2  3  1
1  2  3     4  5           6              7                                          8

1/1=100% 4/5=80,0%     6/10=60,0%     7/15=46,7%                                  8/30=26,7%
2/2=100%    5/6=83,3%
3/3=100%
```

Top row: 1 to 30, middle row: categories 1 to 3 of 30, bottom row: share of category 1 plus percentage. The bottom row depicts the 'jumps' in the graph of n=30 below.

The graphs below illustrate the entire progression of the share of category 1 for primorial numbers. I will run through the steps above for the primorials n_1=(2)=2, n_2=(2 3)=6, n_3=(2 3 5)=30 and n_4=(2 3 5 7)=210 as well. We can see that the share of category 1 depends on the primorial (the primorial anchor number) at hand. The share of category 1 numbers roughly decreases and eventually converges towards zero. Note that there are upward jumps at the locations of the factors, so for n_p/prime factor and n_p/(prime factor 1 x prime factor 2) and n_p/(prime factor 1 x prime factor 2 x prime factor 3), etc., as long as the product of the prime factors is smaller than n_p. This is highly visible at 5, 6, 10, 15, and 30 for 30=(2 3 5) and at 5, 6,

[470] According to the Prime Number Theorem, proposed by Gauss and proven by Hadamard and de la Vallée-Poussin in 1896 (independently from one another, using the zeta function), the amount of prime number up to n is described as follows: $\Pi(n) \sim n/\ln(n)$ (where $\Pi(n)$ represents the amount of prime numbers up to n, and has nothing do with the pi of a circle).

7, 10, 14, 15, 21, 30, 35, 42, 70, 105 and 210 for 210=(2 3 5 7). These jumps are not present at factors 1, 2, and 3. After all, 100% is 100%.

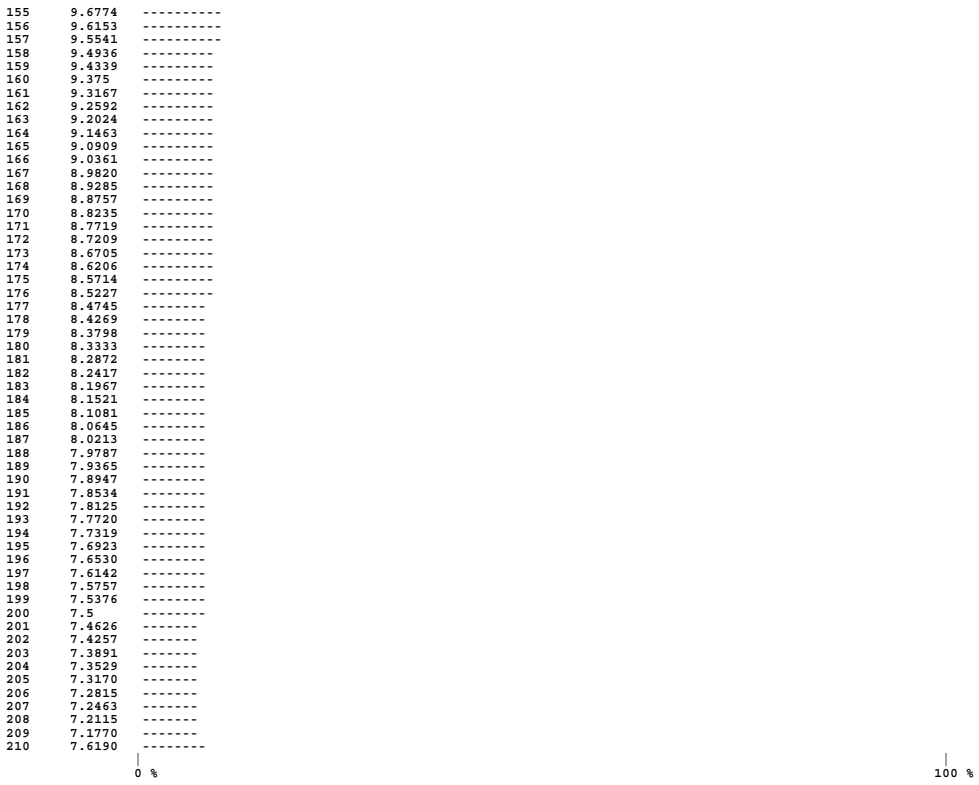
```
                0 %                                                                                                 100 %
                |                                                                                                   |
((1 1) (2 1))
 1       100.0    ----------------------------------------------------------------------------------------------------
 2       100.0    ----------------------------------------------------------------------------------------------------


((1 1) (2 1) (3 1) (4 2) (5 3) (6 1))
 1       100.0    ----------------------------------------------------------------------------------------------------
 2       100.0    ----------------------------------------------------------------------------------------------------
 3       100.0    ----------------------------------------------------------------------------------------------------
 4       75.0     ---------------------------------------------------------------------------
 5       60.0     ------------------------------------------------------------
 6       66.666   ----------------------------------------------------------------
((1 1) (2 1) (3 1) (4 2) (5 1) (6 1) (7 3) (8 2) (9 2) (10 1) (11 3) (12 2) (13 3) (14 3) (15 1) (16 2) (17 3) (18 2) (19 3)
(20 2) (21 3) (22 3) (23 3) (24 2) (25 2) (26 3) (27 2) (28 2) (29 3) (30 1))
 1       100.0    ----------------------------------------------------------------------------------------------------
 2       100.0    ----------------------------------------------------------------------------------------------------
 3       100.0    ----------------------------------------------------------------------------------------------------
 4       75.0     ---------------------------------------------------------------------------
 5       80.0     -------------------------------------------------------------------------------
 6       83.333   ---------------------------------------------------------------------------------
 7       71.428   ----------------------------------------------------------------------------
 8       62.5     ------------------------------------------------------------
 9       55.555   ----------------------------------------------------------
 10      60.0     ------------------------------------------------------------
 11      54.545   ---------------------------------------------------------
 12      50.0     ----------------------------------------------------------
 13      46.153   ------------------------------------------------
 14      42.857   ----------------------------------------------
 15      46.666   ------------------------------------------------
 16      43.75    ----------------------------------------------
 17      41.176   ---------------------------------------------
 18      38.888   ----------------------------------------------
 19      36.842   ------------------------------------------
 20      35.0     ----------------------------------
 21      33.333   --------------------------------
 22      31.818   -------------------------------
 23      30.434   -----------------------------
 24      29.166   ----------------------------
 25      28.0     ---------------------------
 26      26.923   --------------------------
 27      25.925   -------------------------
 28      25.0     ------------------------
 29      24.137   -----------------------
 30      26.666   --------------------------




((1 1) (2 1) (3 1) (4 2) (5 1) (6 1) (7 1) (8 2) (9 2) (10 1) (11 3) (12 2) (13 3) (14 1) (15 1) (16 2) (17 3) (18 2) (19 3)
(20 2) (21 1) (22 3) (23 3) (24 2) (25 2) (26 3) (27 2) (28 2) (29 3) (30 1) (31 3) (32 2) (33 3) (34 3) (35 1) (36 2) (37 3)
(38 3) (39 3) (40 2) (41 3) (42 1) (43 3) (44 2) (45 2) (46 3) (47 3) (48 2) (49 2) (50 2) (51 3) (52 2) (53 3) (54 2) (55 3)
(56 2) (57 3) (58 3) (59 3) (60 2) (61 3) (62 3) (63 2) (64 2) (65 3) (66 3) (67 3) (68 2) (69 3) (70 1) (71 3) (72 2) (73 3)
(74 3) (75 2) (76 2) (77 3) (78 3) (79 3) (80 2) (81 2) (82 3) (83 3) (84 2) (85 3) (86 3) (87 3) (88 2) (89 3) (90 2) (91 3)
(92 2) (93 3) (94 3) (95 3) (96 2) (97 3) (98 2) (99 2) (100 2) (101 3) (102 3) (103 3) (104 2) (105 1) (106 3) (107 3) (108
2) (109 3) (110 3) (111 3) (112 2) (113 3) (114 3) (115 3) (116 2) (117 2) (118 3) (119 3) (120 2) (121 2) (122 3) (123 3)
(124 2) (125 2) (126 2) (127 3) (128 2) (129 3) (130 3) (131 3) (132 2) (133 3) (134 3) (135 2) (136 2) (137 3) (138 3) (139
3) (140 2) (141 3) (142 3) (143 3) (144 2) (145 3) (146 3) (147 2) (148 2) (149 3) (150 2) (151 3) (152 2) (153 2) (154 3)
(155 3) (156 2) (157 3) (158 3) (159 3) (160 2) (161 3) (162 2) (163 3) (164 2) (165 3) (166 3) (167 3) (168 2) (169 2) (170
3) (171 2) (172 2) (173 3) (174 3) (175 2) (176 2) (177 3) (178 3) (179 3) (180 2) (181 3) (182 3) (183 3) (184 2) (185 3)
(186 3) (187 3) (188 2) (189 2) (190 3) (191 3) (192 2) (193 3) (194 3) (195 3) (196 2) (197 3) (198 2) (199 3) (200 2) (201
3) (202 3) (203 3) (204 2) (205 3) (206 3) (207 2) (208 2) (209 3) (210 1))
 1       100.0    ----------------------------------------------------------------------------------------------------
 2       100.0    ----------------------------------------------------------------------------------------------------
 3       100.0    ----------------------------------------------------------------------------------------------------
 4       75.0     ---------------------------------------------------------------------------
 5       80.0     -------------------------------------------------------------------------------
 6       83.333   ---------------------------------------------------------------------------------
 7       85.714   -----------------------------------------------------------------------------------
 8       75.0     ---------------------------------------------------------------------------
 9       66.666   ----------------------------------------------------------------
 10      70.0     -----------------------------------------------------------------
 11      63.636   --------------------------------------------------------------
 12      58.333   ------------------------------------------------------------
 13      53.846   ----------------------------------------------------------
 14      57.142   ------------------------------------------------------------
 15      60.0     --------------------------------------------------------------
 16      56.25    ------------------------------------------------------------
 17      52.941   ----------------------------------------------------------
 18      50.0     ---------------------------------------------------
 19      47.368   ----------------------------------------------
 20      45.0     ---------------------------------------------
 21      47.619   ----------------------------------------------
 22      45.454   ---------------------------------------------
 23      43.478   -------------------------------------------
 24      41.666   ----------------------------------------------
 25      40.0     ---------------------------------------------
 26      38.461   -------------------------------------------
 27      37.037   ------------------------------------------
 28      35.714   ----------------------------------
 29      34.482   --------------------------------
 30      36.666   ----------------------------------
 31      35.483   ---------------------------------
 32      34.375   --------------------------------
 33      33.333   -------------------------------
 34      32.352   ------------------------------
 35      34.285   --------------------------------
 36      33.333   -------------------------------
 37      32.432   ------------------------------
 38      31.578   ------------------------------
 39      30.769   -----------------------------
 40      30.0     ----------------------------
 41      29.268   ---------------------------
```

```
42      30.952  ------------------------------
43      30.232  -----------------------------
44      29.545  ------------------------------
45      28.888  -----------------------------
46      28.260  ----------------------------
47      27.659  ----------------------------
48      27.083  ----------------------------
49      26.530  ---------------------------
50      26.0    ---------------------------
51      25.490  ---------------------------
52      25.0    ------------------------
53      24.528  ------------------------
54      24.074  ------------------------
55      23.636  ------------------------
56      23.214  ----------------------
57      22.807  ----------------------
58      22.413  ----------------------
59      22.033  ----------------------
60      21.666  ---------------------
61      21.311  ---------------------
62      20.967  ---------------------
63      20.634  ---------------------
64      20.312  --------------------
65      20.0    --------------------
66      19.696  --------------------
67      19.402  -------------------
68      19.117  -------------------
69      18.840  -------------------
70      20.0    -------------------
71      19.718  -------------------
72      19.444  ------------------
73      19.178  ------------------
74      18.918  ------------------
75      18.666  ------------------
76      18.421  -----------------
77      18.181  -----------------
78      17.948  -----------------
79      17.721  -----------------
80      17.5    -----------------
81      17.283  ----------------
82      17.073  ----------------
83      16.867  ----------------
84      16.666  ----------------
85      16.470  ---------------
86      16.279  ---------------
87      16.091  ---------------
88      15.909  ---------------
89      15.730  ---------------
90      15.555  ---------------
91      15.384  --------------
92      15.217  --------------
93      15.053  --------------
94      14.893  --------------
95      14.736  --------------
96      14.583  --------------
97      14.432  -------------
98      14.285  -------------
99      14.141  -------------
100     14.0    -------------
101     13.861  -------------
102     13.725  -------------
103     13.592  -------------
104     13.461  ------------
105     14.285  -------------
106     14.150  -------------
107     14.018  -------------
108     13.888  -------------
109     13.761  -------------
110     13.636  -------------
111     13.513  -------------
112     13.392  ------------
113     13.274  ------------
114     13.157  ------------
115     13.043  ------------
116     12.931  ------------
117     12.820  ------------
118     12.711  ------------
119     12.605  ------------
120     12.5    ------------
121     12.396  ------------
122     12.295  ------------
123     12.195  ------------
124     12.096  ------------
125     12.0    ------------
126     11.904  ------------
127     11.811  ------------
128     11.718  ------------
129     11.627  ------------
130     11.538  ------------
131     11.450  -----------
132     11.363  -----------
133     11.278  -----------
134     11.194  -----------
135     11.111  -----------
136     11.029  -----------
137     10.948  -----------
138     10.869  -----------
139     10.791  -----------
140     10.714  -----------
141     10.638  -----------
142     10.563  -----------
143     10.489  ----------
144     10.416  ----------
145     10.344  ----------
146     10.273  ----------
147     10.204  ----------
148     10.135  ----------
149     10.067  ----------
150     10.0    ----------
151     9.9337  ----------
152     9.8684  ----------
153     9.8039  ----------
154     9.7402  ----------
```



Percentage share of category 1 numbers for 1 up to n_p for n_1=(2), n_2=6=(2 3), n_3=30=(2 3 5), and n_4=210=(2 3 5 7). This share converges to zero for larger primorial numbers.

On a very large scale, a more or less inverse image should present itself for the category 3 numbers, due to the convergence of square-free numbers, or category 1 plus category 3 combined, to $1 - 6/\pi^2$. The increase in the amount of category 3 numbers roughly progresses as follows for primorial n=30:

```
 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
 1  1  1  2  1  1  3  2  2  1  3  2  3  3  1  2  3  2  3  2  3  3  3  2  2  3  2  2  3  1
                   1           2     3  4        5     6     7  8  9       10       11
```

1/7=14,3% 3/13=23,1% 5/17=29,4% 7/21=33,3% 9/29=31,0%
2/11=18,2% 6/19=31,6% 4/14=28,6% 8/22=36,4%

The increase in the amount of category 2 numbers roughly progresses as follows for primorial n=30:

```
1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1  1  1  2  1  1  3  2  2  1  3  2  3  3  1  2  3  2  3  2  3  3  3  2  2  3  2  2  3  1
      1           2  3        4           5     6     7           8  9    10 11

1/4=25,0%   2/8=25,0%  4/12=33,3%   5/16=31,3% 7/20=35,0%  8/24=33,3%
               3/9=33,3%               6/18=33,3%           9/25=36,0%
                                                              10/27=37,0%
```

The share of category 2, 1, and 3 (note the reverse order: I start with category 2, and I put category 1 in the middle, because this becomes smaller and smaller, so strictly for cosmetic reasons) for the numbers up to the primorials 30=(2 3 5) and 210=(2 3 5 7) looks as follows.[471] The left side of the figure contains the percentage shares, also in the order of category 2, category 1, and category 3.

```
((1 1) (2 1) (3 1) (4 2) (5 1) (6 1) (7 3) (8 2) (9 2) (10 1)
(11 3) (12 2) (13 3) (14 3) (15 1) (16 2) (17 3) (18 2) (19 3) (20 2)
(21 3) (22 3) (23 3) (24 2) (25 2) (26 3) (27 2) (28 2) (29 3) (30 1))

        Cat 2   cat 1   cat 3

 1      0.0     100.0   0.0
 2      0.0     100.0   0.0
 3      0.0     100.0   0.0
 4      25.0    75.0    0.0
 5      20.0    80.0    0.0
 6      16.666  83.333  0.0
 7      14.285  71.428  14.285
 8      25.0    62.5    12.5
 9      33.333  55.555  11.111
 10     30.0    60.0    10.0
 11     27.272  54.545  18.181
 12     33.333  50.0    16.666
 13     30.769  46.153  23.076
 14     28.571  42.857  28.571
 15     26.666  46.666  26.666
 16     31.25   43.75   25.0
 17     29.411  41.176  29.411
 18     33.333  38.888  27.777
 19     31.578  36.842  31.578
 20     35.0    35.0    30.0
 21     33.333  33.333  33.333
 22     31.818  31.818  36.363
 23     30.434  30.434  39.130
 24     33.333  29.166  37.5
 25     36.0    28.0    36.0
 26     34.615  26.923  38.461
 27     37.037  25.925  37.037
 28     39.285  25.0    35.714
 29     37.931  24.137  37.931
 30     36.666  26.666  36.666
```

[471] The use of integer characters causes rounding errors to appear, see the erratic line to the right. If all 3 categories to the left end with less than 0.5, the line to the right is the shortest, see 7 and 8 above, for example. If all three end at more than 0.5, the line is the longest, as is the case for 14 and 15, for example.

```
((1 1) (2 1) (3 1) (4 2) (5 1) (6 1) (7 1) (8 2) (9 2) (10 1) (11 3) (12 2) (13 3) (14 1) (15 1) (16 2) (17 3) (18 2)
(19 3) (20 2) (21 1) (22 3) (23 3) (24 2) (25 2) (26 3) (27 2) (28 2) (29 3) (30 1) (31 3) (32 2) (33 3) (34 3) (35 1)
(36 2) (37 3) (38 3) (39 3) (40 2) (41 3) (42 1) (43 3) (44 2) (45 2) (46 3) (47 3) (48 2) (49 2) (50 2) (51 3) (52 2)
(53 3) (54 2) (55 3) (56 2) (57 3) (58 3) (59 3) (60 2) (61 3) (62 3) (63 2) (64 2) (65 3) (66 3) (67 3) (68 2) (69 3)
(70 1) (71 3) (72 2) (73 3) (74 3) (75 2) (76 2) (77 3) (78 3) (79 3) (80 2) (81 2) (82 3) (83 3) (84 2) (85 3) (86 3)
(87 3) (88 2) (89 3) (90 2) (91 3) (92 2) (93 3) (94 3) (95 3) (96 2) (97 3) (98 2) (99 2) (100 2) (101 3) (102 3)
(103 3) (104 2) (105 1) (106 3) (107 3) (108 2) (109 3) (110 3) (111 3) (112 2) (113 3) (114 3) (115 3) (116 2) (117
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(132 2) (133 3) (134 3) (135 2) (136 2) (137 3) (138 3) (139 3) (140 2) (141 3) (142 3) (143 3) (144 2) (145 3) (146
3) (147 2) (148 2) (149 3) (150 2) (151 3) (152 2) (153 2) (154 3) (155 3) (156 2) (157 3) (158 3) (159 3) (160 2)
(161 3) (162 2) (163 3) (164 2) (165 3) (166 3) (167 3) (168 2) (169 2) (170 3) (171 2) (172 2) (173 3) (174 3) (175
2) (176 2) (177 3) (178 3) (179 3) (180 2) (181 3) (182 3) (183 3) (184 2) (185 3) (186 3) (187 3) (188 2) (189 2)
(190 3) (191 3) (192 2) (193 3) (194 3) (195 3) (196 2) (197 3) (198 2) (199 3) (200 2) (201 3) (202 3) (203 3) (204
2) (205 3) (206 3) (207 2) (208 2) (209 3) (210 1))
```

	cat 2	cat 1	cat 3
1	0.0	100.0	0.0
2	0.0	100.0	0.0
3	0.0	100.0	0.0
4	25.0	75.0	0.0
5	20.0	80.0	0.0
6	16.666	83.333	0.0
7	14.285	85.714	0.0
8	25.0	75.0	0.0
9	33.333	66.666	0.0
10	30.0	70.0	0.0
11	27.272	63.636	9.0909
12	33.333	58.333	8.3333
13	30.769	53.846	15.384
14	28.571	57.142	14.285
15	26.666	60.0	13.333
16	31.25	56.25	12.5
17	29.411	52.941	17.647
18	33.333	50.0	16.666
19	31.578	47.368	21.052
20	35.0	45.0	20.0
21	33.333	47.619	19.047
22	31.818	45.454	22.727
23	30.434	43.478	26.086
24	33.333	41.666	25.0
25	36.0	40.0	24.0
26	34.615	38.461	26.923
27	37.037	37.037	25.925
28	39.285	35.714	25.0
29	37.931	34.482	27.586
30	36.666	36.666	26.666
31	35.483	35.483	29.032
32	37.5	34.375	28.125
33	36.363	33.333	30.303
34	35.294	32.352	32.352
35	34.285	34.285	31.428
36	36.111	33.333	30.555
37	35.135	32.432	32.432
38	34.210	31.578	34.210
39	33.333	30.769	35.897
40	35.0	30.0	35.0
41	34.146	29.268	36.585
42	33.333	30.952	35.714
43	32.558	30.232	37.209
44	34.090	29.545	36.363
45	35.555	28.888	35.555
46	34.782	28.260	36.956
47	34.042	27.659	38.297
48	35.416	27.083	37.5
49	36.734	26.530	36.734
50	38.0	26.0	36.0
51	37.254	25.490	37.254
52	38.461	25.0	36.538
53	37.735	24.528	37.735
54	38.888	24.074	37.037
55	38.181	23.636	38.181
56	39.285	23.214	37.5
57	38.596	22.807	38.596
58	37.931	22.413	39.655
59	37.288	22.033	40.677
60	38.333	21.666	40.0
61	37.704	21.311	40.983
62	37.096	20.967	41.935
63	38.095	20.634	41.269
64	39.062	20.312	40.625
65	38.461	20.0	41.538
66	37.878	19.696	42.424
67	37.313	19.402	43.283
68	38.235	19.117	42.647
69	37.681	18.840	43.478
70	37.142	20.0	42.857
71	36.619	19.718	43.661
72	37.5	19.444	43.055
73	36.986	19.178	43.835
74	36.486	18.918	44.594
75	37.333	18.666	44.0
76	38.157	18.421	43.421
77	37.662	18.181	44.155
78	37.179	17.948	44.871
79	36.708	17.721	45.569
80	37.5	17.5	45.0
81	38.271	17.283	44.444
82	37.804	17.073	45.121
83	37.349	16.867	45.783
84	38.095	16.666	45.238
85	37.647	16.470	45.882
86	37.209	16.279	46.511
87	36.781	16.091	47.126
88	37.5	15.909	46.590
89	37.078	15.730	47.191
90	37.777	15.555	46.666
91	37.362	15.384	47.252
92	38.043	15.217	46.739
93	37.634	15.053	47.311
94	37.234	14.893	47.872
95	36.842	14.736	48.421
96	37.5	14.583	47.916
97	37.113	14.432	48.453

98	37.755	14.285	47.959
99	38.383	14.141	47.474
100	39.0	14.0	47.0
101	38.613	13.861	47.524
102	38.235	13.725	48.039
103	37.864	13.592	48.543
104	38.461	13.461	48.076
105	38.095	14.285	47.619
106	37.735	14.150	48.113
107	37.383	14.018	48.598
108	37.962	13.888	48.148
109	37.614	13.761	48.623
110	37.272	13.636	49.090
111	36.936	13.513	49.549
112	37.5	13.392	49.107
113	37.168	13.274	49.557
114	36.842	13.157	50.0
115	36.521	13.043	50.434
116	37.068	12.931	50.0
117	37.606	12.820	49.572
118	37.288	12.711	50.0
119	36.974	12.605	50.420
120	37.5	12.5	50.0
121	38.016	12.396	49.586
122	37.704	12.295	50.0
123	37.398	12.195	50.406
124	37.903	12.096	50.0
125	38.4	12.0	49.6
126	38.888	11.904	49.206
127	38.582	11.811	49.606
128	39.062	11.718	49.218
129	38.759	11.627	49.612
130	38.461	11.538	50.0
131	38.167	11.450	50.381
132	38.636	11.363	50.0
133	38.345	11.278	50.375
134	38.059	11.194	50.746
135	38.518	11.111	50.370
136	38.970	11.029	50.0
137	38.686	10.948	50.364
138	38.405	10.869	50.724
139	38.129	10.791	51.079
140	38.571	10.714	50.714
141	38.297	10.638	51.063
142	38.028	10.563	51.408
143	37.762	10.489	51.748
144	38.194	10.416	51.388
145	37.931	10.344	51.724
146	37.671	10.273	52.054
147	38.095	10.204	51.700
148	38.513	10.135	51.351
149	38.255	10.067	51.677
150	38.666	10.0	51.333
151	38.410	9.9337	51.655
152	38.815	9.8684	51.315
153	39.215	9.8039	50.980
154	38.961	9.7402	51.298
155	38.709	9.6774	51.612
156	39.102	9.6153	51.282
157	38.853	9.5541	51.592
158	38.607	9.4936	51.898
159	38.364	9.4339	52.201
160	38.75	9.375	51.875
161	38.509	9.3167	52.173
162	38.888	9.2592	51.851
163	38.650	9.2024	52.147
164	39.024	9.1463	51.829
165	38.787	9.0909	52.121
166	38.554	9.0361	52.409
167	38.323	8.9820	52.694
168	38.690	8.9285	52.380
169	39.053	8.8757	52.071
170	38.823	8.8235	52.352
171	39.181	8.7719	52.046
172	39.534	8.7209	51.744
173	39.306	8.6705	52.023
174	39.080	8.6206	52.298
175	39.428	8.5714	52.0
176	39.772	8.5227	51.704
177	39.548	8.4745	51.977
178	39.325	8.4269	52.247
179	39.106	8.3798	52.513
180	39.444	8.3333	52.222
181	39.226	8.2872	52.486
182	39.010	8.2417	52.747
183	38.797	8.1967	53.005
184	39.130	8.1521	52.717
185	38.918	8.1081	52.972
186	38.709	8.0645	53.225
187	38.502	8.0213	53.475
188	38.829	7.9787	53.191
189	39.153	7.9365	52.910
190	38.947	7.8947	53.157
191	38.743	7.8534	53.403
192	39.062	7.8125	53.125
193	38.860	7.7720	53.367
194	38.659	7.7319	53.608
195	38.461	7.6923	53.846
196	38.775	7.6530	53.571
197	38.578	7.6142	53.807
198	38.888	7.5757	53.535
199	38.693	7.5376	53.768
200	39.0	7.5	53.5
201	38.805	7.4626	53.731
202	38.613	7.4257	53.960
203	38.423	7.3891	54.187
204	38.725	7.3529	53.921
205	38.536	7.3170	54.146
206	38.349	7.2815	54.368
207	38.647	7.2463	54.106
208	38.942	7.2115	53.846
209	38.755	7.1770	54.066
210	38.571	7.6190	53.809

The share of category 2 numbers is completely inert for the primorial step, and therefore the primorial anchor number at hand: in both of the depicted graphs, the shares of category 2 numbers (the left side of the graphs) up to 30 are exactly the same. A number either has a quadratic prime factorization, or it does not. The share of category 2 (quadratic) is first 0 for 1, 2, and 3, then becomes 25% for 4, the first number with a quadratic prime factorization. The share of category 2 numbers for n=210 follows an erratic path upwards to 37.571%, and already approaches the convergence value of 39.2…%. This erratic behaviour appears to be chaotic, but it does diminish. That is because of damping: the addition of individual quadratic numbers is followed by damping due to an increasingly large number of vacancies.

This paints the picture for the long term. However, the graphs also show - and that is much more interesting for the topic at hand, a proof of the Riemann hypothesis – how the share of category 1 numbers for the first 30 numbers of the graph for 210 (the second graph) *increases* relative to the graph for 30 (the first graph), and the share of category 3 numbers *decreases*.[472] The share of category 1 and 3 does not just depend on the current primorial step, but for the tiny starting segment of the entire number line, it behaves in a completely contradictory manner compared to regular long term behaviour. For example, looking at the integers 10, 20, and 30 in both graphs depicted above, we can find shares of category 1 of 60.0%, 35.0%, and 26.666% in the graph of primorial 30, and 70.0%, 45.0%, and 36.666% in the graph of primorial 210. This is caused by the transformation of category 3 numbers into category 1 numbers during primorial steps: category 3 diminishes at the cost of category 1, and it does so with overwhelming enthusiasm near the 1. Category 2 is not involved and remains inert relative to this transformation process.

This progression of the share of category 1 and category 3 for primorial steps in the short term is completely perpendicular to the progression of the share of category 1 and category 3 in the very long term (the asymptotic progression): the share of category 1 actually diminishes and approaches zero, whereas the share of category 1 and category 3 combined neatly converge to $1/\zeta(2)$, with $6/\pi^2$ as a closed form solution, or around 60.8%. As the share of category 1 approaches zero, you could also say that the share of category 3 progresses asymptotically to $1/\zeta(2)$. For 210, the share of category 1 has already diminished to 7.6%, and the share of category 3 has increased to 53.8% (61.4% combined).

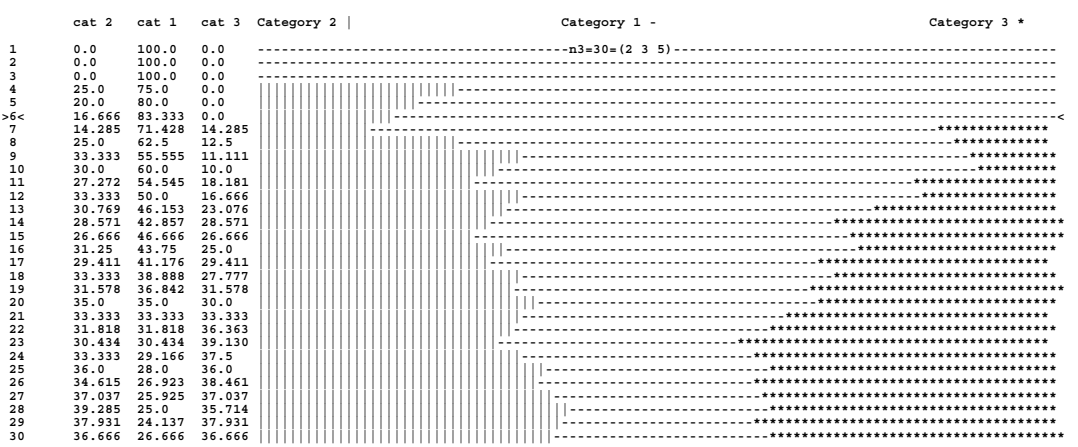
The phenomenon that we observe here, when taking primorial steps, is that, on a truly small, minuscule segment starting from 1, the ratios between the shares of category 1, 2, and 3 numbers display entirely different behaviours relative to the much longer term, up to the last primorial number. When progressing through primorial steps, category 3 numbers of the previous primorial number are converted into category 1 numbers of the new primorial number, and this happens much more intensively to the left (at the start of the primorial segment) than the right (at the end of, but actually on the predominant share of

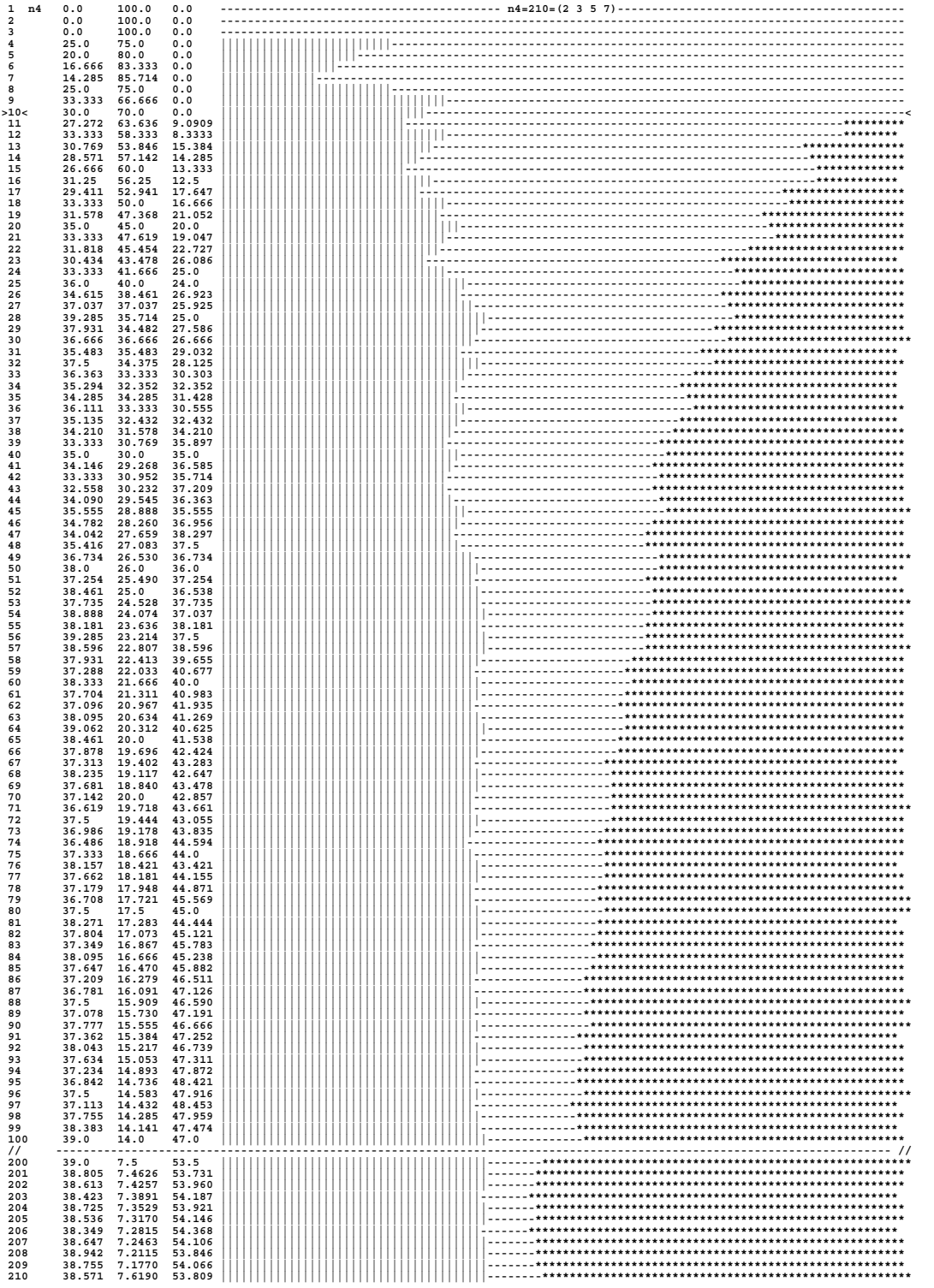
[472] Starting from 6, because a share smaller than 0 is impossible.

the primorial segment). Therefore, with every primorial step, a small but slightly larger section of the number line from 1 contains more category 1 numbers and loses category 3 numbers. Reversely, with every primorial step, a large and growing segment of the number line up to the new primorial number contains more and more category 3 numbers, and loses category 1 numbers. There is a tipping point.

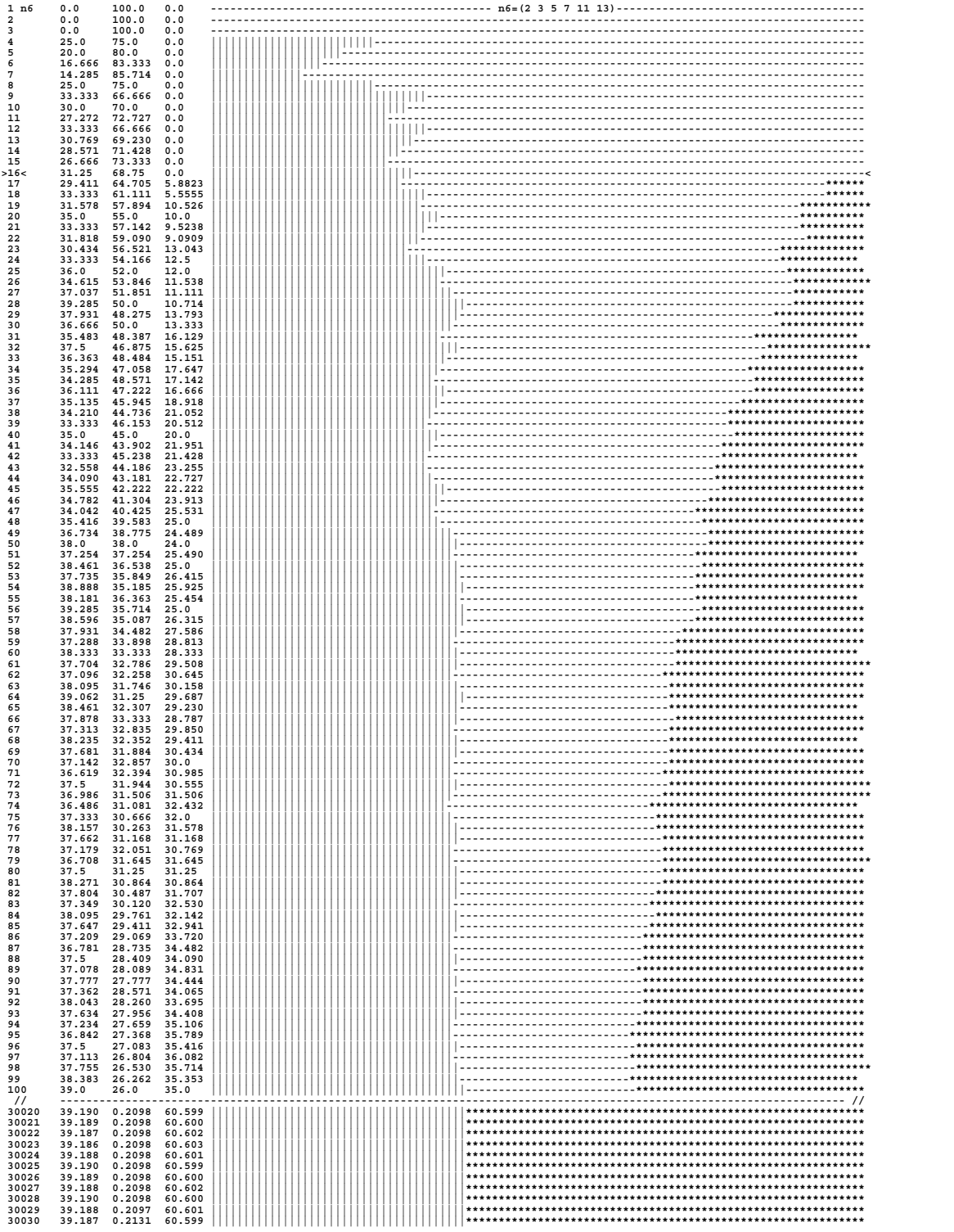
When I say small and large segments, I mean truly small and large. I already mentioned it before. For the primorial step from n_{12} to n_{13}=304250263527210, the segment of the number line that becomes free of category 1 numbers goes from 1 to 42, a share of the whole segment of around $1{\cdot}10^{-11}$%. For pragmatists, that is *virtually* nothing.

Below, you will find the graphs of the shares of category 1, 2, and 3 numbers for the primorial numbers n_3=30, n_4=210, n_5=2310, n_6=30030, n_8=9699690, n_{10}=6469693230, and n_{13}=304250263527210. You can see which graph belongs to which primorial in the first line of the graph (for example p3=30=(2 3 5) underneath 'Category 1'). Again, for cosmetic reasons, I switch the order of categories around: first category 2 (the numbers with square-free prime factorizations), then category 1 (the factors of primorials), and then category 3 (the remaining numbers with square-free prime factorizations; 'the proof disruptors'). For primorials > 100, I present the numbers 1 up to 100, and in some cases I also include the final 10 numbers (as long as my computer can keep up), to show how much the convergence has progressed.

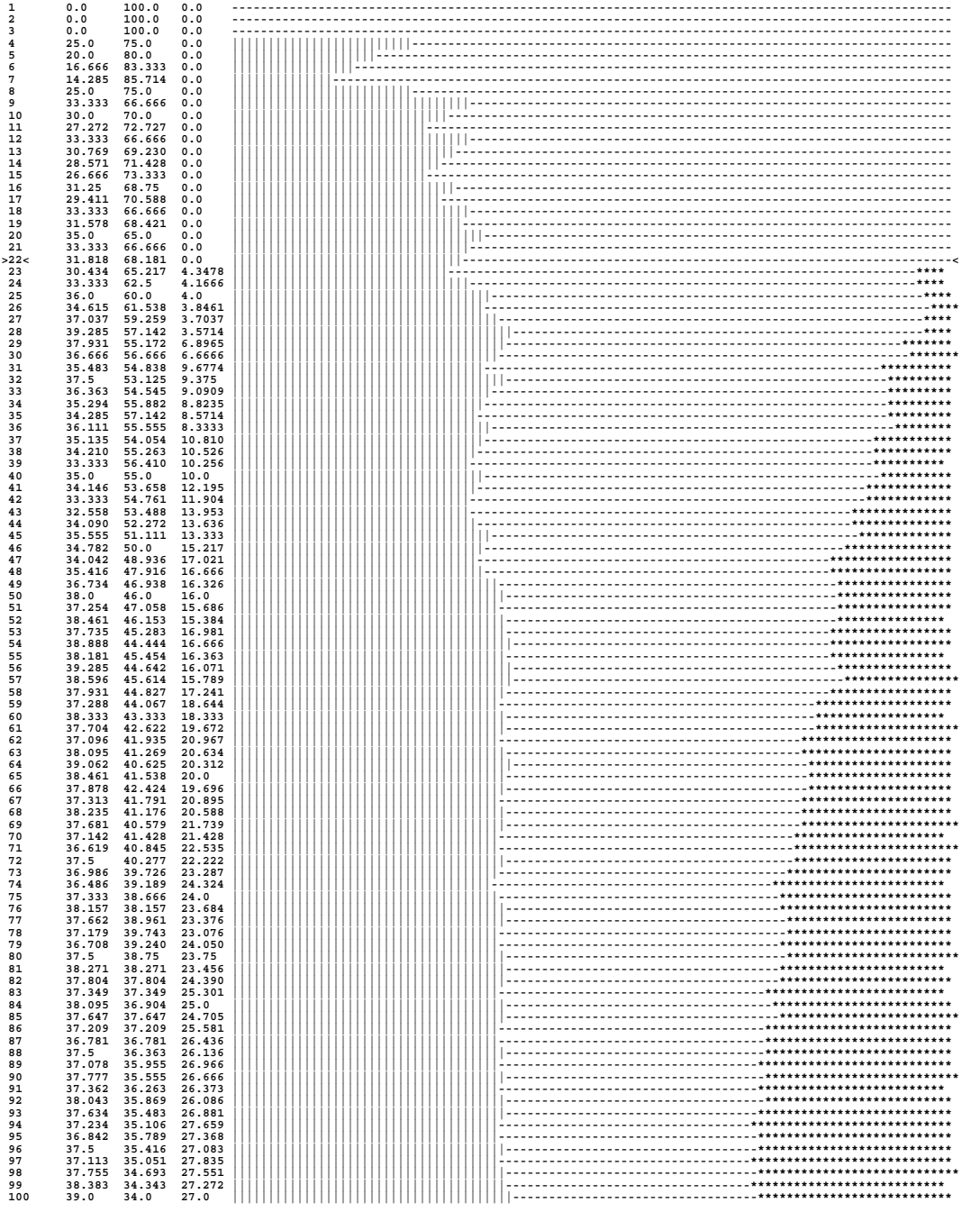



1 n4 0.0 100.0 0.0 n4=210=(2 3 5 7)
2 0.0 100.0 0.0
3 0.0 100.0 0.0
4 25.0 75.0 0.0
5 20.0 80.0 0.0
6 16.666 83.333 0.0
7 14.285 85.714 0.0
8 25.0 75.0 0.0
9 33.333 66.666 0.0
>10< 30.0 70.0 0.0
11 27.272 63.636 9.0909
12 33.333 58.333 8.3333
13 30.769 53.846 15.384
14 28.571 57.142 14.285
15 26.666 60.0 13.333
16 31.25 56.25 12.5
17 29.411 52.941 17.647
18 33.333 50.0 16.666
19 31.578 47.368 21.052
20 35.0 45.0 20.0
21 33.333 47.619 19.047
22 31.818 45.454 22.727
23 30.434 43.478 26.086
24 33.333 41.666 25.0
25 36.0 40.0 24.0
26 34.615 38.461 26.923
27 37.037 37.037 25.925
28 39.285 35.714 25.0
29 37.931 34.482 27.586
30 36.666 36.666 26.666
31 35.483 35.483 29.032
32 37.5 34.375 28.125
33 36.363 33.333 30.303
34 35.294 32.352 32.352
35 34.285 34.285 31.428
36 36.111 33.333 30.555
37 35.135 32.432 32.432
38 34.210 31.578 34.210
39 33.333 30.769 35.897
40 35.0 30.0 35.0
41 34.146 29.268 36.585
42 33.333 30.952 35.714
43 32.558 30.232 37.209
44 34.090 29.545 36.363
45 35.555 28.888 35.555
46 34.782 28.260 36.956
47 34.042 27.659 38.297
48 35.416 27.083 37.5
49 36.734 26.530 36.734
50 38.0 26.0 36.0
51 37.254 25.490 37.254
52 38.461 25.0 36.538
53 37.735 24.528 37.735
54 38.888 24.074 37.037
55 38.181 23.636 38.181
56 39.285 23.214 37.5
57 38.596 22.807 38.596
58 37.931 22.413 39.655
59 37.288 22.033 40.677
60 38.333 21.666 40.0
61 37.704 21.311 40.983
62 37.096 20.967 41.935
63 38.095 20.634 41.269
64 39.062 20.312 40.625
65 38.461 20.0 41.538
66 37.878 19.696 42.424
67 37.313 19.402 43.283
68 38.235 19.117 42.647
69 37.681 18.840 43.478
70 37.142 20.0 42.857
71 36.619 19.718 43.661
72 37.5 19.444 43.055
73 36.986 19.178 43.835
74 36.486 18.918 44.594
75 37.333 18.666 44.0
76 38.157 18.421 43.421
77 37.662 18.181 44.155
78 37.179 17.948 44.871
79 36.708 17.721 45.569
80 37.5 17.5 45.0
81 38.271 17.283 44.444
82 37.804 17.073 45.121
83 37.349 16.867 45.783
84 38.095 16.666 45.238
85 37.647 16.470 45.882
86 37.209 16.279 46.511
87 36.781 16.091 47.126
88 37.5 15.909 46.590
89 37.078 15.730 47.191
90 37.777 15.555 46.666
91 37.362 15.384 47.252
92 38.043 15.217 46.739
93 37.634 15.053 47.311
94 37.234 14.893 47.872
95 36.842 14.736 48.421
96 37.5 14.583 47.916
97 37.113 14.432 48.453
98 37.755 14.285 47.959
99 38.383 14.141 47.474
100 39.0 14.0 47.0
200 39.0 7.5 53.5
201 38.805 7.4626 53.731
202 38.613 7.4257 53.960
203 38.423 7.3891 54.187
204 38.725 7.3529 53.921
205 38.536 7.3170 54.146
206 38.349 7.2815 54.368
207 38.647 7.2463 54.106
208 38.942 7.2115 53.846
209 38.755 7.1770 54.066
210 38.571 7.6190 53.809

1 n5	0.0	100.0	0.0	n5=(2 3 5 7 11)
2	0.0	100.0	0.0	
3	0.0	100.0	0.0	
4	25.0	75.0	0.0	
5	20.0	80.0	0.0	
6	16.666	83.333	0.0	
7	14.285	85.714	0.0	
8	25.0	75.0	0.0	
9	33.333	66.666	0.0	
10	30.0	70.0	0.0	
11	27.272	72.727	0.0	
>12<	33.333	66.666	0.0	
13	30.769	61.538	7.6923	
14	28.571	64.285	7.1428	
15	26.666	66.666	6.6666	
16	31.25	62.5	6.25	
17	29.411	58.823	11.764	
18	33.333	55.555	11.111	
19	31.578	52.631	15.789	
20	35.0	50.0	15.0	
21	33.333	52.380	14.285	
22	31.818	54.545	13.636	
23	30.434	52.173	17.391	
24	33.333	50.0	16.666	
25	36.0	48.0	16.0	
26	34.615	46.153	19.230	
27	37.037	44.444	18.518	
28	39.285	42.857	17.857	
29	37.931	41.379	20.689	
30	36.666	43.333	20.0	
31	35.483	41.935	22.580	
32	37.5	40.625	21.875	
33	36.363	42.424	21.212	
34	35.294	41.176	23.529	
35	34.285	42.857	22.857	
36	36.111	41.666	22.222	
37	35.135	40.540	24.324	
38	34.210	39.473	26.315	
39	33.333	38.461	28.205	
40	35.0	37.5	27.5	
41	34.146	36.585	29.268	
42	33.333	38.095	28.571	
43	32.558	37.209	30.232	
44	34.090	36.363	29.545	
45	35.555	35.555	28.888	
46	34.782	34.782	30.434	
47	34.042	34.042	31.914	
48	35.416	33.333	31.25	
49	36.734	32.653	30.612	
50	38.0	32.0	30.0	
51	37.254	31.372	31.372	
52	38.461	30.769	30.769	
53	37.735	30.188	32.075	
54	38.888	29.629	31.481	
55	38.181	30.909	30.909	
56	39.285	30.357	30.357	
57	38.596	29.824	31.578	
58	37.931	29.310	32.758	
59	37.288	28.813	33.898	
60	38.333	28.333	33.333	
61	37.704	27.868	34.426	
62	37.096	27.419	35.483	
63	38.095	26.984	34.920	
64	39.062	26.562	34.375	
65	38.461	26.153	35.384	
66	37.878	27.272	34.848	
67	37.313	26.865	35.820	
68	38.235	26.470	35.294	
69	37.681	26.086	36.231	
70	37.142	27.142	35.714	
71	36.619	26.760	36.619	
72	37.5	26.388	36.111	
73	36.986	26.027	36.986	
74	36.486	25.675	37.837	
75	37.333	25.333	37.333	
76	38.157	25.0	36.842	
77	37.662	25.974	36.363	
78	37.179	25.641	37.179	
79	36.708	25.316	37.974	
80	37.5	25.0	37.5	
81	38.271	24.691	37.037	
82	37.804	24.390	37.804	
83	37.349	24.096	38.554	
84	38.095	23.809	38.095	
85	37.647	23.529	38.823	
86	37.209	23.255	39.534	
87	36.781	22.988	40.229	
88	37.5	22.727	39.772	
89	37.078	22.471	40.449	
90	37.777	22.222	40.0	
91	37.362	21.978	40.659	
92	38.043	21.739	40.217	
93	37.634	21.505	40.860	
94	37.234	21.276	41.489	
95	36.842	21.052	42.105	
96	37.5	20.833	41.666	
97	37.113	20.618	42.268	
98	37.755	20.408	41.836	
99	38.383	20.202	41.414	
100	39.0	20.0	41.0	
//				//
2300	39.217	1.3478	59.434	
2301	39.200	1.3472	59.452	
2302	39.183	1.3466	59.470	
2303	39.209	1.3460	59.444	
2304	39.236	1.3454	59.418	
2305	39.219	1.3449	59.436	
2306	39.202	1.3443	59.453	
2307	39.185	1.3437	59.471	
2308	39.211	1.3431	59.445	
2309	39.194	1.3425	59.462	
2310	39.177	1.3852	59.437	


1 n6 0.0 100.0 0.0 n6=(2 3 5 7 11 13)
2 0.0 100.0 0.0
3 0.0 100.0 0.0
4 25.0 75.0 0.0
5 20.0 80.0 0.0
6 16.666 83.333 0.0
7 14.285 85.714 0.0
8 25.0 75.0 0.0
9 33.333 66.666 0.0
10 30.0 70.0 0.0
11 27.272 72.727 0.0
12 33.333 66.666 0.0
13 30.769 69.230 0.0
14 28.571 71.428 0.0
15 26.666 73.333 0.0
>16< 31.25 68.75 0.0
17 29.411 64.705 5.8823
18 33.333 61.111 5.5555
19 31.578 57.894 10.526
20 35.0 55.0 10.0
21 33.333 57.142 9.5238
22 31.818 59.090 9.0909
23 30.434 56.521 13.043
24 33.333 54.166 12.5
25 36.0 52.0 12.0
26 34.615 53.846 11.538
27 37.037 51.851 11.111
28 39.285 50.0 10.714
29 37.931 48.275 13.793
30 36.666 50.0 13.333
31 35.483 48.387 16.129
32 37.5 46.875 15.625
33 36.363 48.484 15.151
34 35.294 47.058 17.647
35 34.285 48.571 17.142
36 36.111 47.222 16.666
37 35.135 45.945 18.918
38 34.210 44.736 21.052
39 33.333 46.153 20.512
40 35.0 45.0 20.0
41 34.146 43.902 21.951
42 33.333 45.238 21.428
43 32.558 44.186 23.255
44 34.090 43.181 22.727
45 35.555 42.222 22.222
46 34.782 41.304 23.913
47 34.042 40.425 25.531
48 35.416 39.583 25.0
49 36.734 38.775 24.489
50 38.0 38.0 24.0
51 37.254 37.254 25.490
52 38.461 36.538 25.0
53 37.735 35.849 26.415
54 38.888 35.185 25.925
55 38.181 36.363 25.454
56 39.285 35.714 25.0
57 38.596 35.087 26.315
58 37.931 34.482 27.586
59 37.288 33.898 28.813
60 38.333 33.333 28.333
61 37.704 32.786 29.508
62 37.096 32.258 30.645
63 38.095 31.746 30.158
64 39.062 31.25 29.687
65 38.461 32.307 29.230
66 37.878 33.333 28.787
67 37.313 32.835 29.850
68 38.235 32.352 29.411
69 37.681 31.884 30.434
70 37.142 32.857 30.0
71 36.619 32.394 30.985
72 37.5 31.944 30.555
73 36.986 31.506 31.506
74 36.486 31.081 32.432
75 37.333 30.666 32.0
76 38.157 30.263 31.578
77 37.662 31.168 31.168
78 37.179 32.051 30.769
79 36.708 31.645 31.645
80 37.5 31.25 31.25
81 38.271 30.864 30.864
82 37.804 30.487 31.707
83 37.349 30.120 32.530
84 38.095 29.761 32.142
85 37.647 29.411 32.941
86 37.209 29.069 33.720
87 36.781 28.735 34.482
88 37.5 28.409 34.090
89 37.078 28.089 34.831
90 37.777 27.777 34.444
91 37.362 28.571 34.065
92 38.043 28.260 33.695
93 37.634 27.956 34.408
94 37.234 27.659 35.106
95 36.842 27.368 35.789
96 37.5 27.083 35.416
97 37.113 26.804 36.082
98 37.755 26.530 35.714
99 38.383 26.262 35.353
100 39.0 26.0 35.0
// //
30020 39.190 0.2098 60.599
30021 39.189 0.2098 60.600
30022 39.187 0.2098 60.602
30023 39.186 0.2098 60.603
30024 39.188 0.2098 60.601
30025 39.190 0.2098 60.599
30026 39.189 0.2098 60.600
30027 39.188 0.2098 60.602
30028 39.190 0.2098 60.600
30029 39.188 0.2097 60.601
30030 39.187 0.2131 60.599

n8= 9699690 = (2 3 5 7 11 13 17 19)



1	0.0	100.0	0.0	
2	0.0	100.0	0.0	
3	0.0	100.0	0.0	
4	25.0	75.0	0.0	
5	20.0	80.0	0.0	
6	16.666	83.333	0.0	
7	14.285	85.714	0.0	
8	25.0	75.0	0.0	
9	33.333	66.666	0.0	
10	30.0	70.0	0.0	
11	27.272	72.727	0.0	
12	33.333	66.666	0.0	
13	30.769	69.230	0.0	
14	28.571	71.428	0.0	
15	26.666	73.333	0.0	
16	31.25	68.75	0.0	
17	29.411	70.588	0.0	
18	33.333	66.666	0.0	
19	31.578	68.421	0.0	
20	35.0	65.0	0.0	
21	33.333	66.666	0.0	
>22<	31.818	68.181	0.0	
23	30.434	65.217	4.3478	
24	33.333	62.5	4.1666	
25	36.0	60.0	4.0	
26	34.615	61.538	3.8461	
27	37.037	59.259	3.7037	
28	39.285	57.142	3.5714	
29	37.931	55.172	6.8965	
30	36.666	56.666	6.6666	
31	35.483	54.838	9.6774	
32	37.5	53.125	9.375	
33	36.363	54.545	9.0909	
34	35.294	55.882	8.8235	
35	34.285	57.142	8.5714	
36	36.111	55.555	8.3333	
37	35.135	54.054	10.810	
38	34.210	55.263	10.526	
39	33.333	56.410	10.256	
40	35.0	55.0	10.0	
41	34.146	53.658	12.195	
42	33.333	54.761	11.904	
43	32.558	53.488	13.953	
44	34.090	52.272	13.636	
45	35.555	51.111	13.333	
46	34.782	50.0	15.217	
47	34.042	48.936	17.021	
48	35.416	47.916	16.666	
49	36.734	46.938	16.326	
50	38.0	46.0	16.0	
51	37.254	47.058	15.686	
52	38.461	46.153	15.384	
53	37.735	45.283	16.981	
54	38.888	44.444	16.666	
55	38.181	45.454	16.363	
56	39.285	44.642	16.071	
57	38.596	45.614	15.789	
58	37.931	44.827	17.241	
59	37.288	44.067	18.644	
60	38.333	43.333	18.333	
61	37.704	42.622	19.672	
62	37.096	41.935	20.967	
63	38.095	41.269	20.634	
64	39.062	40.625	20.312	
65	38.461	41.538	20.0	
66	37.878	42.424	19.696	
67	37.313	41.791	20.895	
68	38.235	41.176	20.588	
69	37.681	40.579	21.739	
70	37.142	41.428	21.428	
71	36.619	40.845	22.535	
72	37.5	40.277	22.222	
73	36.986	39.726	23.287	
74	36.486	39.189	24.324	
75	37.333	38.666	24.0	
76	38.157	38.157	23.684	
77	37.662	38.961	23.376	
78	37.179	39.743	23.076	
79	36.708	39.240	24.050	
80	37.5	38.75	23.75	
81	38.271	38.271	23.456	
82	37.804	37.804	24.390	
83	37.349	37.349	25.301	
84	38.095	36.904	25.0	
85	37.647	37.647	24.705	
86	37.209	37.209	25.581	
87	36.781	36.781	26.436	
88	37.5	36.363	26.136	
89	37.078	35.955	26.966	
90	37.777	35.555	26.666	
91	37.362	36.263	26.373	
92	38.043	35.869	26.086	
93	37.634	35.483	26.881	
94	37.234	35.106	27.659	
95	36.842	35.789	27.368	
96	37.5	35.416	27.083	
97	37.113	35.051	27.835	
98	37.755	34.693	27.551	
99	38.383	34.343	27.272	
100	39.0	34.0	27.0	

n10 = 6469693230 = (2 3 5 7 11 13 17 19 23 29)

1	0.0	100.0	0.0	
2	0.0	100.0	0.0	
3	0.0	100.0	0.0	
4	25.0	75.0	0.0	
5	20.0	80.0	0.0	
6	16.666	83.333	0.0	
7	14.285	85.714	0.0	
8	25.0	75.0	0.0	
9	33.333	66.666	0.0	
10	30.0	70.0	0.0	
11	27.272	72.727	0.0	
12	33.333	66.666	0.0	
13	30.769	69.230	0.0	
14	28.571	71.428	0.0	
15	26.666	73.333	0.0	
16	31.25	68.75	0.0	
17	29.411	70.588	0.0	
18	33.333	66.666	0.0	
19	31.578	68.421	0.0	
20	35.0	65.0	0.0	
21	33.333	66.666	0.0	
22	31.818	68.181	0.0	
23	30.434	69.565	0.0	
24	33.333	66.666	0.0	
25	36.0	64.0	0.0	
26	34.615	65.384	0.0	
27	37.037	62.962	0.0	
28	39.285	60.714	0.0	
29	37.931	62.068	0.0	
30	36.666	63.333	0.0	
31	35.483	61.290	3.2258	
32	37.5	59.375	3.125	
33	36.363	60.606	3.0303	
34	35.294	61.764	2.9411	
35	34.285	62.857	2.8571	
36	36.111	61.111	2.7777	
37	35.135	59.459	5.4054	
38	34.210	60.526	5.2631	
39	33.333	61.538	5.1282	
40	35.0	60.0	5.0	
41	34.146	58.536	7.3170	
42	33.333	59.523	7.1428	
43	32.558	58.139	9.3023	
44	34.090	56.818	9.0909	
45	35.555	55.555	8.8888	
46	34.782	56.521	8.6956	
47	34.042	55.319	10.638	
48	35.416	54.166	10.416	
49	36.734	53.061	10.204	
50	38.0	52.0	10.0	
51	37.254	52.941	9.8039	
52	38.461	51.923	9.6153	
53	37.735	50.943	11.320	
54	38.888	50.0	11.111	
55	38.181	50.909	10.909	
56	39.285	50.0	10.714	
57	38.596	50.877	10.526	
58	37.931	51.724	10.344	
59	37.288	50.847	11.864	
60	38.333	50.0	11.666	
61	37.704	49.180	13.114	
62	37.096	48.387	14.516	
63	38.095	47.619	14.285	
64	39.062	46.875	14.062	
65	38.461	47.692	13.846	
66	37.878	48.484	13.636	
67	37.313	47.761	14.925	
68	38.235	47.058	14.705	
69	37.681	47.826	14.492	
70	37.142	48.571	14.285	
71	36.619	47.887	15.492	
72	37.5	47.222	15.277	
73	36.986	46.575	16.438	
74	36.486	45.945	17.567	
75	37.333	45.333	17.333	
76	38.157	44.736	17.105	
77	37.662	45.454	16.883	
78	37.179	46.153	16.666	
79	36.708	45.569	17.721	
80	37.5	45.0	17.5	
81	38.271	44.444	17.283	
82	37.804	43.902	18.292	
83	37.349	43.373	19.277	
84	38.095	42.857	19.047	
85	37.647	43.529	18.823	
86	37.209	43.023	19.767	
87	36.781	43.678	19.540	
88	37.5	43.181	19.318	
89	37.078	42.696	20.224	
90	37.777	42.222	20.0	
91	37.362	42.857	19.780	
92	38.043	42.391	19.565	
93	37.634	41.935	20.430	
94	37.234	41.489	21.276	
95	36.842	42.105	21.052	
96	37.5	41.666	20.833	
97	37.113	41.237	21.649	
98	37.755	40.816	21.428	
99	38.383	40.404	21.212	
100	39.0	40.0	21.0	

n13 = 304250263527210 = (2 3 5 7 11 13 17 19 23 29 31 37 41)

1	0.0	100.0	0.0	
2	0.0	100.0	0.0	
3	0.0	100.0	0.0	
4	25.0	75.0	0.0	
5	20.0	80.0	0.0	
6	16.666	83.333	0.0	
7	14.285	85.714	0.0	
8	25.0	75.0	0.0	
9	33.333	66.666	0.0	
10	30.0	70.0	0.0	
11	27.272	72.727	0.0	
12	33.333	66.666	0.0	
13	30.769	69.230	0.0	
14	28.571	71.428	0.0	
15	26.666	73.333	0.0	
16	31.25	68.75	0.0	
17	29.411	70.588	0.0	
18	33.333	66.666	0.0	
19	31.578	68.421	0.0	
20	35.0	65.0	0.0	
21	33.333	66.666	0.0	
22	31.818	68.181	0.0	
23	30.434	69.565	0.0	
24	33.333	66.666	0.0	
25	36.0	64.0	0.0	
26	34.615	65.384	0.0	
27	37.037	62.962	0.0	
28	39.285	60.714	0.0	
29	37.931	62.068	0.0	
30	36.666	63.333	0.0	
31	35.483	64.516	0.0	
32	37.5	62.5	0.0	
33	36.363	63.636	0.0	
34	35.294	64.705	0.0	
35	34.285	65.714	0.0	
36	36.111	63.888	0.0	
37	35.135	64.864	0.0	
38	34.210	65.789	0.0	
39	33.333	66.666	0.0	
40	35.0	65.0	0.0	
41	34.146	65.853	0.0	
42	33.333	66.666	0.0	
43	32.558	65.116	2.3255	
44	34.090	63.636	2.2727	
45	35.555	62.222	2.2222	
46	34.782	63.043	2.1739	
47	34.042	61.702	4.2553	
48	35.416	60.416	4.1666	
49	36.734	59.183	4.0816	
50	38.0	58.0	4.0	
51	37.254	58.823	3.9215	
52	38.461	57.692	3.8461	
53	37.735	56.603	5.6603	
54	38.888	55.555	5.5555	
55	38.181	56.363	5.4545	
56	39.285	55.357	5.3571	
57	38.596	56.140	5.2631	
58	37.931	56.896	5.1724	
59	37.288	55.932	6.7796	
60	38.333	55.0	6.6666	
61	37.704	54.098	8.1967	
62	37.096	54.838	8.0645	
63	38.095	53.968	7.9365	
64	39.062	53.125	7.8125	
65	38.461	53.846	7.6923	
66	37.878	54.545	7.5757	
67	37.313	53.731	8.9552	
68	38.235	52.941	8.8235	
69	37.681	53.623	8.6956	
70	37.142	54.285	8.5714	
71	36.619	53.521	9.8591	
72	37.5	52.777	9.7222	
73	36.986	52.054	10.958	
74	36.486	52.702	10.810	
75	37.333	52.0	10.666	
76	38.157	51.315	10.526	
77	37.662	51.948	10.389	
78	37.179	52.564	10.256	
79	36.708	51.898	11.392	
80	37.5	51.25	11.25	
81	38.271	50.617	11.111	
82	37.804	51.219	10.975	
83	37.349	50.602	12.048	
84	38.095	50.0	11.904	
85	37.647	50.588	11.764	
86	37.209	50.0	12.790	
87	36.781	50.574	12.643	
88	37.5	50.0	12.5	
89	37.078	49.438	13.483	
90	37.777	48.888	13.333	
91	37.362	49.450	13.186	
92	38.043	48.913	13.043	
93	37.634	49.462	12.903	
94	37.234	48.936	13.829	
95	36.842	49.473	13.684	
96	37.5	48.958	13.541	
97	37.113	48.453	14.432	
98	37.755	47.959	14.285	
99	38.383	47.474	14.141	
100	39.0	47.0	14.0	

I have also depicted the final 10 numbers for the graphs for primorials n_4=210=(2 3 5 7), n_5=2310=(2 3 5 7 11), and n_6=30030=(2 3 5 7 11 13) on the bottom, to illustrate how far the convergence has progressed. This is 6, 5, and 4 graphs earlier. It is clear how category 3, on the right side of the graph, starts later and later for higher primorials (at 11, 13, and 17, respectively, for n_4, n_5, and n_6**)**. At 100, the share of category 3 has already diminished substantially (respectively 74.0%, 41.0%, and 35.0%), which reflects the transformation from category 3 to category 1. Once the primorial number has been reached, category 3 is much closer to the convergence value of $(1- 6/\pi^2) \approx 60.8$ % for higher primorial values (210: 53.809; 2310: 59.437, and 30030: 60.599).

For 30030, with percentage shares of 39.187 (category 2), 0.2131 (category 1), and 60.599 (category 3), we can see that category 1 is making good strides towards zero, and that category 2 and category 1+3 combined are progressing towards the convergence values $6/\pi^2 \approx 39.2...$% and $1 - 6/\pi^2 \approx 60.8...$%, even though the pattern swings back and forth and the process slows down a lot.

We can also see how category 1, in the middle, for the first segment from 1 to 100 in absolute terms for increasingly large primorial, progresses from 100% towards 0% with decreasing speed. Due to the fact that category 2 on the left is the same in all graphs, we can also see the inverse picture: category 3, on the right, grows in absolute terms for the first segment from 1 to 100 decreasingly fast as we take subsequent primorial steps. The number of proof disruptors of the Riemann hypothesis, which are essentially category 3 numbers, relatively decreases as we take another primorial step. In fact, we can say that the number of category 3 proof disruptors diminishes from 1 as the primorial increases, analogously to the decrease of prime numbers as we move towards infinity. Another crucial observation here is the following: as we take primorial steps, there is even a steadily growing segment starting from 1, where category 3 numbers, a.k.a. proof disruptors, are completely absent! This is precisely what I want to focus on in the next paragraph, because this is a final crucial recognition for my second proposal for a proof of the Riemann hypothesis.

Viewpoint 3: Condensation of factors at primorial steps.
With every primorial step, the category 3 numbers at the start of the primorial segment become sparser, and denser at the end. We can see this on the right side of the previous graphs in the wide strip of stars that becomes smaller as we move down. And with every primorial step, the segment from 1 to the first category 3 number grows, the segment of the entire number line where no category 3 numbers are present. This is visualized by the growing part in the top of the previous graphs, on the right side again, where no category 3 stars can be found.

A partial segment emerges that is free of category 3, from 1 up to the first category 3 number, which increases with every primorial step. We know how large this partial segment free of category 3 will grow: up to the *new* prime number that is added in the current primorial step. This new prime number will fill the first vacancy that could not have been filled with the prime numbers that were available at that time (this is the

constructivist interpretation of prime numbers, which I compared with the sieve interpretation). This partial segment even grows up to the number directly prior to the *subsequent* prime number, which, at that moment, has not yet been filled by the subsequent primorial step. The partial segment free of category 3 therefore always goes from 1 (inclusive) up to the new primorial prime number of the subsequent primorial step minus 1. This mathematically defines it, as opposed to it being an empirical observation.

I will give examples based on the seven previous graphs, because this general way of phrasing it might make it a bit difficult to grasp.

> Say that we have the primorial n_3=3=(2 3 5). We know that on the primorial segment of 30, the part free of category 3 numbers extends from 1 to 5, because 5 is the most recently added prime number in the previous primorial step, which is filled because a vacancy existed that could not have been 'prime factorized' by the available prime numbers at the time (in this case: 2 and 3). The segment even continues to 7-1=6, because 7 is the *subsequent* prime number. On the right side of the graph of n_3=30=(2 3 5), seven graphs earlier, we can see that category 3 indeed does not start until the number 6. For the smaller numbers 1 to 5, only category 2 and 1 numbers were present.
>
> For primorial n_4=210=(2 3 5 7), it holds that the part free of category 3 continues up to 10, because 11 is the next prime number, and 11 – 1 = 10. This can be seen 6 graphs earlier.
>
> For primorial n_5=2310=(2 3 5 7 11), it holds that the part free of category 3 continues up to 12, because the next prime number is 13. This can be seen 5 graphs earlier.
>
> For primorial n_6=30030=(2 3 5 7 11 13), it holds that the part free of category 3 continues up to 16, because the next prime number is 17. This can be seen 4 graphs earlier.
>
> For primorial n_8=9699690 = (2 3 5 7 11 13 17 19), it holds that the part free of category 3 continues up to 22, because the next prime number is 23. This can be seen 3 graphs earlier.
>
> For primorial n_{10}=6469693230 = (2 3 5 7 11 13 17 19 23 29), it holds that the part free of category 3 continues up to 30, because the next prime number is 31. This can be seen 2 graphs earlier.
>
> For primorial n_{13}=304250263527210 = (2 3 5 7 11 13 17 19 23 29 31 37 41), it holds that the part free of category 3 continues up to 42, because the next prime number is 43. This is the graph directly above.

This paragraph is called '*Condensation* of factors at primorial steps'. This left-sided primorial filling process of the number line with only category 1 (and therefore category 2) numbers

(category 3 steadily disappears) strongly reminded me of a clotting or condensation process. This probably has to do with the fact that I was once trained as a chemist, but I am also following in the footsteps of Bose and Einstein.[473] The category 3 numbers are the cause of the erratic and seemingly unpredictable results of the Mertens function. To the left, category 1 numbers are clustered together, pushing away the category 3 numbers, until at a certain moment, to the left of the vacancy (the prime number that allows for the subsequent primorial step), category 3 numbers can no longer be pushed away. This makes the Mertens function better behaved than a random series of Bernoulli experiments with a coin. The category 1 numbers thereby 'tame' the erratic results of the Mertens function from the left onwards. This is not a continuous process, there are jumps in between, dictated by the prime numbers.

The above explanations, tables, and graphs revealed that there is a shift in balance that occurs when taking primorial steps. We know that the ratio

numbers with a quadratic prime factorization
:
numbers with a square-free prime factorization

moves towards the balance value $6/\pi^2 : (1 - 6/\pi^2) \approx 39.2 : 60.8$. But when we open the box of numbers with a square-free prime factorization, there appears to be a major mutual shift between category 1 and category 3: from 100% of category 1 at the start of the primorial segment to virtually 100% category 3 for the increasingly large primorial anchor number at hand. Virtually, because as Euclides has proven, prime numbers will always keep popping up, even though they become less frequent. This mutual shift is asymmetric: the increase of category 1 strongly manifests itself in the very first minuscule part of the primorial segment. The major part of the primorial segment mainly shows the growth of category 3.

It is precisely this minuscule starting section free of category 3, which steadily grows with every primorial step, which will turn out to be crucial to my second proposal for a proof of the Riemann hypothesis, now focused on the first equivalent phrasing. I will now start with that.

Second proposal for a proof of the Riemann hypothesis

The earlier mentioned first equivalent phrasing of the Riemann hypothesis by Edwards, in contrast to the second and third phrasings for which I proposed a proof earlier in this book, is in fact widely accepted by professional mathematicians. I repeat:

[473] The association with Bose–Einstein condensates is quickly found, a phenomenon that is closely related to super conduction. In specific cases where the smallest prime numbers are utilized in a primorial number, such as for primorial products, reconfiguring the perspectives may occur with the smallest losses and least amount of effort. The absolute zero in physics, is then the situation in which you use those smallest prime numbers in recursive perspectivism. That provides optimal flexibility and the highest improvement potential.

1: If $M(x) = O(x^{(½ + \varepsilon)})$ is true with probability one, the Riemann hypothesis is true with probability one (Edwards, Howard, Riemann's zeta function, Chapter 12.1).

Above, I have investigated this equivalent proof for the Riemann hypothesis, defined in terms of the Mertens function, with three fresh viewpoints: first (1) with a comparison of the Mertens function with a Bernoulli experiment (such as tossing a coin, I was essentially exploring the route of Denjoy), then (2) with the recognized three categories of numbers, and finally (3) with the concept of 'condensation' of an interleaving sigma Möbius when taking primorial steps.

Based on these three viewpoints, I will now put forward a second proposal for a proof of the Riemann hypothesis, now focused on the *first*, more formal equivalent phrasing, which was repeated above. The previously mentioned clause in which I stated that I am not doing this as a professional mathematician is still very much in effect.

This second proposal is heavily based on the previous paragraphs and chapters and contains corresponding terminology. The result of this is a 4-step proof on the basis of:

1: Patterns
2: Interleaving
3: Relation between Bernoulli experiments and the Mertens function
4: Condensation

It is far from inconceivable that I, as a non-mathematician, skip some steps or cut some corners, or employ mathematically awkward terminology. I am working according to the motto of the Order of the Gartner (I still find myself on very thin ice). Nevertheless: the concept of this second proposal for a proof of the Riemann hypothesis is hereby written down on paper. It is as follows:

1: Patterns

1a: The category 1 numbers of a primorial anchor number, or the factors of this number, each with their own square-free prime factorization, conform neatly to the *discrete combinatorial and binomial bell pattern* of the corresponding row of Pascal's triangle (with the function f_p). Take n_3=30=(2 3 5). The factors are:

```
k=0       1       1
k=1       3       2 3 5
k=2       3       6 10 15
k=3       1       30
```

The k range of k=0 is 1, the k range of k=1 is equal to 2, 3, and 5, the k range of k=2 is equal to 6, 10, and 15, and the k range of k=3 is equal to 30. (Strictly speaking, the highest and lowest values of k do not form a range as there is only one number).

1b: every square-free prime factorization has its corresponding binomial or combinatory 'bell pattern', which can be found in the corresponding row of Pascal's triangle. Uneven and

even prime factorizations have double and single peaks, respectively. The sigma Möbius over the factors of a square-free number is always 0.

1c: When the prime factors at hand are around the same size (their mutual ratios are around 1), a sawtooth pattern emerges that follows the corresponding row of Pascal's triangle exactly. For an even number of prime factors, the sawtooth is a mirror symmetry, for an uneven number of prime factors, it is a rotational symmetry.

1d: The factors of a primorial anchor number n completely cover both the x and y values of the discrete inverse proportionality of this number n: n=x·y (we can see the factors appear twice, once on the x positions, and once in the inverse direction on the y positions):

```
6 = (2 3) =>
                    (1 6); (2 3); (3 2); (6 1)
30 = (2 3 5) =>
                    (1 30); (2 15); (3 10); (5 6); (6 5); (10 3); (15 2); (30 1)
210 = (2 3 5 7) =>
                    (1 210); (2 105); (3 70); (5 42); (6 35); (7 30); (10 21); (14 15);
                    (15 14); (21 10); (30 7); (35 6); (42 5); (70 3); (105 2); (210 1)
```

2: Interleaving

2a: *Interleaving* occurs as soon as the ratios between prime factors, in terms of numerical values, sufficiently deviate from one another: the different k *ranges* of the discrete binomial bell pattern will then overlap. Naturally, the factors remain neatly positioned on the discrete inverse proportionality. As the ends of the k ranges are the most sensitive to interleaving (they form the points in the sawtooth patterns), we can see that the peaks of the binomial sawtooth pattern are the first to be switched (topped). 'The saw blade wears down'.

2b: Due to the binomial construction of factors (see 1), interleaving is a symmetric fact: there is a strict mirror symmetry in the centre of the sequence of factors of a primorial number, where the *centre* is the position for which half the factors are located to the left of it, and half to the right. This position is the square root of the primorial anchor number.

2c: The lower limit of a higher k range of a number with a square-free prime factorization can never be smaller than the lower limit of a lower k range. Reversely, the upper limit of a lower k range of number with a square-free prime factorization can never be larger than the upper limit of a higher k range.

2d: The sigma Möbius over the factors of a number with a square-free prime factorization therefore remains zero after interleaving, and the sigma Möbius pattern over the factors will also remain symmetrical after interleaving. For prime factorizations with an even number of prime factors, there is a regular mirror symmetry with a mirror line in the centre, whereas for prime factorizations with an uneven number of prime factors there is a 180-degree rotational symmetry, with the origin in the centre.

2e: For primorial numbers, interleaving causes characteristic wave patterns to emerge. It still holds that the sigma Möbius is equal to zero. That is because primorial numbers

represent an optimal distribution of factors over a discrete inverse proportionality. In this context, optimal refers to the combination of two conditions:

-1- there cannot be more than one stepping stone on the same position (which can be the case for quadratic prime factorizations; I eliminated doubles, but you could also say that this increases the probability of occurrence), and

-2- the distance between the stepping stones on the inverse proportionality is as short as possible.

3: Relation between Bernoulli experiments and the Mertens function

3a: Denjoy saw relationships between a Bernoulli experiment and the progression of the Mertens function.

3b: For a Bernoulli experiment, such as repeated coin tosses, it holds that the probability of heads is equal to the probability of tails, and subsequent tosses are in no way dependent on one another (or the other way around). The two conditions are therefore: the two values have an equal probability of occurrence and they are independent of each other.

3c: For a Bernoulli experiment, we know that '*with probability 1 the number of heads minus the number of tails grows less rapidly than* $N^{(1/2)+\varepsilon}$' (Edwards).

3d: If, for the integers along the number line, it holds true that a) the probability of an even and an uneven square-free prime factorization is asymptotically equal (the same odds), and b) previous occurrences of even or uneven prime factorizations have no influence on the occurrence of subsequent prime factorizations, the Mertens function would be equal to a Bernoulli experiment, and based on this equality it would hold true that $M(x) = O(x^{(½ + \varepsilon)})$. That would prove the Riemann hypothesis.

3e: The first condition of equal probability is met (see my previous proof for the third equivalent phrasing of the Riemann hypothesis). The second condition of independence, however, is *not*. The sawtooth patterns and the symmetric interleaving patterns indicate that there are in fact mutual dependencies between the occurrences of numbers with even and uneven square-free prime factorizations.

3f: The end of Denjoy? Not exactly. We know more about Bernoulli experiments. If we repeat a sequence of *n coin tosses* increasingly often, the average of these sequences will start to resemble the ratios of the corresponding row of Pascal's triangle increasingly well. For a repetition of n=4 tosses, for example, the ratio pattern 1 4 6 4 1 (the fourth row of Pascal's triangle) will be approximated more and more accurately on average, based on the following combinatory distribution:

```
k       m k k k       k m k m k m       k m m m       m
k       k m k k       k m m k m k       m k m m       m
k       k k m k       m k m k k m       m m k m       m
k       k k k m       m k k m m k       m m m k       m

1           4                 6                 4           1   (sum=16)
```

That is a matter of entropy, which rests on the assumption that the probability for heads and tails is equal, and that the tosses are mutually independent. Asymptotically, this ratio will be approximated increasingly well.

We can also interpret many sequences of four coin tosses as a single, longer sequence of tosses. That is merely a matter of interpretation; this does not change anything about the factual coin tosses. The only difference is that one long sequence has a random length, whereas a number of sequences of four coin tosses will always have to be a multiple of four. However, as the number of repetitions increases, this difference approaches zero.

The following two descriptions therefore must be asymptotically equal (see also viewpoint 1, mentioned previously):

> 1: A growing number of short sequences of a set number of coin tosses will approximate the binomial pattern of the corresponding row of Pascal increasingly well.

and:

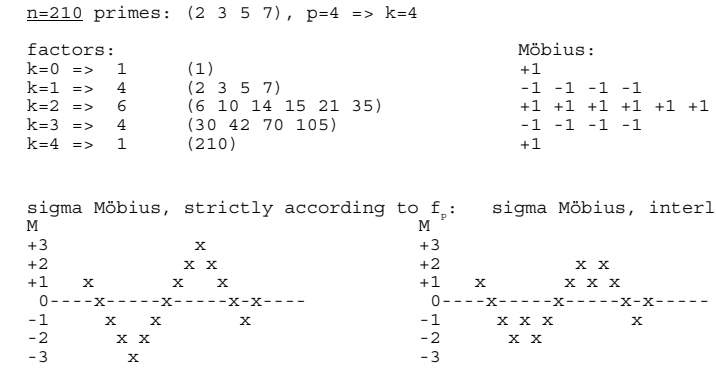
> 2: For an increasingly long sequence of coin tosses, it must hold that *'with probability 1 the number of heads minus the number of tails grows less rapidly than* $N^{(1/2)+\varepsilon}$' (Edwards).

3g: If these two descriptions are asymptotically equal, there exists a deeper relation between a) a Bernoulli experiment, and b) a sigma Möbius over the factors of a square-free number. Both (a and b) are then based on the ratios as presented by the binomial patterns of the corresponding row of Pascal's triangle.

3h: More specifically, a Bernoulli experiment featuring 16 sequences of 4 coin tosses, which realizes the exact heads and tails sequences for 1 4 6 4 1 (sum=16) presented above, will yield the exact same number of heads and tails, and result in a perfect binomial bell curve that adheres to the fourth row of Pascal's triangle. The same applies to 32 sequences of 5 coin tosses, because the fifth row of Pascal's triangle is 1 5 10 10 5 1 (together 32=2x16). And for 64 sequences of 6 coin tosses, the pattern 1 6 15 20 15 6 1 (together 64=2x32). Or, in the other direction: 8 sequences of 3 coin tosses, or 4 sequences of 2 tosses, or 2 'sequences' of a single toss.

3i: (Thus), so too will the factors of a square-free number with four different prime factors for k=1, k=2, k=3, and k=4 follow the exact same binomial pattern of 1 4 6 4 1. They too realize a perfect binomial bell curve that adheres to the fourth row of Pascal's triangle. In terms of the sigma Möbius, square-free anchor numbers realize a sawtooth without interleaving, and primorial numbers with interleaving display a wave pattern. After interleaving, the

numbers neatly follow the x positions of a perfect discrete inverse proportionality (or the y position, but in the reverse order): (1 210)(2 105)(3 70)(5 42)(7 30)(6 35)(10 21)(14 15)(15 14)(21 10)(35 6)(30 7)(42 5)(70 3)(105 2)(210 1).



In the bottom left, you can see sigma Möbius: a Mertens-like function, strictly over the factors of the square-free p=4 number 210, for which the progressing pattern of the k values is accurately followed. If we follow the number line instead, the interleaved sigma Möbius results (for primorial numbers a neat wave pattern, in the bottom right).

3j: The consequence of this relationship between a Bernoulli experiment and the factors of a square-free number, is that for the factors of a square-free number it also holds that: Sigma Möbius < $x^{(½ + ε)}$.

4: Condensation

4a: The only thing in the way of a proof of the Riemann hypothesis is the fact that generally, there are quadratic numbers between the factors of a square-free number (category 1 numbers) that are not a factor (category 3). Category 3 numbers are therefore proof disruptors.[474] (We already saw this when categorizing the numbers up to 30: the Mertens function results in -3, and because the sigma Möbius over the factors of a square-free number is 0, the result of -3 is completely caused by the category 3 numbers).

4b: Viewpoint 3 above illustrated that, for progressing primorial steps, there are no category 3 numbers at all in a steadily growing segment from 1 upwards. They are transformed into category 1. To put it more precisely: the segment *from* 1 *up to* the prime number that shapes the next primorial step minus 1, *is free of category 3*.

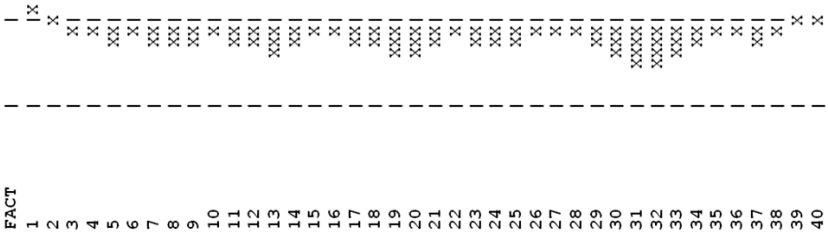
[474] Category 1 numbers x (or y) of an anchor number n are located on the inverse proportionality x y=n. This means that these numbers are scale invariant. If you multiply x (or y) of a position (x, y) with a subsequent prime number z, the number (x, z, y) will also be located on the inverse proportionality (x z) y=n2. This does not apply to category 3 numbers, and that is why they are proof disruptors.

4c: The crucial consequence of this is that the first segment of the sigma Möbius over the factors of a primorial number, exactly up to the prime number that shapes the next primorial step minus 1, is completely identical to the Mertens function up to this number.

4d: And if we take a subsequent primorial step, this fully equal segment increases somewhat in size (this growth more or less follows an inverse logarithmic path, in accordance with the *Prime Number Theorem*, because the prime factorization of the next primorial is based on the addition of the next prime number along the number line).

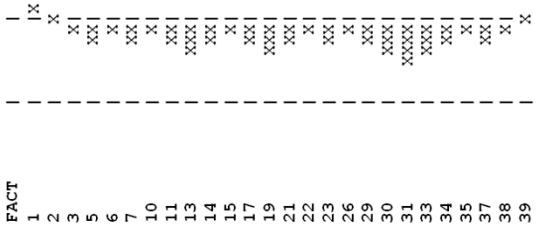
4e: This recursively proves that the Mertens function, up to an arbitrary x, is exactly equal to the sigma Möbius up to this x over the factors of the primorial number based on the prime factors up to this x. This allows all prime numbers in a row, from the bottom up, to be 'caught'. The category 3 numbers therefore dissipate, for the exact same reason that prime numbers become less frequent as you move up along the number line. For progressing primorial numbers, the Mertens function and the Sigma Möbius function over the factors of a primorial number become exactly equal to one another from 1 upwards for an increasingly large section. The Riemann hypothesis therefore must be true.

4f: Below you will find – for the visual thinkers among us – figures that illustrate this. This is the Mertens function for all numbers up to 40:



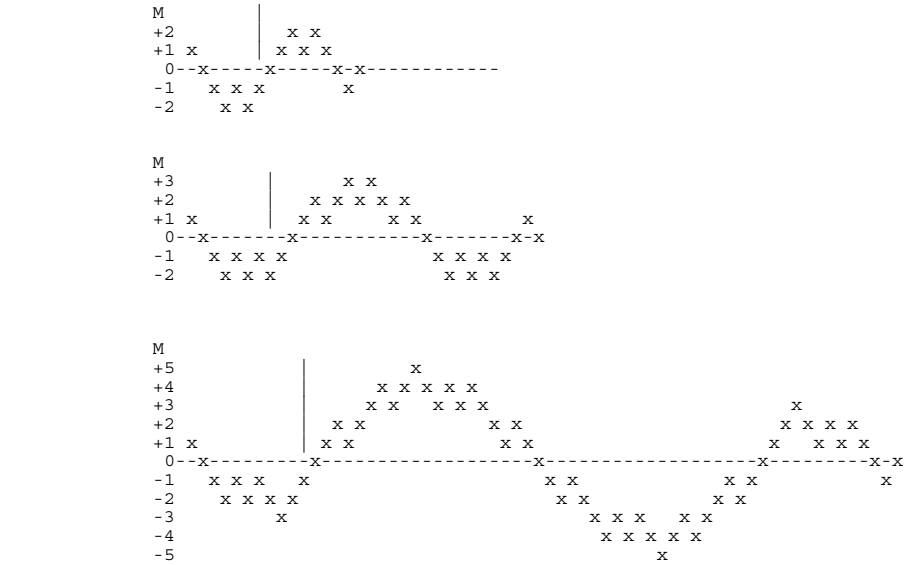
Mertens function up to 40, all numbers (square-free and quadratic prime factorizations).

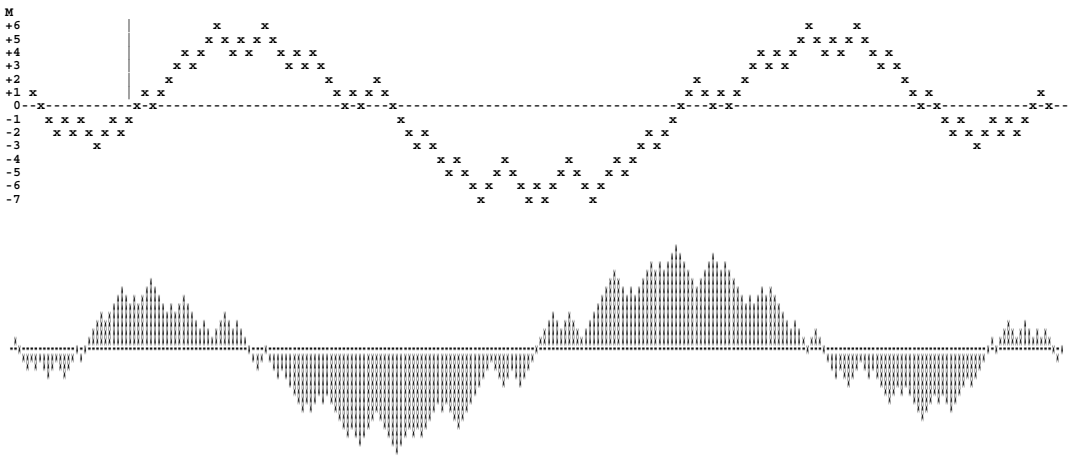
The quadratic prime factorizations repeat the previous Mertens value. Möbius is zero (see 8 and 9, for example), which adds nothing, so I eliminate all quadratic prime factorizations. The result is the Mertens function for the numbers with a square-free prime factorization:



The Mertens function up to 40, only square-free prime factorizations (the quadratic prime factorizations, and thus the Möbius zeros that do not change the Mertens function, have been removed).

The sigma Möbius (the sum of the Möbius values) over the *factors* of progressing primorial anchor numbers, *with* interleaving, is depicted below (The last ones have been presented previously, I put them underneath each other here). These are the primorial products 210=(2 3 5 7) with p=4 and thus 2^4 factors, 2310=(2 3 5 7 11) with p=5 and 2^5 factors, 300300=(2 3 5 7 11 13) with p=6 and 2^6 factors, 510510=(2 3 5 7 11 13 17) with p=7 and 2^7 factors, and 9699690=(2 3 5 7 11 13 17 19) with p=8 and 2^8 factors. Now we can compare the first section of the wave patterns with the Mertens function above:





An accurate comparison of the first segment of the wave patterns presented above, and the square-free Mertens function (previous page), indicates that a first, growing section (up to the vertical line) is identical to the Mertens function. This is the section that does not contain any category 3 numbers (see also the graphs with the shares of category 1, 2, and 3 a few pages ago). This is not an empirical fact, but purely mathematical.

5: The proof in short. I will summarize the main line of thought of this second proposal for a proof of the Riemann hypothesis, aimed at the first equivalent phrasing of the Riemann hypothesis. This phrasing is:

> If $M(x) = O(x^{(½ + \varepsilon)})$ is true with probability one, the Riemann hypothesis is true with probability one (Edwards, Chapter 12.1).

The main principle is as follows:

5a: Strictly for the *factors* of a square-free anchor number n, without interleaving[475], and based on the discussion under viewpoint 1, it should hold that:

$$\text{sigma Möbius without interleaving} = O(x^{1/2})$$

That is because the sigma Möbius taken strictly over the factors of a square-free number and without interleaving follows the sawtooth pattern of the corresponding row of Pascal's triangle exactly and perfectly. And this is precisely the ratio pattern to which a repeated sequence of tosses will converge.

Strictly over the *factors* of a ***primorial*** anchor number, *with* interleaving, and based on the discussion under viewpoint 1, I suspect that the following must hold true as well:

$$\text{sigma Möbius with interleaving} < O(x^{1/2})$$

The peaks of the sawtooth are trimmed if interleaving occurs.

5b: In between the factors of a ***primorial*** anchor number, there are category 2 numbers (which do not influence the sigma Möbius) and category 3 numbers (they disrupt the sigma Möbius through interleaving $< O(x^{1/2})$).

5c: As there are no category 3 numbers in the first segment – *from* 1 (inclusive) *up to* the new prime number of the next primorial step -1 – when calculating the sigma Möbius over the factors of a primorial number, the function of the sigma Möbius over this segment is exactly equal to the Mertens function over this segment. This holds true recursively.

[475] For example, interleaving will not occur when the prime numbers that compose the prime factorization are relatively close together. But you can also simply ignore or suppress interleaving. All that matters is for the sawtooth pattern to be followed perfectly, without any deviations whatsoever.

That is why it should also hold true that $M(x) = O(x^{(½ + \varepsilon)})$ is true with probability 1, and therefore the Riemann hypothesis is true with a probability of 1.

14: Conclusion of the perspectivist analysis

To clarify: I, as a non-mathematician, think that the Riemann hypothesis is true, and I have provided my arguments above. With this, I will leave this patch of thin Riemann and Mertens ice, while keeping the quotes of Schrödinger and John Stuart Mill, all the way at the start of this book, in my mind.

For the alphas and gammas among you, the above must have been a truly incomprehensible part of this book (that is why you are probably not reading these lines). I presented a truckload of aspects of the perspectivist analysis and I did not shy away from tackling deep and fundamental problems.

The reason for my expedition on this – for me – very thin ice, is that I, armed with a recursive perspectivist point of view, standing on the broad shoulders of Pascal and Newton, with a clear societal improvement goal in my sights, saw hints of perspectivist patterns.

I think it is interesting how an exploration of perspectivist configurations has led to a journey into the deep bowels of mathematical number theory, resulting in intriguing relationships with wave patterns that strongly resemble quantum theoretical phenomena and experiments. It is the discrete inverse proportionality, the quantum theoretical limitation up to $x \cdot y = n$, with x and $y \in N$ (in two, and more, dimensions) that allows fascinating wave patterns to emerge via Pascal's triangle and the binomial bell curve.

Those wave patterns instantly reminded me of the famous two-slit experiment, first executed by the Englishman Thomas Young, in 1805, as an interference experiment, aimed at gaining a better understanding of the wave–particle behaviour of light. In the 1960s-1990s, quantum theoretical variations of this experiment were performed with electrons (particles), first by the German Claus Jönsson, and later by the Italian Pier Giorgio Merli, and even later by Akira Tonomura. You can easily look this up on the internet, as these are classical experiments by now. Even for people with a comprehensive background in quantum theoretical phenomena, the results of these experiments, specifically the differences between results with and without slit detections, remain fascinating.

The most plausible quantum theoretical interpretation of wave patterns is the one involving a probability function (the square of the wave function is a probability in quantum mechanics). I already gave some examples of probabilities (orbitals) regarding partying sons in Zeist. In mathematical terms, a quantum theoretical probability is generally represented by the motion of a wave. The wave function that describes this wave motion does not describe the position of a particle, but it indicates the probability of encountering the particle. As this probability function changes in times, and it assumes different values for different positions in space, one can interpret the changing of the

probability function as a probability wave moving through space. That is exactly how a primorial number of n perspectives can assume a specific number of configurations, which depict two-dimensional wave patterns. An experience can then be described with all possible configurations for this specific n, and only a targeted observation will clarify which configuration is most frequent (the wave pattern collapses, according to the Copenhagen interpretation of quantum mechanics).

The concept of perspectivist configurations as experiences and their quantum theoretical interpretations require further analyzing and studying. But I believe that the underlying reason for the rise of wave patterns for primorial numbers of perspectives n is rooted in the urge of a human consciousness to create value as effectively and as efficiently as possible. In short, this means as many dimensions as possible (and therefore prime numbers that are as small as possible) and as few quadratic prime factorizations as possible. The factors of primorial products correspond the best to this ideal image. They utilize all possible square-free positions on the discrete inverse proportionality of a primorial number up to a subsequent prime number, and they regularly distribute the black blocks over the discrete inverse proportionality. You can recursively untangle them even further, and they will end up on multi-dimensional isosurfaces. From this point of view, prime numbers (their specific position) are the consequence of empirical optimization, of the urge of a perspectivist consciousness to generate value as effectively and as efficiently as possible, to create as much value for as little effort as possible.

Only prime numbers higher than the highest prime factor of a primorial anchor number, and products containing these prime numbers, can disrupt the progression of the Mertens function up to this anchor number, relative to the characteristic wave patterns. The wave pattern 'clots' (it closes off, eventually condensing) from left to right for increasing primorial numbers. For an increasingly large section of the natural number line from 1, there is no place for strange numbers to force their way in. The number of positions that allow this increases on the right, which explains why oscillations of the Mertens function to the left are damped increasingly well, while they swing wildly further to the right. I sometimes compare this to *Indiana Jones'* whip: near the hand, the whip is sturdy, but the end of the whip flies all over the place. The 'clotting' of the left part (condensation) indicates that the structure of the corresponding section to the right is fully known *a priori* as well due to the symmetries that are present, even though this pattern to the right is dominated by the brutal disruption of square-free numbers that are not a factor of a primorial anchor number n (the category 3 numbers).

As a reflective pragmatist, I will probably have cut many mathematical corners, utilized unusual argumentations and made mistakes in my proposals for proofs of the Riemann hypothesis. I have no other excuse for this than that of John Stuart Mill (*On Liberty*, 1859), which already received a prominent place at the start of this book:

> *'Truth gains more even by the errors of one who, with due study and preparation, thinks for himself, than by the true opinions of those who only hold them because they do not suffer themselves to think.'*

I believe that the relevance of the Riemann hypothesis and the notion of harmonic perspectivist configurations go far beyond the mathematical domain. If the Riemann hypothesis is true, *the path of humanity* will also converge under the perspectivist assumptions of this book. Even if it only were roughly true, it offers support to the path. That is an especially hopeful message. I myself believe that I may have proven the Riemann hypothesis to be true. At the least, I have substantiated my arguments in detail: I believe it is true. A joke among mathematicians states that it is easier to prove the Riemann hypothesis than it is to find someone who understands it. I could see the irony in there. Even so, I will gladly leave the judgement regarding the value of the relationships that I laid bare between recursive perspectivism and the Riemann hypothesis to mathematical and physical experts, because I am definitely not one of them.

This brings me to the end of my number theoretical explorations. I think that they properly illustrate the many tireless relationships between societal development, perspectivist configurations, quantum theory, and number theory, including all the mistakes that I am bound to have made. That helps us as a society. It is therefore useful for professional quantum theorists and mathematicians to take a good look at this as well.

8.5 Summarizing explanation of pattern laws

Why are random numerical figures from random newspapers, or heights of mountains, related to each other? Why do the words in a book or census numbers of cities in countries follow strong inversely proportional rank–frequency patterns, across all books and countries? These are manifestations of Benford's (newspapers and mountains) and Zipf's (words and census figures) law. These are mysterious laws that detail the *what*. The perspectivist explanation, the *why*, is not simple. That is why I would like to summarize this perspectivist explanation again in this chapter.

This definitely does not represent the final words on pattern laws in perspective. Perspectives sometimes resemble pieces of soap in a full bathtub. Recursive perspectivism does, however, open some new windows overlooking our societal development, presenting an intriguing landscape, a landscape we will have to explore further, a landscape that promises a more thorough understanding of pattern laws.

People wonder how it is possible that Benford's law and Zipf's law occur so clearly, so broadly, and in completely unrelated complex domains in the objective, material world around us. At first sight, that question seems completely fair, but at a second glance, it may have been formulated awkwardly.

Why is the formulation awkward? Because it is based on incorrect premises. The reason for this is that these pattern laws do not occur in an *a priori* (priorly) existing objective world.

Recursive perspectivism states that we give rise to our own integral experiential world with our (in our) perspectivist consciousness. That integral experiential world contains both our objective, material experiential world (our 'surroundings') and our mental experiential world (our feelings and thoughts), and everything in between.[476] We create (sculpt, search, configure, construct …) our surroundings *ourselves*, before we experience it, I say with Immanuel Kant in my mind. And we experience it before we create it, there is a strong interaction at play, I say with developmental psychologist Piaget in my mind.

For example, take a book, which is written by (in) a consciousness, that much is clear. But similarly, we also give rise to our awareness and understanding of mountain tops: through our perspectivist consciousness. The foundation of the development of this awareness and understanding is rooted in our early childhood, a phase that we as adults do not remember that well (perhaps that is why).

Dimensions

A perspectivist consciousness is capable of experiencing in perspectives, and thereby creates a certain perspectivist order. That order is based on perspectivist dimensions. Take objectivity and subjectivity. Take time and space. Or take pluriformity, similarity, and unity.

A perspectivist dimension refers strictly to the positive natural number line. It starts with 1, then goes up via 2, 3, 4, etc. Not to infinity, because perspective is always limited. And not via continuous intermediate steps, because perspectives are quanta; only whole steps are possible.

Every (societal) consciousness has a certain perspectivist capacity. You can exchange worse perspectives for better ones. By doing so, you are changing the content without exceeding capacity. As dualists, we can understand that: the size of the utilized perspectivist capacity is roughly proportional to the number of individuals that participate.

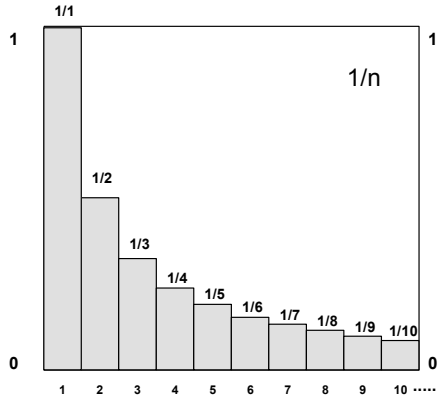
Dimensions have a property; it is in their nature to sort perspectives. A consciousness therefore maintains a *principle of purposefulness*: it searches for value, which takes effort. Value can assume all kinds of forms: it represents that what is strived for by a perspectivist actor. From your children's happiness, to financial wealth, to the ability to quickly assess possibly dangerous situations (in which spatiality plays a crucial role). Value is thus an intrinsic relativistic concept: it ranges from practically objective (everyone always thinks this) to practically subjective (one actor thinks this in a specific situation).

The harmonic row

A consciousness strives for as much *value* as possible for the least amount of *effort*, that is what makes it purposeful. It does so by sorting perspectivist dimensions, by arranging them according to harmonic rows. In a harmonic row, the second perspective has half the

[476] And everything in between, recursive perspectivism is spectral, after all.

value of the first perspective, the third perspective has one-third of the value of the first, etc.[477]



A harmonic value progression (vertical) along a perspectivist dimension (horizontal). The value of n corresponds to the surface area under the graph up to n.

Multi-dimensional balance: balance systems

The reason for this harmonic relation is as follows. Sorting according to the harmonic row is in maximum accordance with a perspectivist consciousness' strive for purposefulness: if there are multiple dimensions, the consciousness can simply find the balance, the diagonal, and follow it upwards, because that is generally where the most value is provided for the least amount of effort.

Examples of such *balance systems* are given by the object–subject surface, and the three-dimensional perspectivist space created by pluriformity, similarity, and unity. Our three-dimensional spatial experience, too, is probably nothing more than a value-generating perspectivist balance system.[478]

The crucial question is therefore not *how* dimensions in a consciousness can display a harmonic progression of value. The reverse is true:

A consciousness is always looking for dimensions that possess the best harmonic properties.

It creates, discards, and reconfigures perspectives on its search for these dimensions. A consciousness gives rise to harmonic value arrangements, that is what it is supposed to do.

[477] You can also regard this in terms of effort: to generate the same value as the first perspective, you will have to exert yourself twice as hard the second time, three times as hard the third time, etc.

[478] I believe that the fact that both spatiality and the perspectivist pure space – the most breath taking dimensionalities we know – have *three* dimensions, is because after three steps along a single dimension, a crossing onto a next dimension is opportune. As the addition of dimensions also introduces perspectives, we follow the diagonals in existing, less dimensional systems. They emerge automatically!

If they are not available, then this consciousness has not done right by its carrier: chaos will befall him.

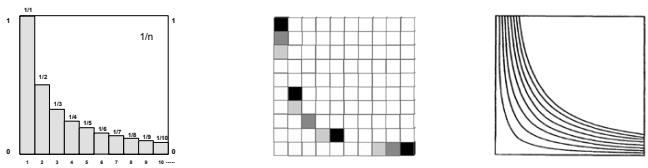
Perspectives thus have to earn their place in perspectivist spaces, on positions in dimensions. It all revolves around value and effort. Perspectives that are clearly underperforming are nominated for elimination, and others take their place. Or they are partially absorbed into a new perspective. Perspectives that overperform can be detailed further. It is a wild, adaptive game in perspective, also known as life.

The relationship between improvement potential and experiential value

I will represent the total harmonic value at a certain position in a dimension in two different ways. *Prior to* utilizing (realizing) this perspective, I will speak of improvement potential. *After* utilization (realization) of this perspective, I will speak of experiential value instead. For a proper understanding: these are *average* potentials and values one can expect, fully in accordance with the statistical and probabilistic nature of recursive perspectivism. It is a quantum theory. In the long term, these two values will generally coincide nicely.

From harmonic row to inverse proportionality

The harmonic row can easily be converted into a quantized inverse proportionality between the number of perspectives and value: it suffices to divide the *vertical* axis into as many equal segments as there are perspectives along the *horizontal* axis (see the left and middle figure below). For sufficiently high values of n along a perspectivist dimension, we can approximate the harmonic row increasingly well with a continuous inverse proportionality (think of the block stacker).



Conversion from harmonic row (left) via quantized inverse proportionality (middle) to – in practical terms – continuous inverse proportionality (for high n, right).

This might be why physics and chemistry are full of continuous inverse proportionalities: V=I·R (Ohm), PV = nRT (Boyle and Gay-Lussac; note that this is quantized via n), F=m·a (Newton), Coulomb's law, etc.

Explanation of Benford's pattern law

Benford's law presents a certain percentage ratio relative to the frequency of the number 1, 2, 3, …, 9 as a first digit in uncorrelated objective data (such as phone books and mountain heights). In a sense, it forces one of the two dimensions of an inverse proportionality into 10 segments. I call this the Benford dimension. It counts *units*, which is why it resembles the similarity axis of the perspectivist space.

Every other dimension that forms a balance system with this Benford dimension, will therefore display Benford's pattern. There are plenty of such balance systems, because this is what a consciousness strives for. An interesting question then arises: what *types* of dimensions will form a balance system with the Benford dimension?

Typical dimensions that display Benford's pattern are the surface areas of lakes, the heights of mountains, and numbers from newspapers and magazines. Objectively observable things, the dualist would say. If you apply yourself, you can gather quite a collection. That is inherent to Benford's pattern: there are broad collections of objective data, which you will have to collect randomly. The elements of just one of these dimensions (individual mountains, or rivers, or processes based on numbers in newspapers) are enormously complex phenomena in their history, and their influence on one another is limited. What they do share is expressed in the Benford dimension.

The elements resemble the dimension *pluriformity* of the perspectivist space, and if that is correct, they indeed form a balance system with the Benford dimension (which covers *uniformity*). The relationship, when approximated, is inversely proportional, resulting in the occurrence of Benford's pattern.

Explanation of Zipf's pattern law

Zipf saw that the rank and frequency of words in a book, or rank and number of citizens in cities in a country, are practically *inversely proportional.* Rank is a natural number line (rank moves upwards from 1 in whole steps of 1), so this indicates that the other dimension (for example the frequency of a word in a book, or population number in a city in a country) assumes *specific integer values*. For example, Zipf found that in the book Ulysses (James Joyce, 1922), the word 'I' has a rank of 10 and frequency of 2653. The word 'say' has rank 100 and frequency 265. Rank and frequency are virtually *inversely proportional*, with a bizarre accuracy: 10 x 2653 ~ 26500, and 100 x 265 = 26500. At first glance, this makes Zipf's pattern even more miraculous than Benford's. Why would words in a book or in a writer's head do this?

By now, we can better understand why, for example, the population number of cities 'searches' for very specific positions, and why cities in a country have certain mutual ratios. Or why words in a book display very specific frequency patterns. That has to do with the quantum theoretical availability of specific positions, perspectivist configurations with a high improvement potential (position near a top) and preferably a suitable reachability (an accessible path with intermediate steps).

The improvement potential is calculated with the multi-dimensional harmonic series. There is a clear preference for prime factorizations with much lower prime factors, which causes very specific perspectivist configurations to be propagated, while other configurations are entirely undesirable. Those configurations can be expressed, for example, in population numbers, or frequencies of words, or numbers of animal and plant species.

Why does every city not have that ideal population number? Why is Zipf's pattern spread out? Three recursive perspectivist reasons can be given for this.

First of all, some cities (and words) are not independent of one another. There are capital cities, regional cities, and small cities, and they share functionalities (value representing multi-actor systems) such as a government, a provincial board, or a regional function. Similarly, a book contains central concepts, important concepts, and supportive concepts. There are also differences in societal development. This allows cities and words to be configured differently, and that is why they search for the best positions on entirely different sections of the perspectivist spectrum. In a continuous world, that would lead to global patterns, but in the recursive perspectivist world, there are very specific peaks in improvement potential, which display mutual distances that correspond to Zipf patterns. Cities, concepts, anything crawls towards that, ever improving, and that is why Zipf's pattern occurs.

Secondly, not only the lowest symmetric factorizations are appealing (with only twos), but a mix of different low factors forms nice peaks in the improvement potential as well. They are slightly worse in terms of improvement potential (but not by much, especially when n becomes very large). This replacement of twos by threes and fours and fives, etc., ensures that Zipf patterns keep appearing, because these factorizations have characteristic distances between them. Humans, as improvers, as hill climbers, will end up on those mountain peaks, and therefore on Zipf patterns.

Thirdly, it is not just the height of a peak that makes it appealing, it is also its reachability. The improvement potential of an asymmetric mix of different low factors in a perspectivist configuration – especially per perspective – does not go down by much, even though the number of factors can be much higher than for highly symmetric low factorizations. You can imagine these factors as stepping stones, steps of some type of stairs to a high peak. An untouchably high mountain might be high, but you need to be able to get there. A high number of factors, well spread, is therefore also an asset. Primorial numbers meet these requirements best.

For patterns of Zipf, it holds that those configurations of perspectives that are closest to the diagonal, and are as low as possible, will possess the highest improvement potential. After realization, they will also result in the highest experiential value. It should not become too symmetric, because then the factorization goes down and the reachability suffers for it.[479] The most interesting phenomena gather around the diagonal.

Conclusion Benford and Zipf

In short, a perspectivist consciousness is at the helm of a fascinating recursive perspectivist game of experience. There are two sides to that game.

[479] Perhaps this is why sequences of dice rolls and coin tosses do not strive for a perfect balance, but instead stay at a relatively small but approximatable distance. That distance is √n on average for n coin tosses.

On one side, there exists an *a priori* structural landscape of perspectivist configurations. Parmenides might call it unchangeable, and Plato might only refer to it in numerical values. That landscape is characterized by axes, balance systems, peaks and valleys, diagonal and peripheral positions, symmetric and asymmetric factorizations. On the other side, there exist content perspectives that we can consciously experience as individual entities. This brings content to the structural landscape.

It does not matter to that landscape which perspectives are placed in there in terms of *content*, that is the other side. But as soon as you place perspectives there, they will adjust and conform to the inherent possibilities offered by this landscape. Improvement potentials and factors are thus determined by this landscape.

This book highlights and lifts the veil off of this perspectivist structural landscape. Zipf's patterns conform to this landscape, and thus display the characteristic Zipf pattern. But this actually applies to all pattern laws: no matter how you look at it, it all revolves around consciousness conforming to *a priori* determined perspectivist structures, configurations, which are needed by this consciousness to function effectively. Zipf's law shows quantum theoretical perspectivist phenomena in complex coherent and cooperating perspectivist systems. Because that is what a book and a country essentially are.

That also applies to Benford's pattern. A perspectivist consciousness uses harmonic purposefulness. That requires multi-dimensional systems with harmonic arrangements: balance systems in perspective. Benford's law shows that a perspectivist consciousness subconsciously searches for these dimensions with harmonic arrangements. They express themselves as inverse proportionalities. Object–subject, pluriformity–similarity–unity, these are large examples. Phone numbers, digits in newspapers, are smaller examples. Benford's law shines a light on them.

Recursive perspectivism is not a simple methodological framework. For example, it does away with the idea of an *a priori* objective material reality (physicalism), or an *a priori* subjective mental world (mentalism). It interprets these as approachable, but eventually unreachable limit cases of a spectral perspectivist societal experiential world. But it is quite a feat for recursive perspectivism to lift the veil off of the mysterious and barely understood pattern laws to such a degree. The key is located within ourselves as conscious actors: we create these patterns with our (as a, from a) perspectivist consciousness.

I therefore believe that the occurrence of pattern laws like those of Benford and Zipf form an important foundation for further research and use of recursive perspectivism as an integral philosophical and pragmatic societal image.

8.6 Configurations and improvement potentials.

8.6.1 Primes in the dark

Recursive perspectivism offers new insights to further investigate pattern laws. The path of humanity is a perspectivist pattern law as well. It is the big brother of Zipf's law and Benford's law. I even suspect that it is the largest possible pattern law, because it involves the most ambitious and largest event that we can experience as humans.

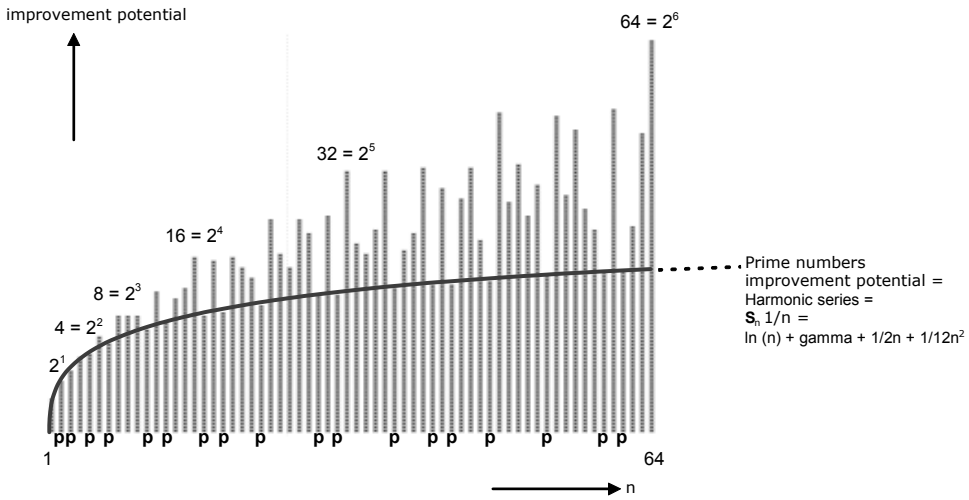
In this chapter, I will further investigate the relationship between perspectivist configurations, improvement potential, and experiential value. That is important, because this allows us to search and follow the path of humanity better, more aware, and more professional in the future. Societies of a higher quality then await us. The prime numbers play a crucial role in this.

The lower limit in improvement potential
In statistical terms, the lowest improvement potentials on average per perspective are found for strict harmonic progressions:

Improvement potential (n) = $\mathbf{\Sigma}_n 1/n$ (the harmonic series)

(with n = 1, 2, 3, 4, 5, …)

This progression has to hold for *prime numbers* n=2 3 5 7 11…. The dimensionality, in this case, remains limited to one axis (positions based on more dimensions are not available, because a prime number cannot be divided by other factors, and the balance is minimal. For all other numbers, this is one of the *possible* configurations (the one with the lowest improvement potential). The resulting graph of improvement potentials (the harmonic series, the points on the *bottom* black curve) resembles a natural logarithmic progression:



For n perspectives where n= prime number, the improvement potential follows from the harmonic series.

The Swiss mathematician Euler (1707-1783) already researched the relationship between the harmonic series and the natural logarithm (I mentioned this previously). He found the following approximation formula for the harmonic series, which applies increasingly well as n grows larger, and which indeed contains a natural logarithmic element.

$$\mathbf{\Sigma}_n\, 1/n = 1/1 + 1/2 + 1/3 + \ldots + 1/n \approx \ln(n) + \gamma + 1/(2n) + 1/(12n^2)$$

where γ, (gamma), is the Euler–Mascheroni constant:

$$\gamma = \mathbf{\Sigma}_{n=>\infty}\, 1/n - \ln(n) = 0.5772156\ldots \text{ for } n => \infty.$$

For $n => \infty$, $1/2n$ and $1/12n^2$ become increasingly small.

Based on the perspectivist structural landscape (and therefore improvement potential and experiential value), it is not the natural logarithm, but the harmonic series, consisting of the sum of rational numbers, that is discretely founded on perspective. The natural logarithm describes a continuous approach, a guideline.

The upper limit of improvement potential

The lowest improvement potentials can be found at prime numbers. The *highest* improvement potentials, on average per perspective and in statistical terms, are found for the symmetric factorizations that solely consist of twos. These numbers can be written as 2^1, 2^2, 2^3, 2^4, 2^5, 2^6, … and all correspond to n= 2, 4, 8, 16, 32, 64, … . In this case, the dimensionality (the number of axes) is the highest, and the factors used are the lowest (they are all two). The configurational degrees of freedom are now optimal; you can create as many structurally different perspectivist networks as possible, from fully linear (one stack:

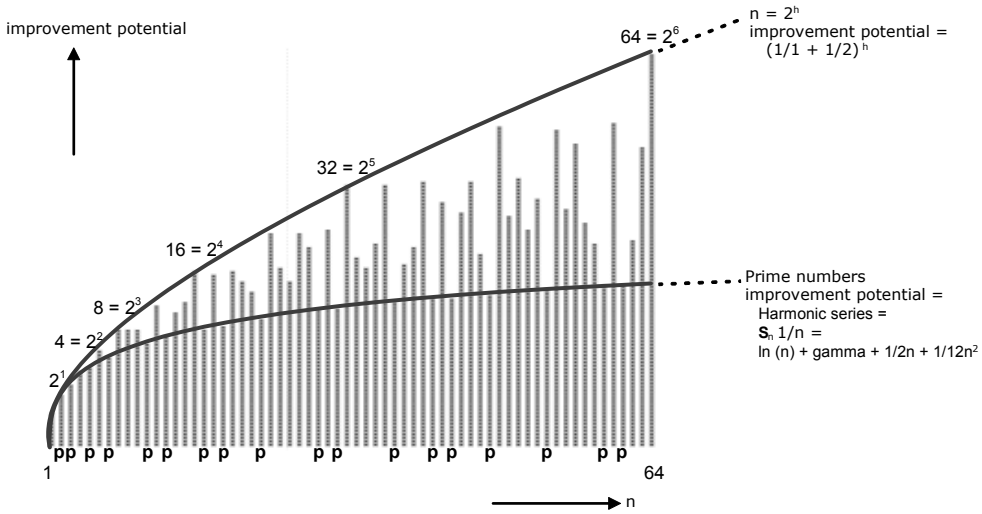
the pseudoprime configurations[480]), to strongly multi-dimensional (the highest powers of 2).

In the multi-dimensional case, the improvement potential is also calculated based on the harmonic series, but now in *more* dimensions. Whenever dimensions are switched around, the heading changes and the harmonic series starts over from the result of the previous dimension, which offers a clear advantage in terms of improvement potential relative to continuing with a one-dimensional harmonic series:

$n = 2^h$ => improvement potential = $(1/1 + 1/2)^h$

(with n = 2, 4, 8, 16, 32, 64, ...)

This relation is represented by the upper black curve in the graph on the following page.



The bandwidth in perspectivist improvement potential is well determined and is located between both curves.

The two black curves in the graph above set the upper and lower limit for an essentially discreet phenomenon. In statistical terms, you can assume that in the long term (in a *continuous* interpretation), for large values of perspectives, an improvement potential for a certain number of perspectives n will generally be *above* the bottom curve and *below* the highest curve.

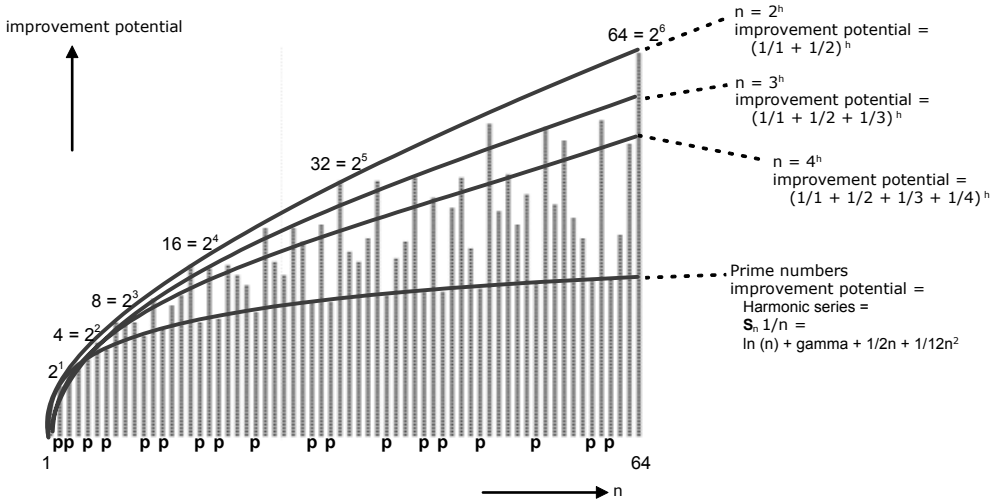
[480] The pseudoprime configuration of the number 12 is (12), and not (2 6) or (3 4). The prime number 11 only has a configuration (11). That is why I refer to the configuration (12) as a pseudoprime (resembling a prime configuration).

Other symmetrical factorizations besides two

There exist other symmetrical curves, formed by prime numbers, which are located *under* the upper symmetrical curve of 2 and *above* the lower limit. For increasingly high symmetric factorizations of 2 (take 3, 4, …, 100, …), after applying the harmonic series in more than one dimension, it holds that:

$n = 3^h$ => improvement potential = $(1/1 + 1/2 + 1/3)^h$
(with n = 3, 9, 27, 81, 32, 243, …)
$n = 4^h$ => improvement potential = $(1/1 + 1/2 + 1/3 + 1/4)^h$
(with n = 4, 16, 64, 256, 1024, 4096, …)
…
$n = 100^h$ => improvement potential = $(1/1 + 1/2 + 1/3 + ¼ + … + 1/100)^h$
(with n = 100, 10,000, 1,000,000, 100,000,000, $1{\cdot}10^{10}$, $1{\cdot}10^{12}$, …)
Etc.

These curves crawl closer to the lowest curve as the symmetric factor increases (3, 4, …, 100, …), but they also cover fewer points on the natural number line **N.**



Intermediate symmetrical curves: 3h, 4h, etc. (> 4h is not drawn)

Improvement potential is quantized

For prime numbers, there are no other, and thus no higher improvement potentials available than those on the lowest (harmonic) level of the lower limit. In statistical terms, the improvement potentials of prime numbers (take 3, 5, or 11) are therefore positioned exactly on the rationally determined points of the one-dimensional harmonic series for these values of n (or: exactly on the lower limit).

For non-prime numbers, the one-dimensional harmonic improvement potential is merely one of the possible choices of improvement potentials, and also the least interesting,

namely the lowest. There exists at least one better factorization, the prime factorization, which assumes a more symmetrical position in a multi-dimensional space. Only when this is perfectly symmetrical (so $n=f^h$), does the improvement potential find itself on one of the symmetric curves, of which a couple are depicted in the figure above. That is why not all vertical lines from the graph above end exactly on a black line. In more precise terms, all non-symmetric factorizations end up between the black symmetry lines (and naturally the harmonic lower limit), and not on them.

For example, take 9, which factorizes to 3·3 (in two dimensions), perfectly symmetrical, so the improvement potential resides on the line (3^h) only one away from the upper black line. It is at 3^2, to be exact. For 9, there are two available improvement potentials: one on the bottom black line (the 'pseudo prime' factorization or configuration on the harmonic line) and two away from the upper black line (the prime symmetry of 3^h).

Or take 12. Possible configurations are 12 (in one dimension, the 'pseudo prime' factorization), 3·4 (in two dimensions), and 3·2·2 (the prime factorization, in three dimensions, not perfectly symmetrical, so lower than the upper black line and 6·2.

With the same number of perspectives (n is set), in many cases, different positions in terms of configurations can be filled in the multi-dimensional space. They differ in improvement potential, but they are well determined, because the possible configurations are well determined. There is always only one current configuration (compare this to the position of an electron in one energy orbit of an atom). Here we again find differences between continuous and quantum theoretical interpretations.

Only for prime numbers is there only one, low, available improvement potential. The curve 2^h represents the highest improvement potential, compared to nearby numbers of perspective n.

Recursive symmetry
For symmetric positions that have not yet been factorized up to a prime level, in specific cases, symmetrical positions with a prime factorization, and therefore an even higher improvement potential, become available. The improvement potential of the shortest factorization is lower, after all. See the following examples with prime factor 2 (they are generalized, so you can enter random natural numbers for h>1):

$2^{2h} <=> 2^{(h+h)} <=> (2\cdot2)^h <=> 4^h$
$2^{3h} <=> 2^{(h+h+h)} <=> (2\cdot2\cdot2)^h <=> 8^h$
$2^{4h} <=> 2^{(h+h+h+h)} <=> (2\cdot2\cdot2\cdot2)^h <=> 16^h$
Etc. Examples of the differences in improvement potential (with f=2 and h=2) are:

Base n=16:
$2^4 = (2\cdot2\cdot2\cdot2)$ => improvement potential = $(1/1 + 1/2)^4 = 5.063$
$4^2 = (4\cdot4)$ => improvement potential = $(1/1 + 1/2 + 1/3 + 1/4)^2 = 4.340$
Base n=64:

$2^6 = (2{\cdot}2{\cdot}2{\cdot}2{\cdot}2{\cdot}2) \Rightarrow$ improvement potential $= (1/1 + 1/2)^6 = 11.391$
$4^3 = (4{\cdot}4{\cdot}4) \Rightarrow$ improvement potential $= (1/1 + 1/2 + 1/3 + 1/4)^3 = 9.042$

Symmetry and asymmetry
In accordance with the spectral (non-dualist) nature of recursive perspectivism, there exist all sorts of gradations between full symmetry and full asymmetry.

A full symmetry consists of a multiplication of only one number (for example 2·2·2 or 4·4). A full prime symmetry is preferable to a full non-prime symmetry, for equal values of n (see the examples with 2 and 4 directly above). And as the prime factor decreases in value, the symmetry is more favourable in terms of improvement potential.

A full asymmetry consists of a multiplication of different numbers (for example 2·3·5 or 2·3·6).

The highest improvement potentials have symmetries of the lowest prime numbers, so 2^2 (the upper curve). After all, they have the highest dimensionality, namely n. You can therefore call it the ultimate symmetry: a hypercube with n sides of 2.

The lowest improvement potentials have prime numbers (the bottom harmonic curve). They have the lowest dimensionality, namely 1. That is why you can call this the ultimate asymmetry: a line (a stack of blocks) with length p, in which p is a prime number.

Hybrid factorizations
In the figure on the previous page, we can see that there are improvement potentials between the symmetric curves. Those are the *hybrid* configurations (factorizations), which consist of different factors. For example 6=2·3, or 36=2·2·3·3. Hybrids are located between full symmetry and full asymmetry.

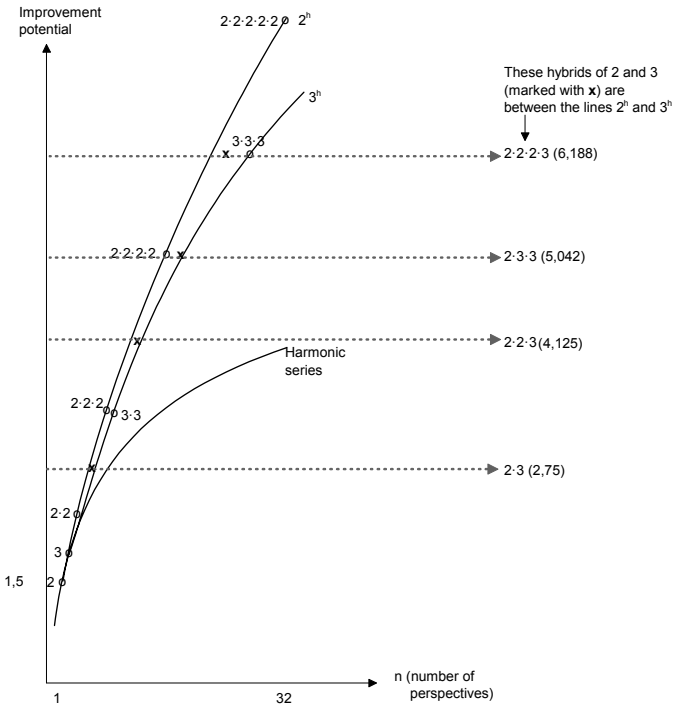
For hybrids of the factors 2 and 3, we can easily determine that they are all positioned between the symmetric curves $n = 2^h$ and $n = 3^h$. For example, take the point 12 with the highest improvement potential with 2·2·3 (2·2·3 is the prime factorizations and therefore the most symmetric factorization of 12). It is in the nature of the calculation formula for improvement potential that this factorization is located between the prime factorization 2·2·2 of 8 (with improvement potential 3.375) and prime factorization 3·3·3 of 27 (with improvement potential 6.162). The same applies to n=18 with the most symmetric factorization being 2·3·3, and n=25 with the most symmetric factorization being 2·2·2·3. You can easily calculate improvement potentials of hybrids of 2 and 3 by deriving the hybrid formula from the homogenous (symmetric) formulas for 2 and 3.[481] In three dimensions, this leads to:

[481] There exists a quick calculation method for the above calculations, which relates the sum with the multiplication, in which the natural logarithm and its inverse appear again. It holds true that $\ln(x{\cdot}y) = \ln(x) +$

Improvement potential 8 in configuration (2·2·2) = $(1/1 + 1/2)^3 = 3.375$
Improvement potential 12 in configuration (2·2·3) = $(1/1 + 1/2)^2(1/1 + 1/2 + 1/3)^1 = 4.125$
Improvement potential 18 in configuration (2·3·3) = $(1/1 + 1/2)^1(1/1 + 1/2 + 1/3)^2 = 5.042$
Improvement potential 27 in configuration (3·3·3) = $(1/1 + 1/2 + 1/3)^3 = 6.162$

And in four dimensions it leads to:

Improvement potential 16 in configuration (2·2·2·2) = $(1/1 + 1/2)^4 = 5.0625$
Improvement potential 24 in configuration (2·2·2·3) = $(1/1 + 1/2)^3(1/1 + 1/2 + 1/3)^1 = 6.188$
Improvement potential 36 in configuration (2·2·3·3) = $(1/1 + 1/2)^2(1/1 + 1/2 + 1/3)^2 = 7.563$
Improvement potential 54 in configuration (2·3·3·3) = $(1/1 + 1/2)^1(1/1 + 1/2 + 1/3)^3 = 9.243$
Improvement potential 81 in configuration (3·3·3·3) = $(1/1 + 1/2 + 1/3)^4 = 11.297$



ln(y), and therefore e (ln(x) + ln(y)) = x·y. This allows complex multiplications to be converted into a simple sum.

Hybrids of 2 and 3 are located between the symmetric curves ^{2h} and ^{3h} (where h is a positive natural number).

Generalization to all hybrids

This formula can easily be generalized to all hybrids, including those with more than two random numbers. For example:

Improvement potential 33 in configuration (3·11) = (1/1 + 1/2 + 1/3)(1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 + 1/9 + 1/10 + 1/11) = 5.536

Improvement potential 42 in configuration (2·3·7) = (1/1 + 1/2) (1/1 + 1/2 + 1/3) (1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7) = 7.130

The same applies to hybrids that have not been fully factorized into primes. For example:

Improvement potential 8 in configuration (8), a pseudo-prime configuration = (1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8)= 2.718

Improvement potential 8 in configuration (4·2) = (1/1 + 1/2 + 1/3 + 1/4) (1/1 + 1/2)= 3.125

Improvement potential 8 in configuration (2·2·2) = $(1/1 + 1/2)^3$ = 3.375

Hybrid factorizations differ by constant factors

In the graph above, we can see that the powers of 2, 3, …, are positioned on curves (the symmetric curves 2^h, 3^h, …). The hybrids of 2 and 3 are also located between the symmetric curves of 2 and 3 in terms of improvement potential. They too are positioned neatly on a curve, the hybrid curve that bridges the gap between the symmetric curves.

If we line up the hybrid factorizations of 2 and 3 above, it can be noted that the improvement potentials differ by a constant multiplication factor. The improvement potentials of the symmetric curves also differ by a constant factor when the power increases. There are many constant multiplication factors that correspond to specific curves. That is inherent to the harmonic formula for the improvement potential in numerous directions. I will address a few.

The table below depicts the points of a number of different symmetric curves. Successively from left to right, they show: the number of perspectives n, an interesting factorization for a specific curve, the corresponding improvement potential, the factor by which the *total improvement potential* increases relative to the previous row, the improvement potential *per perspective*, and the factor by which the *improvement potential per perspective* decreases relative to the previous row.

The first four rows in the table are not very interesting. They illustrate that multiplying by 1 does not change anything. Still, the 1 is special as a position: the number can single-handedly represent an infinite number of dimensions (even though you may never know how many): 1 = 1·1·1 = 1·1·1·1·1·1·1·1·1 = 1·1·1… These are then followed by the points of the symmetric curves of 2, 3, and 4, separated by white lines.

n	factorization	impr pot	factor	impr pot/n	factor
1	(1)	1.0	start	1.0	start
1	(1 1)	1.0	1.0	1.0	1.0
1	(1 1 1)	1.0	1.0	1.0	1.0
1	(1 1 1 1)	1.0	1.0	1.0	1.0
2	(2)	1.5	start	0.75	start
4	(2 2)	2.25	1.5	0.5625	0.75
8	(2 2 2)	3.375	1.5	0.421875	0.75
16	(2 2 2 2)	5.0625	1.5	0.31640625	0.75
3	(3)	1.8333334	start	0.6111111	start
9	(3 3)	3.3611112	1.8333334	0.3734568	0.61111116
27	(3 3 3)	6.1620374	1.8333334	0.2282236	0.6111111
81	(3 3 3 3)	11.297069	1.8333334	0.13946998	0.6111111
4	(4)	2.0833333	start	0.5208333	start
16	(4 4)	4.3402777	2.0833333	0.27126735	0.5208333
64	(4 4 4)	9.042245	2.0833333	0.14128508	0.5208333
256	(4 4 4 4)	18.838009	2.0833333	0.07358597	0.5208333

Table: improvement potentials for symmetric curves.

For example, for (2 2), the above table shows how multiplication with an extra symmetric value, resulting in (2 2 2), increases the improvement potential every time with the same factor. And this factor is exactly equal to the harmonic series for the base number at hand.

For the symmetric series of 2^h, this factor is the fourth column of the table, so (1/1 +1/2) = 1.5, for the symmetric series of 3^h it is (1/1 + 1/2 + 1/3) = 1.83333, for 4^h the factor is (1/1 + 1/2 + 1/3 + 1/4) = 2.0833, etc. This follows directly from the basic harmonic formula. The improvement potential for n^h is $(\Sigma\ 1/n)^h$ and h increases by one.

At the same time, the improvement potential per perspective (improvement potential per perspective, impr pot / n, the fifth column) is decreased by the same factor (see the second factor in the sixth column). That makes sense too: the *number* of perspectives increases by a set factor, namely the symmetric factor. That is why for the series 1^h, this factor is (1/1)/1 = 1. For the symmetric series 2^h, this factor is (1/1 + 1/2) / 2 = 0.75. For the symmetric series 3^h it is (1/1 + 1/2 + 1/3) / 3 = 0.61111, etc. (see the sixth and last column).

The table below shows points of a number of different *hybrid* factorizations. These are hybrids of two numbers. You can see how they follow a curve from a low symmetry point to a high symmetry point (for example (2 2 2) via hybrids of 2 and 3 to (3 3 3). You can also write this as follows: (2 2 2)(2 2 3)(2 3 3)(3 3 3) = (2^3) $(2^2\ 3)(2\ 3^2)(3^3)$. This – quadratic – notation stresses the (partial) symmetry.

n	factorization	impr pot	factor	impr pot/n	factor
1	(1 1 1)	1.0	start	1.0	start
2	(1 1 2)	1.5	1.5	0.75	0.75
4	(1 2 2)	2.25	1.5	0.5625	0.75
8	(2 2 2)	3.375	1.5	0.421875	0.75
1	(1 1 1 1)	1.0	start	1.0	start
2	(1 1 1 2)	1.5	1.5	0.75	0.75
4	(1 1 2 2)	2.25	1.5	0.5625	0.75
8	(1 2 2 2)	3.375	1.5	0.421875	0.75
16	(2 2 2 2)	5.0625	1.5	0.31640625	0.75
4	(2 2)	2.25	start	0.5625	start
6	(2 3)	2.75	1.2222222	0.45833334	0.8148148
9	(3 3)	3.3611112	1.2222222	0.3734568	0.8148148
8	(2 2 2)	3.375	start	0.421875	start
12	(2 2 3)	4.125	1.2222222	0.34375	0.8148148
18	(2 3 3)	5.041667	1.2222223	0.2800926	0.8148148
27	(3 3 3)	6.1620374	1.2222222	0.2282236	0.81481487
16	(2 2 2 2)	5.0625	start	0.31640625	start
24	(2 2 2 3)	6.1875	1.2222222	0.2578125	0.8148148
36	(2 2 3 3)	7.5625	1.2222222	0.21006945	0.8148148
54	(2 3 3 3)	9.243056	1.2222223	0.17116772	0.8148149
81	(3 3 3 3)	11.297069	1.2222222	0.13946998	0.81481475
9	(3 3)	3.3611112	start	0.3734568	start
12	(3 4)	3.8194444	1.1363636	0.31828704	0.8522727
16	(4 4)	4.3402777	1.1363636	0.27126735	0.8522727
27	(3 3 3)	6.1620374	start	0.2282236	start
36	(3 3 4)	7.0023146	1.1363635	0.19450873	0.8522726
48	(3 4 4)	7.9571757	1.1363636	0.1657745	0.85227275
64	(4 4 4)	9.042245	1.1363636	0.14128508	0.8522727
81	(3 3 3 3)	11.297069	start	0.13946998	start
108	(3 3 3 4)	12.837578	1.1363636	0.11886646	0.8522727
144	(3 3 4 4)	14.588155	1.1363635	0.10130663	0.8522726
192	(3 4 4 4)	16.577448	1.1363636	0.08634087	0.8522727
256	(4 4 4 4)	18.838009	1.1363636	0.07358597	0.85227275
4	(2 2)	2.25	start	0.5625	start
8	(2 4)	3.125	1.3888888	0.390625	0.6944444
16	(4 4)	4.3402777	1.3888888	0.27126735	0.6944444
16	(2 2 4)	4.6875	start	0.29296875	start
32	(2 4 4)	6.5104165	1.3888888	0.20345052	0.6944444
64	(4 4 4)	9.042245	1.3888888	0.14128508	0.6944444
16	(2 2 2 2)	5.0625	start	0.31640625	start
32	(2 2 2 4)	7.0312495	1.3888888	0.21972655	0.6944444
64	(2 2 4 4)	9.765625	1.388889	0.15258789	0.6944445
128	(2 4 4 4)	13.563367	1.3888887	0.10596380	0.69444436
256	(4 4 4 4)	18.838009	1.3888888	0.07358597	0.6944444

Table: improvement potentials for hybrid curves.

The hybrid curves clearly illustrate the general principle behind these multiplication factors. Below, I will first address this principle specifically, and then I will generalize it. This principle is inherent to the harmonic formula for the determination of improvement potential in multiple dimensions.

Take the change from (2 2 2) to (2 2 3), the final 2 is then replaced by a 3. An extra term (in this case 1/3) is added to a number (1/1 + 1/2) in a larger product, which increases the improvement potential. The total improvement potential then becomes (1/1 + 1/2 + 1/3) / (1/1

+ 1/2) = 1.2222 times as large (this factor is indicated by 'factor' in *column 4* of the table above).[482]

When a *random* factor 2 in a *random* factorization is replaced by a factor 3, the absolute improvement potential will also increase with this constant multiplication factor 1.2222. For a replacement of (2 4 11 104) to (3 4 11 104), the same factor applies. Here, the same 1/3 term is added.

The absolute improvement potential increases, but the improvement potential per perspective decreases. That has to be the case, because the total number of perspectives is now multiplied by 3 instead of 2 (there are 3/2 = 1.5 times as many perspectives, because a 2 is replaced by a 3 in the factorization. That is why the number of perspectives increases by a factor of 1.5.

For an increase of 2 to 3 in a factorization, the following values therefore apply. The total improvement potential is 1.2222 times as large. The number of perspectives is multiplied by 1.5. The average improvement potential per perspective decreases by a factor 1.2222 / 1.5 = 0.8148.

This applies to a random substitution of a 2 by a 3, in a random factorization. When you enlarge the number of perspectives by a factor of 1.5, you need to be left with an integer amount of perspectives. This means that the original number of perspectives should be dividable by 2 (half perspectives do not exist in quantum theory), and that was already guaranteed by the presence of the two in the starting factorization. That is exactly why the perspectivist space is organized around factorizations.

Now we can also calculate larger steps in a single dimension. Say that we replace the 2 by a 4. Now the extra terms 1/3 + 1/4 are added to the product, the total improvement potential then becomes 1/1 + 1/2 + 1/3 + 1/4) / (1/1 + 1/2) = 1.3888 times as large. The number of perspectives doubles (we swap a 2 for a 4 in the factorization) and the average improvement potential per perspective thus becomes 1.3888 / 2 = 0.6944 times as small.

If we replace a 2 by a 127, the procedure is exactly the same. The harmonic series now works up to 1/127. The number of perspectives becomes 127/2 = 63.5 times as large. If we replace a 5 by a 7, the total improvement potential becomes (1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7) / (1/1 + 1/2 + 1/3 + 1/4 + 1/5) = 2.5929/2.2833 = 1.1356 times as large. The average improvement potential per perspective drops by a factor of 1.1356 / 1.4 = 0.8111.

In the examples above, the number of dimensions remains the same, because an element in a factorization changes. However, what if we add an element to the factorization, and thus

[482] This number too is exactly rational, even though a decimal approximation is depicted. The clause of rationality applies continuously within discrete recursive perspectivism, to put it in less than appropriate words.

add a dimension? We need to remember that for every factorization, implicitly, an infinite number of ones can be added. So (2 2 2) is equal to (2 2 2 1 1 1 1 1 1 …). If we add a dimension, we simply grab one of these latent dimensions, and increase it from 1 to a random higher value. And then we can apply the procedure above again. (Reversely, we can also remove an element).

If, for example, we substitute a 1 for a 3, then we make a latent dimension available for experience. Now the extra terms 1/2 + 1/3 are added to the latent and already present product factor of 1. The total improvement potential thus becomes (1/1 + 1/2 + 1/3) / (1/1) = 1.8333 as large. The number of perspectives triples (we substituted a 1 for a 3 in the factorization) and the average improvement potential per perspective then becomes 1.8333 / 3 = 0.6111 times as small.

In the double table below, a new factor is added as an *extra* dimension on every subsequent row, higher than the previous one. This illustrates the discussion above for adding a dimension, with various values (the value 3, used above, indeed corresponds to the factor 1.833 in column 4 and 0.6111 in column 6).

In the upper part, the factorization develops as the natural number line, in the bottom part, it develops as the row of prime numbers. We can see the complete harmonic series present itself in the upper part of column 4. In the lower part of column 4, which has prime factorizations, the exact values that correspond to those prime numbers appear.

n	factorization	impr pot	factor	impr pot/n	factor
1	(1)	1.0	start	1.0	start
2	(1 2)	1.5	1.5	0.75	0.75
6	(1 2 3)	2.75	1.8333334	0.45833334	0.6111111
24	(1 2 3 4)	5.7291665	2.0833333	0.23871528	0.5208333
120	(1 2 3 4 5)	13.081596	2.2833333	0.109013304	0.45666665
720	(1 2 3 4 5 6)	32.04991	2.45	0.044513766	0.40833333
5040	(1 2 3 4 5 6 7)	83.10084	2.5928571	0.016488262	0.37040815
40320	(1 2 3 4 5 6 7 8)	225.8562	2.7178571	0.0056015924	0.33973214
362880	(1 2 3 4 5 6 7 8 9)	638.94	2.828968	0.0017607474	0.3143298
3628800	(1 2 3 4 5 6 7 8 9 10)	1871.4349	2.9289682	5.157173e-4	0.2928968
39916800	(1 2 3 4 5 6 7 8 9 10 11)	5651.504	3.0198772	1.4158209e-4	0.27453429
479001600	(1 2 3 4 5 6 7 8 9 10 11 12)	17537.807	3.1032104	3.661325e-5	0.25860086
6227020800	(1 2 3 4 5 6 7 8 9 10 11 12 13)	55772.57	3.1801338	8.956542e-6	0.24462569
87178291200	(1 2 3 4 5 6 7 8 9 10 11 12 13 14)	181347.98	3.2515624	2.0801967e-6	0.23225445
1307674368000	(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15)	601754.1	3.318229	4.601712e-7	0.22121523
20922789888000	(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16)	2034367.6	3.380729	9.723214e-8	0.21129557
355687428096000	(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17)	6997314.5	3.4395525	1.9672651e-8	0.20232663

n	factorization	impr pot	factor	impr pot/n	factor
1	(1)	1.0	start	1.0	start
2	(1 2)	1.5	1.5	0.75	0.75
6	(1 2 3)	2.75	1.8333334	0.45833334	0.6111111
30	(1 2 3 5)	6.2791667	2.2833333	0.20930555	0.45666665
210	(1 2 3 5 7)	16.280983	2.5928574	0.07752849	0.37040818
2310	(1 2 3 5 7 11)	49.166573	3.0198774	0.02128423	0.27453429
30030	(1 2 3 5 7 11 13)	156.35628	3.1801338	0.00520666	0.24462567
510510	(1 2 3 5 7 11 13 17)	537.79565	3.4395528	0.00105344	0.20232663

Table: factorizations and prime factorizations, adding dimensions.

Armed with the above insights, we can cross random paths through the perspectivist space and assess their improvement potentials.

8.7 A societal quantum theory

I have now laid the groundwork (and more) to shoot the theoretical ball between the goal posts, in accordance with the aim of this book: improving our societal practices. The above introduces a perspectivist quantum theory that explains the irrepressible urge towards more complex societal practices.

There exists a strong analogy between large-scale perspectivist configurations, say societal multi-actor configurations, and quantum theoretical models of the smallest particles, say the atom model of Niels Bohr.[483] Perhaps this comes as a surprise to you. What does societal development, working with and in enormous perspectivist structures, have to do with the internal structure of the smallest material particles? As a young chemistry student, these thoughts already occupied my mind while I was back of the lecture room listening intently and with amazement to the explanation of Bohr's atom model. Wisely, I kept quiet, because you do not need to express every thought that pops into your mind (Gauss would mumble in agreement), and people have not changed that much since Galileo.

Societies and atoms are different in many different ways, of course. However, I think that it would be good to look at the similarities as well, instead of purely at the differences. And there is one life-sized similarity; it is so big and obvious that we can barely even see it. (Again I feel Kant's shadow towering over me). Both societal order and the smallest orders of material particles can all be experienced with our consciousness. And according to recursive perspectivism, this consciousness works based on perspectivist balance principles. This is precisely why atom models and societal practices are closely related. They both rest on perspectivist configurations, as large and small parts of *the path of humanity*, respectively. I was not aware of this yet during my time in college.

In the prelude, I already mentioned that recursive perspectivism is a far-reaching generalization, a unification methodology. I came to recursive perspectivism by trying to describe as many experiential phenomena as possible, using as few concepts as possible. Consequently, human experiences, any experiences, all adhere to perspectivist patterns. These pattern laws can only be understood in terms of perspective. Zipf, Benford, Bohr, many natural, sociological, and psychological laws, sensory perception, *the path of humanity*, they all carry the marks of the workings of the recursive perspectivist consciousness.

The famous atom model of Bohr is characterized by the fact that there are only very specific energy paths available for electrons of a certain type of atom (in his case, hydrogen, the first

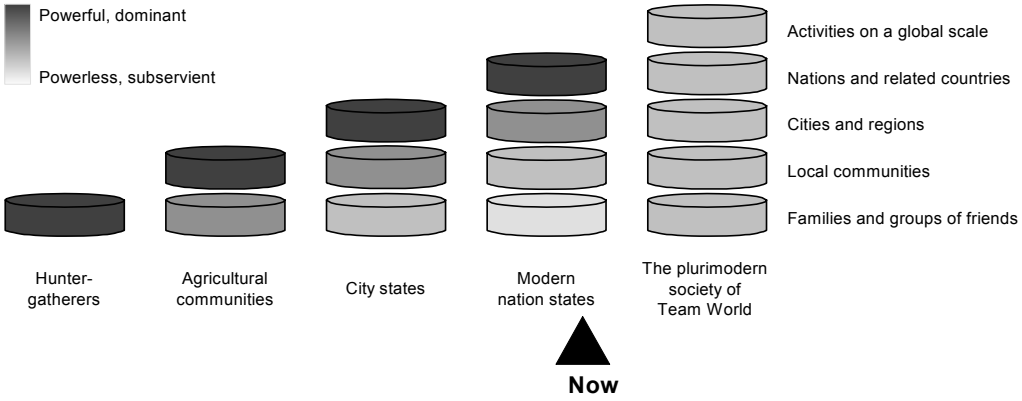
[483] These analogies are not in our surroundings *a priori*, but they emerge from the improvement seeking workings of a perspectivist consciousness, which contains both a self and an environment (and everything in between).

atom in the periodic system. His specific hydrogen model proved difficult to generalize at first). These paths are described by mathematical wave functions. Wave functions for particles are solutions to Schrödinger's equation: a complex continuous function. Phenomena can express themselves either as waves or as particles: these are two expressions of the same underlying phenomenon (I have already briefly touched upon wave–particle dualism). If you have a particle with a mass m and velocity v, the wavelength $\lambda = h/mv$, where h is the famed Planck's constant (that same Planck at the foundation of quantum mechanics).

When you excite an atom by adding precisely enough energy, an electron can also reach higher orbitals, but never more than one at the same time, and its precise location within one path (a better description in more advanced terms is within one orbital) cannot be known exactly. You only work with the probability of encountering the electron. The solutions of the wave functions describe this probability. For outsiders, this may sound mysterious, but for physical chemists, this is routine.

In a strikingly similar manner, there are only specific levels of improvement potentials available to certain set amounts of n perspectives. These are determined by the possible (actor) configurations that correspond with these n perspectives. The same applies here as well: if you add the correct amount of (intentional) energy, you can realize higher levels of improvement potential. There is generally more than one configuration that possesses the same improvement potential due to the fact that the perspectivist space has rotational symmetries around the diagonals. Think of configurations such as (a b c), (a c b), (b a c), (b c a), (c a b), and (c b a) in a three-dimensional space: applying the harmonic formula for improvement potential in three dimensions results in the exact same value for each of these configurations, because they display the same degree of (im)balance.

The path of humanity has shown us for hundreds of thousands of years that some levels do occur frequently, they are stable, while others do not occur frequently or are not stable. The societal stacking of layers from left to right in the figure below (repeated from Section I) depicts this. Civilians, the members of a society, indeed swap societal layers, like electrons: when they vote on some kind of European treaty, for example, they find themselves – or they should – in a higher layer than when they cuddle their children. The fact that for many civilians in increasingly complex societies, the higher layers are unfamiliar territory to them, is exactly why a plurimodern transformation is required. If we cannot realize that transformation, we will have to make do with smaller scale levels. That is exactly what populist politicians and voters do: they search for scales that make some sense to them, which are smaller, but with clear divisions to the outside world. The Brits made such a choice in 2016 with their Brexit. The EU is far from optimal, sure, but with such a step backwards, you lose massive entropic improvement potential.



The qualitative, content half of the dual track. The path of humanity shows a development, stacking, and (in this case a very rough) layeredness that is based on perspectivist quantum theory.

We can now also better understand that the x axis of the figure above does not represent absolute time, but the degree of coherence in a configuration. The y axis represents experiential value through the experience of quality. A society can always fall (and they do so regularly), which implies that the experiential value decreases (downwards), and the configuration becomes less optimal (to the left). If the horizontal axis were an absolute time axis, time would go in reverse, which is something that is definitely illustrated by the toaster story of Thomas Thwaites and my experiences at the Hadza in Tanzania.

On massive perspectivist scales, there also exist clear perspectivist regions of preference, which are determined by the number of perspectives n that are utilized in coherent and cooperative manners. Those n perspectives allow for specific configurations (and excludes others). The improvement potentials (and thus experiential values) can be calculated by using the multi-dimensional harmonic formula for improvement potential.

The *structure* of a unique prime factorization that corresponds to a specific number of perspectives n determines how many factors, and therefore how many alternative configurations there are. Structure knows two extremes: the fully asymmetric (take (2 3 5 7 13): all prime factors are different) and the fully symmetric (take (5 5 5 5): all prime factors are the same). Hybrid possibilities fall in between. Take (4 4 6 6).

The specific value of a unique prime factorization that corresponds to a specific number of perspectives n then determines the exact possible configurations, and thus the corresponding improvement potentials. These improvement potentials can be calculated with the harmonic formula in multiple dimensions.

Take a value of n that progresses from 1 to very large. For a practical example, take 11, or 22, or 27, or 33, or 64 (again: the examples consist of much fewer perspectives than actual societal configurations). Then you determine their possible configurations. The simplest

configuration is one-dimensional. The most complex configuration is the factorization into prime factors. For these examples, that gives (11), (3 3 3), (2 11), and (2 2 2 2 2 2). In between, you will find the configurations that have not been fully factorized. For 27, for example, this is (9 3), because 9 can be factorized further.

We then find the following image (these points are presented in the rows 11, 22, 27, and 64 of the figure following this table some pages further):

Factorization	Experiential value (•Improvement potential)
(11)	3.0198774
(22)	3.6908133
(2 11)	4.529816
(27)	3.8914568
(3 9)	5.186442
(3 3 3)	6.1620374
(64)	4.743891
(2 32)	6.087743
(4 16)	7.043185
(8 8)	7.3867474
(2 2 16)	7.6066403
(2 4 8)	8.493303
(4 4 4)	9.042245
(2 2 2 8)	9.172768
(2 2 4 4)	9.765625
(2 2 2 2 4)	10.546875
(2 2 2 2 2 2)	11.390625

If, for every number of perspectives n, we determine the improvement potentials of all possible factorizations and plot them graphically, we get a figure of a perspectivist societal quantum theory that is central to this book (see the next page). The segment from n=1 to n=128 is shown. That is not very realistic as there are few perspectives, but the pattern goes on and on. We can directly derive the most appealing positions (the high improvement potentials) and the least appealing positions (the low improvement potentials).

The figure shows the available improvement potentials for a certain number of perspectives n. The erratic patterns that we can see at, for example, the lowest 'line' of the harmonic prime development is an artefact: because the figure is calculated with ASCII signs and there are rounding effects.

The figure does not show *how many* configurations there are that possess a specific improvement potential, it only shows us *that* there is a specific improvement potential. Take 30, for example, in the configuration 2·3·5, which is the prime configuration and therefore has the best (the highest) improvement potential. There are six different configurations with this improvement potential in the three available dimensions: (2 3 5)(2 5 3)(3 2 5)(3 5 2)(5 2 3), and (5 3 2). The harmonic formula in three dimensions results in the exact same improvement potential for all six of these configurations.

This pattern of improvement potentials applies to every number of n perspectives: Sometimes, the row has a length of one: for prime numbers, there is only the bottom limit, the sum of the harmonic row. The upper limit is the prime factorizations. Here we can see why prime numbers have only one improvement potential at their disposal: the prime

factorization is equal to the number n itself. The largest number of intermediate levels is available for numbers n with long asymmetric (square-free) prime factorizations (there are no doubles, like 30=2·3·5).

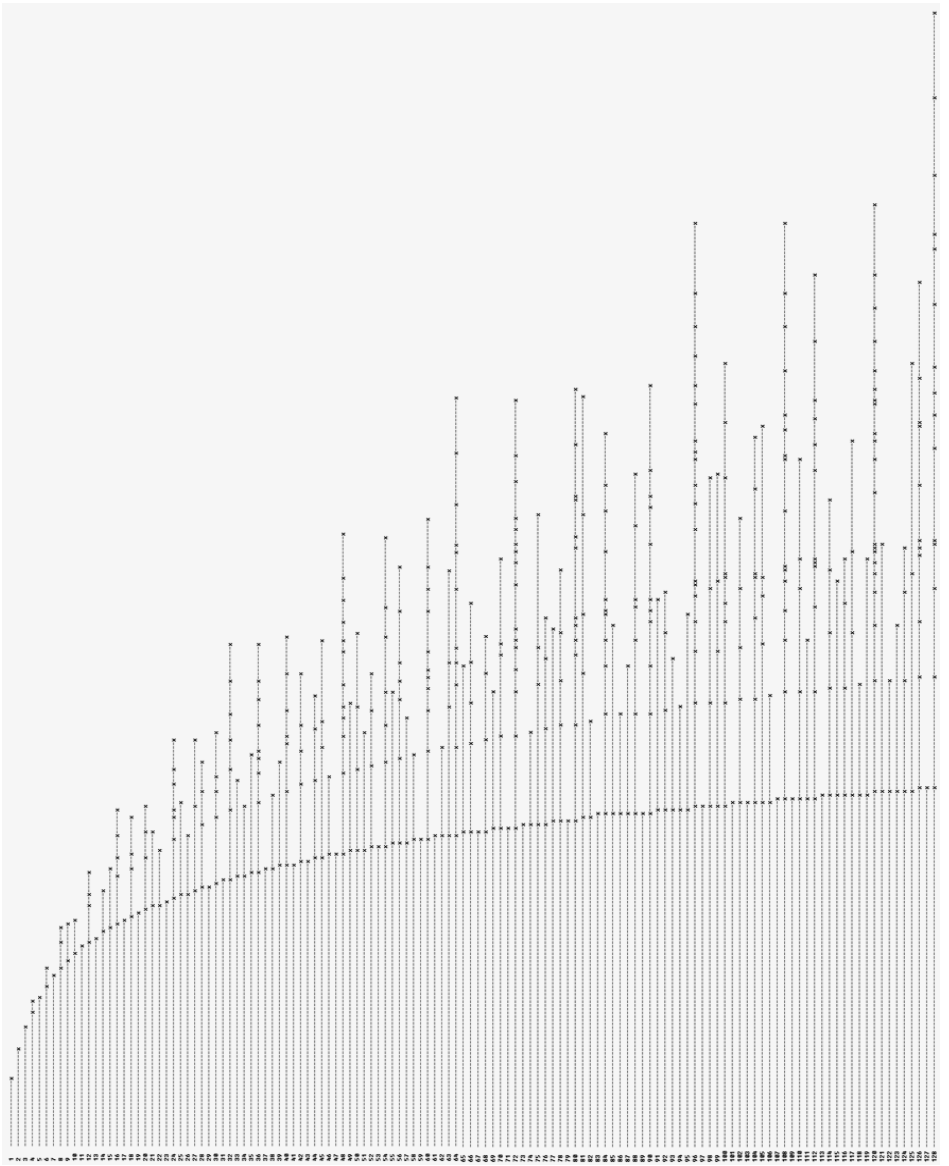
The number of levels for (2 2 5) and (5 5 7) is exactly the same, even though the levels are far away from one another: the number of different combinations is equal. The configuration (2 3 11) has many more levels, but equally many as (3 11 17). The configuration (2 3 7 19) has even more levels. The factorizations (2 3 5)(2 5 3)(3 2 5)(3 5 2)(5 2 3), and (5 3 2) are different, but all six have the same average improvement potential/experiential value. The phenomenon that different configurations have the same value is referred to as *degeneration*. High degeneration = large number of possible configurations, and therefore high entropy. Low degeneration = small number of possible configurations, and therefore low entropy.

The factorization (2 2 5) has fewer levels than (2 3 5), and is therefore less degenerated. As soon as symmetries such as double prime factors occur, which are called squared (also the higher powers) in number theory, the number of possible levels of improvement potential and experiential value diminishes: more doubles equals fewer possibilities, because these configurations are indistinguishable from one another. That applies even more so to 8=2·2·2 perspectives: you can switch the twos around, but you cannot see this change. However, as there are more available underground configurations (2 2 2), there are also more realization opportunities, and therefore there is a much higher probability of occurrence. That is another way of looking at diagonals. It is no coincidence that we value symmetry, up to a certain level. It is a matter of probability (if we only take symmetry into account, we stress the similarity dimension, and then things will go wrong).

Primorial numbers have been given special attention in this book (the primorials). These are numbers for which the prime factorization consists of different prime numbers, with a special precondition that they progress upwards from the previous prime number, without skipping prime numbers. Examples are 6=(2 3), 30=(2 3 5), and 210=(2 3 5 7). They have as many levels in terms of improvement potential as every other number of perspectives with equally many prime factors, such as 30=(2 3 5) and 2431=(11 13 17). In terms of number of levels, they are indistinguishable. However, the levels for primorial numbers are spread more evenly. High symmetric numbers of perspectives with low prime factors such as 27=(3 3 3) have excellent improvement potentials, but very few intermediate levels. Comparable primorial numbers with the same number of prime factors, such as 30=(2 3 5) still have good improvement potentials, but they win in terms of levels. Primorial societies are therefore easier to realize (there are more intermediate phases), and more robust (they do not fall apart the moment something goes wrong).

I will summarize this long story in a single figure. The figure on the next page depicts the improvement potentials of possible perspectivist configurations for a progressing number of perspectives, from 1 to 128. Prime numbers have only one level. The symmetric powers of

2 stand out as the largest of all (take the top at one quarter, $32=2^5$, the top half way, $64=2^6$, and the top to the right, $128=2^7$. Primorial numbers have the most 'knots in the rope', spread most evenly (it is easiest to climb). In societal terms, 128 perspectives is nothing at all, this merely serves as an illustration. But for enormous numbers of perspective, the exact same considerations apply. Societal practices subconsciously search for the most reachable peaks: high, with plenty of easy paths. The 'real' path of human development shapes itself against the possibilities, the contours of the discrete perspectivist space.



A societal quantum theory. This is the quantitative, structural half of the dual track from the introduction of this book. The figure depicts the possible improvement potentials (vertical) for n perspectives (n progressing from 1 to 128, horizontally). The figure contains rounding phenomena (it is ASCII-based) and therefore misses possible improvement potentials.

The societal climbing wall

I will summarize. If n is not a prime number, there are numerous levels of improvement potential other than the harmonic base level (1 extra at a minimum, together that makes 2). An electron can jump between electron orbits (see the Lyman, the Balmer, and the Paschen

series), and so too can a societal consciousness switch levels, creating coherence and cooperation. For symmetries of two, we can see the highest improvement potential (and for high levels of n we can see many levels): they are preferable.

By doing so, the primes cause deep pits, they form the lower limit, and *only* the one-dimensional harmonic improvement potential is available here. The powers of 2 cause high peaks, they form the upper limit. Hybrids of 2 and 3 are the runner-ups. High prime numbers, or low symmetries of high prime numbers provide the lowest improvement potentials and know few levels. (Take 61 61). They generate little value (averagely speaking, the improvement potential neatly correlates to experiential value) and the configuration is highly vulnerable: in societal terms, we do not want to be found there, we are at high risk (multimodernity is an example).

Roughly speaking, the number of levels (layers) increases towards the right as the number of available perspectives grows. The improvement potentials also generally increase to the right. That is why societal development has a tendency to move from the bottom upwards, and from left to right. Both the coherent and cooperating improvement perspectives and the degree of coherence and cooperation have a tendency to find a balance and follow it upwards. But that does not mean that there exist no deviations of this general view. For example, if you wish to go from the peak of 80 to the peak of 96, or from the peak of 112 to the peak of 120, the available improvement potentials take a hard hit, and you will have quite a canyon to cross. Those are typical configurations in which a societal practice (it is only for illustrative purposes, n is very low here) can 'linger' for a long time.

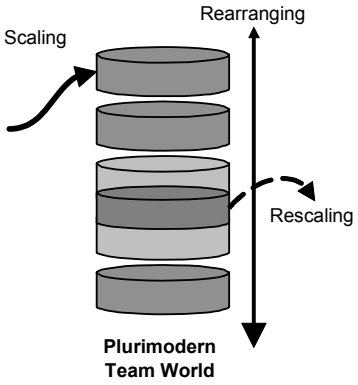
If we regard the available improvement potentials for a certain n as knots in a climbing rope, the most interesting climbing ropes feature a mix of many low prime factors. They link a maximum improvement potential to a large number of well-spread knots to climb upwards with.

However, we can also switch rope. Climbing ropes with a high knot, and neighbouring climbing rows with many knots are then also interesting. Sometimes we temporarily add a number of perspectives, which we remove later once we have moved or climbed further upwards. Or sometimes, we save by conserving it for a while, and then we burst ahead. Sometimes a childless family will adopt an orphan, and other times the survivors of a shipwreck toss someone from the lifeboat to prevent it from sinking.

By absorbing energy, electrons in an atom can move to higher orbitals. When they fall back, they radiate energy of specific wavelengths. This process is quantized. In a similar manner, when a societal consciousness exerts effort, it can reach higher levels of improvement potential faster. Realizing something together provides a huge sense of improvement, the experience of new value. When falling back down, this exertion is no longer required, but the experiential value drops back down to a lower level. The energy comes out as a sense of dissatisfaction, malaise, or downright fear.

These better societal configurations must be available, as in, possible, and it is this aspect specifically that the societal quantum theory shines a light on. It explains the erratic progression of societal development from a strict quantum theoretical perspective. A stable societal configuration clings to the local peaks of the structural landscape, and it has difficulties bridging deep gaps. That is why we need to set very specific demands on our innovation processes. This is the topic of part 3 of this book: *Societal innovation*, which will follow soon.

The scaling, rearranging, and rescaling from Section I (see the figure below, repeated) is nothing more than the search for more optimal perspectivist configurations. We now have a better understanding as to why these are not continuous, gradual changes, but jumpy rearrangements of societal practices instead. Our societies creak, is what I wrote in the prelude to this book. This creaking is so loud because we experience sizable reconfigurations in our late-modern era, on the way to plurimodern future. By now, we know that better societies most likely lie ahead of us. We will have to cross deep spasms, and we should really do so together in optimal coherence and cooperation.



The table and graph on the following pages clarify the improvement potentials for n=1 up to 16 perspectives. The table shows us how many multi-dimensional configurations with (therefore) low prime factorizations and high improvement potentials act as *hot spots* in perspectivist landscapes. That is where it happens, that is where the most interesting cases will be, so that is where we want to be in societal terms.[484] That is where the powerful societal configurations are located. The graph includes the factorizations, and the rational and decimal improvement potentials. Immediately below this table, you will find a graphical representation of the improvement potentials of n=1 up to 16. Recursive perspectivism only works with natural numbers, and it treats them all in the same manner. The values for improvement potentials are therefore strictly rational values. The fact that I

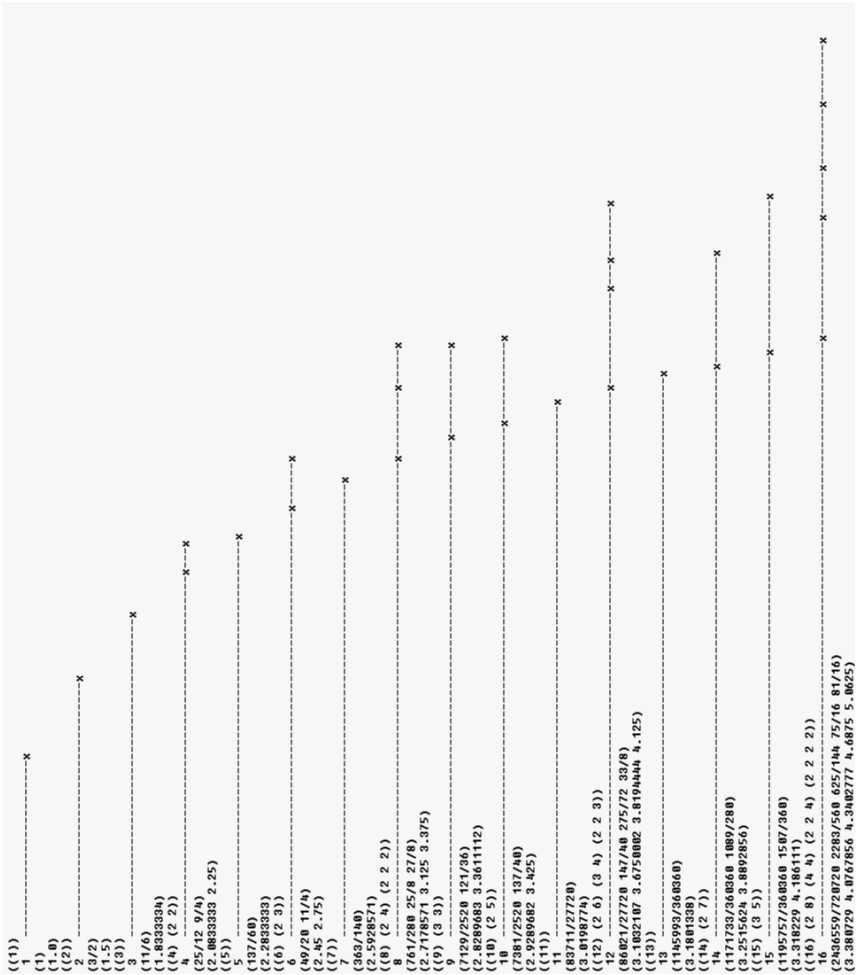
[484] Psychologically, physically, and everything in between.

represent them here in decimals is strictly practical.[485] At the end of this paragraph, you will find the graph from n=1 up to 32, including the curves of the singles, doubles, triplets, and the principle of the sieve of Eratosthenes.

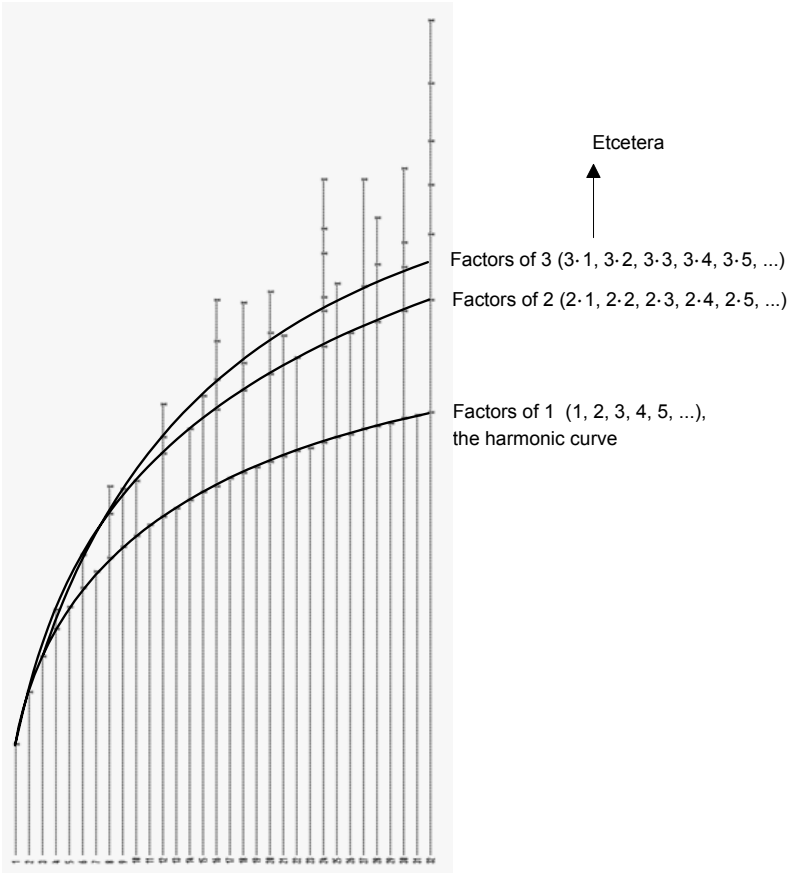
n	Configuration	Improvement potential (formula) ≈ Experiential value	Improvement potential (value)
1	1	1/1	1.0
2	2	1/1 + 1/2	1.5
3	3	1/1 + 1/2 + 1/3	1.8333
4	4	1/1 + 1/2 + 1/3 + 1/4	2.0833
|	2·2	$(1/1 + 1/2)^2$	2.25
5	5	1/1 + 1/2 + … + 1/5	2.2833
6	6	1/1 + 1/2 + … + 1/6	2.45
|	2·3	(1/1 + 1/2) (1/1 + 1/2 + 1/3)	2.75
7	7	1/1 + 1/2 + … + 1/7	2.5929
8	8	1/1 + 1/2 + … + 1/8	2.7179
|	2·4	(1/1 + 1/2) (1/1 + 1/2 + 1/3 + 1/4)	3.125
|	2·2·2	$(1/1 + 1/2)^3$	3.375
9	9	(1/1 + 1/2 + … + 1/9)	2.8290
|	3·3	$(1/1 + 1/2 + 1/3)^2$	3.3611
10	10	(1/1 + 1/2 + … + 1/10)	2.9290
|	2.5	(1/1 + 1/2) (1/1 + 1/2 + … + 1/5)	3.425
11	11	(1/1 + 1/2 + … + 1/11)	3.0199
12	12	(1/1 + 1/2 + … + 1/12)	3.1032
|	2·6	(1/1 + 1/2) (1/1 + 1/2 + … + 1/6)	3.6750
|	3·4	(1/1 + 1/2 + 1/3) (1/1 + 1/2 + 1/3 + 1/4)	3.8194
|	2·2·3	$(1/1 + 1/2)^2$ (1/1 + 1/2 + 1/3)	4.125
13	13	(1/1 + 1/2 + … + 1/13)	3.1801
14	14	(1/1 + 1/2 + … + 1/14)	3.2516
|	2·7	(1/1 + 1/2) (1/1 + 1/2 + … + 1/7)	3.8893
15	15	(1/1 + 1/2 + … + 1/15)	3.3182
|	3·5	(1/1 + 1/2 + 1/3) (1/1 + 1/2 + … + 1/5)	4.1861
16	16	(1/1 + 1/2 + … + 1/16)	3.3807
|	2·8	(1/1 + 1/2) (1/1 + 1/2 + … + 1/8)	4.0768
|	4·4	$(1/1 + 1/2 + 1/3 + 1/4)^2$	4.3403
|	2·2·4	$(1/1 + 1/2)^2$ (1/1 + 1/2 + 1/3 + 1/4)	4.6875
|	2·2·2·2	$(1/1 + 1/2)^4$	5.0625

[485] I am no mathematician, but this reminds of the intuitive maths of Brouwer and his competition with Hilbert (which he – unfortunately, I suspect – had to conclude with little success). Very small deviations between the crosses and the curves you might appear to be observing are the cause of the fact that the graphs are generated in ASCII signs: there are rounding errors (which is ironic).

Table: Possible configurations (the dimensions are allowed to switch around) the formula for the determination of the improvement potential, and the calculated improvement potential for n perspectives from 1 to 16.



Possible improvement potentials for n perspectives, where n progresses from 1 to 16 (see also the previous table). Factorizations and improvement potentials have been added (tilt the book to read the figure), the final one being rational (exact) and decimal (approximated).



Possible improvement potentials for n perspectives (progressing from 1 up to 32). By wiping away factors of 2, 3, ..., from the factors of 1, you implement a sieve of Eratosthenes (you are left with the prime numbers). Continuing up to 5 (the highest integer root under 32) suffices.

8.8 Perspectivist consciousness is at the basis

Prime numbers do not freely share their secrets. I believe that recursive perspectivism shines a special light on number sense. It is not the numbers at the frontline, but perspectivist experiences, perspectivist structures, in specific configurations. Every 'number n' is merely the pseudoprime configuration of n perspectives. The prime factorization is the most interesting, both in terms of paths and improvement potential.

The final word has not been said on the topic, but now we have a better understanding of why pattern laws such as Zipf's law, Benford's law, and *the path of humanity*, appear so persistently, in entirely different situations, as long as there is sufficient perspectivist complexity. That is caused by the inner workings of a perspectivist consciousness. A perspectivist consciousness is continually looking for better improvement perspectives. At larger scales, a multi-actor consciousness is subconsciously heading towards perspectivist configurations with a higher dimensionality, and therefore a better balance, because these configurations possess the best improvement potentials, in statistical terms. They thus allow for the best probability of the highest experiential value for the least amount of effort, while taking as few risks as possible.

Perspectivistically arranging, perspectivistically reconfiguring, and searching for higher improvement potentials and experiential values thus causes pattern laws. Zipf's law, Benford's law, and many other natural scientific and social scientific pattern laws emerge in this way in sufficiently complex situations. The discretely inverse proportionality and (therefore) the harmonic series leave their characteristic patterns as a signature. The Gaussian bell curve and the prime number-based (the quantum-based) wave patterns are emerging phenomena that can be explained on the basis of recursive perspectivism as well. The path of humanity is the most imposing pattern law.

Reversely, the explanation of the occurrence of these pattern laws supports the fact that recursive perspectivism provides a fascinating methodological framework to better understand, organize, and develop complex systems, including our very multi-actor practices. It therefore has the potential to contribute to the improvement of our societal practices. How this can be put into practice is the topic of the final Part 3 of this book: societal innovation, which follows now.

9

Part III: Societal innovation

9.1 Societal innovation in perspective

*'**Innovation** or **renewal** relates to new ideas, goods, services and processes. Innovation can take place in organizations but also within wider – societal – relationships.*
The process of innovation (innovation process) comprises the whole of human actions focused on renewal (of products, services, production processes, etc.).
The dissemination of innovation is called innovation diffusion.'
Source: Wikipedia

9.1.1 Innovation

The above description of innovation (renewal), originating from none other than the Wikipedia website, demonstrates that we are dealing with a many-headed monster.

Societal innovation
This multiplicity is even more prevalent when dealing with *societal* innovation, the most versatile variant of innovation we know. It encompasses all other variants of innovation.

That is why I spent several decades working on an overview of societal innovation, aimed at sustainable development. More details about this close relationship between societal innovation and sustainability will be discussed later.

It all started with thinking about a proposal for a PhD, sometime in the late 1980s. The idea resulted in a doctoral thesis in 1997 about multi-actor processes, and more specifically the intentional modelling of those processes, based on an early form of recursive perspectivism.[486]

Clovers and daisies: societally complete coalitions
In 2000 and 2001, in collaboration with my colleague and independent consultant/researcher Harry te Riele, commissioned by the (then) Ministry of Housing, Spatial Planning and the Environment (VROM), I wrote an essay whose title translates to 'Above the Clover flower the Daisies; a Societal Network for Innovations Directed Toward Sustainability'.[487] *Transition management*, which was aimed at encouraging societal

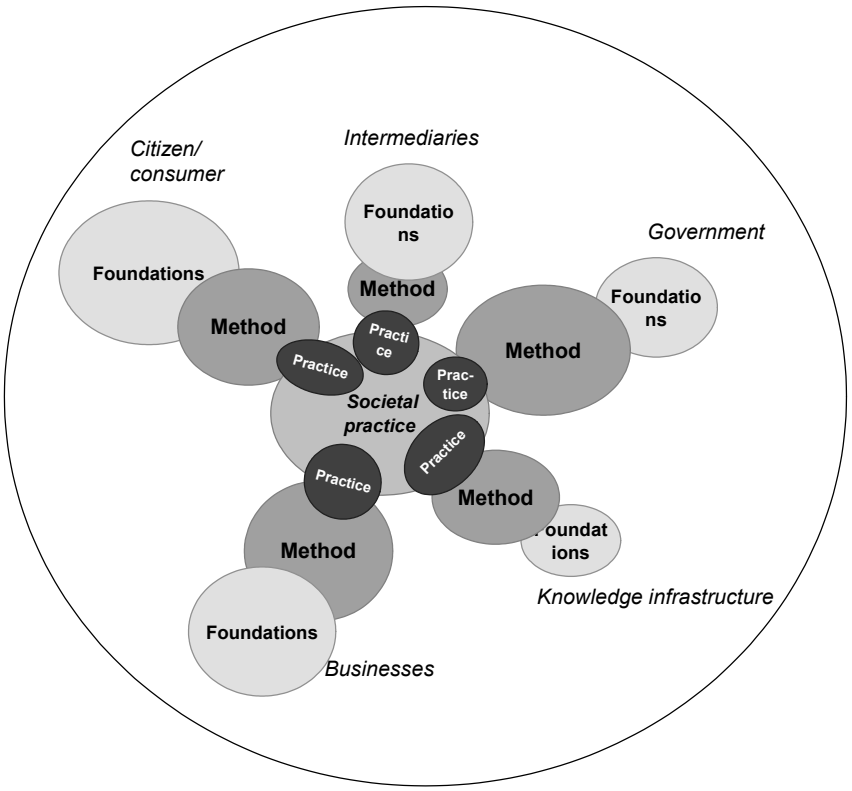
[486] H.B. Diepenmaat (1997), *Trinity, Model-based Support for Multi-Actor Problem Solving*, University of Amsterdam.
[487] Henk Diepenmaat and Harry te Riele, *Boven het klaver bloeien de margrieten: een maatschappelijk netwerk voor innovaties richting duurzaamheid*, published by Actors Process Management BV, 2001. This shadow essay (it was authored by two independent consultants, was never formally published, and is only available through them), has had its influence on the early thoughts on transition regarding the fourth National

transformation towards a more sustainable society, was then in its infancy. The fourth National Environmental Policy Plan of the Dutch Ministry of Housing, Spatial Planning, and the Environment (known colloquially as NMP4)[488] concluded that truly huge environmental problems should no longer be tackled with government-controlled step-by-step policy, but with trend-breaking societal innovations in the form of *transitions*. Transition management was the name slapped onto the mandated approach, but the label was in dire need of more substance. Harry and I thought that such ground-breaking societal innovations should revolve around a society's composite actors gaining more in-depth knowledge of (recognizing, exploring, etc.) each other's needs, competencies, and strengths, and making better use of them. Our essay specifically advocated two measures: first, innovation with and within *societally complete coalitions of actors*, and second, the continued development and mutual connection of in this case at least two levels on which they operate, the *strategic* and the *practical*. The title of the essay referred to this concept: we called strategic coalitions 'clovers' and practical coalitions 'daisies'.

We identified five main groups as central parties in a societally complete coalition (a building block of what I currently call a plurimodern society): citizen/consumers (I deliberately name them first; the reason will follow shortly), the business community, the government, knowledge infrastructure, and intermediaries (see the diagram of 'the little guy' also referred to as 'the dancing figure', from Theme II (Chapter 5), *Identity of actors in perspective*, repeated below).

Environmental Policy Plan (NMP4), in which achieving sustainability in the Netherlands was framed for the very first time as tackling persistent environmental problems by means of focused encouragement of transitions. Influential councils such as the Council for the Environment and Infrastructure and the Social and Economic Council of the Netherlands (SER) quoted the essay in their advisory reports to the Dutch government regarding transitions towards sustainability. In that regard, see the 'decoupling report' (Environment and the economy: decoupling by innovation, 2002, Council for the Environment and Infrastructure) and the advisory report by the Social and Economic Council of the Netherlands regarding the National Environmental Policy Plan 4 (NMP 4: transition thinking) in 2002.

[488] The National Environmental Policy Plan 4 (2001), *A World and a Will: Working on Sustainability*, Ministry of Housing, Spatial Planning and the Environment (VROM).



'The little guy': outlines the societally complete practices by societally complete coalitions in plurimodern societies (from Henk Diepenmaat and Harry te Riele, 2001, 'Boven het klaver bloeien de margrieten'). For the dynamics of 'the little guy', see the section on 'Identity of actors in perspective' in Chapter 5 of this book, and also Volume IV in this series.

The citizen/consumer as a societal cornerstone: the penta helix

For me at that time, writing 'Clovers and Daisies' (as Harry and I invariably keep calling it) was a step in the continued connection of recursive perspectivism and societal innovation.[489] Within societal innovation, we saw a lack of the necessary attention for what we called *societal completeness*. And societally incomplete coalitions, as the name already implies, cannot lead to successful societal innovations. Where was the *citizen/consumer*, for instance? By nature, this is a somewhat schizophrenic actor, because a) as citizens, they are stakeholders in a supportive societal practice and b) as consumers, they fulfil their individual needs. They were (and still are) relatively left out of consideration in many societal innovations and therefore in various more specific roles (the resident in the housing and rental sector, the service user in healthcare, the energy user in power

[489] We called societally incomplete coalitions 'rabbits' because at that time they usually consisted of just two dominant lobes (often the business community and knowledge infrastructure).

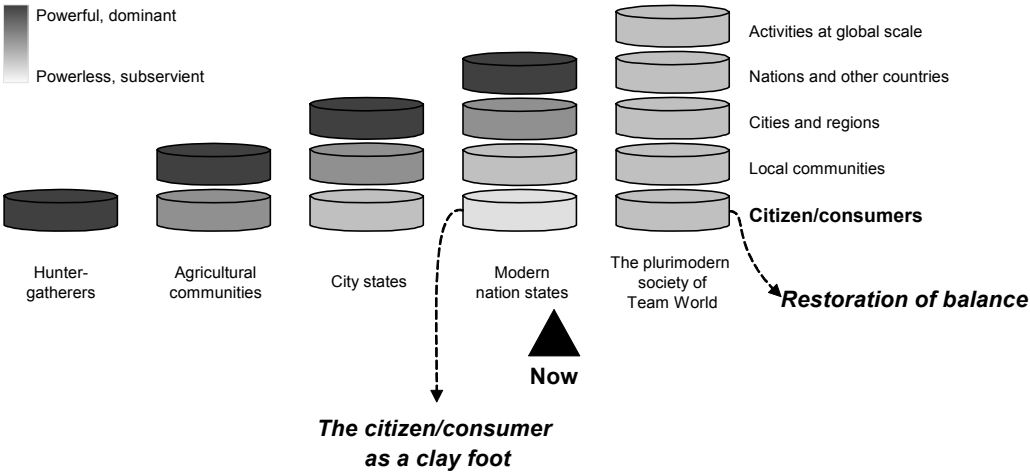
provision, the student in education, the consumer of food in food provision, the user of mobility in the transport discussion, and so on).

We saw this conspicuous omission of the citizen/consumer in the *triple helix* (which in particular emphasizes the roles of government, business community, and knowledge infrastructure in innovation, therefore a trio instead of a quintet),[490] which was gaining popularity at the time (before and around 2000) and is currently still prevalent in the world of innovation. 'The little guy' emphasizes that, from a societal point of view, there is actually a need for a *penta helix*. And of all five segments of the *penta helix*, it is specifically the citizen/consumer, the one that was originally the main focus, which is the worst organized by far. The other four usually have their affairs much better in order, which means their interests are better represented.

The participatory society is already more oriented towards the citizen/consumer (a highly familiar experience for hunter-gatherers, it recently became popular again as a Dutch policy term for a society in which the government takes a step back and in which the citizen plays an important connecting role – essentially and potentially a nice picture). Suspicious citizens suspect that this is mainly because that very same government can no longer maintain, i.e. afford, these same citizens in their roles as consumers (of healthcare for instance). But the citizens, especially those who play active roles in the participatory society, have a difficult time connecting to 'the government'. Citizens do not understand a government that throws duties into their laps, yet fails to yield any of its influence or power or to provide more focused and more effective support to facilitate this transfer of duties, while ideally the government should be closely connected to them. They need each other, but the government exists first and foremost by the grace of the citizen/consumers and to meet their needs.

The path of humanity strongly emphasizes again how very odd it is both to omit citizen/consumers in the triple helix and to commit citizens to a more participatory society without sufficient compensation from the government in return. After all, we are all partly citizen/consumers. The other four groups that tie into a societally complete coalition justify their existence by the sole fact that they provide added value to precisely that citizen/consumer. If they don't, then they are obsolete, redundant, a burden. The citizen/consumer, the cornerstone of society, evolved from the all-round hunter-gatherers to the most basic level of a complex, layered society (see figure below, repeated from Part I, slightly adjusted; the citizen/consumer develops to the right and the bottom) because it adds value to a society. The perfect place where these values should be expressed is ultimately around kitchen tables. Because that is where lives are lived, and where joy and sorrow are experienced most intensely.

[490] The triple helix was developed around 1990 - 1995 by Etzkowitz and Leydesdorff and others. Especially in that time, the trio of government, business community, and knowledge infrastructure was a continued attempt to fortify economic collaboration, but in our view it was also an example of a societally incomplete coalition.



In modernity, the citizen/consumer loses out (see also chapter 4 of this book).

If society no longer takes the citizen/consumer seriously enough, society will have become a clay-footed giant; society will no longer do what it spontaneously evolved (emerged) for and deliberately designed and implemented for. Society will become top-heavy, clay-footed, and will collapse (see the figure above for the *feet of clay*).

The interest of the citizen/consumer, which was originally central, is reflected in the origins of the cooperative foundations of institutions like banks (in Europe, e.g. the *Boerenleenbank* and *Raiffeisenbank*) and insurance companies (Achmea: in 1811 a small number of farmers and dignitaries sat around a large kitchen table in Achlum and decided to cover each other in case of fire and other disasters, in order to reduce personal impact from such calamities). Having evolved into modernist juggernauts, many of the banks and insurance companies have already lost most of their cooperative foundations by now. They either exist in name only or are used as an advertising strategy. These days, companies increasingly find themselves *opposing* their customers in shady investment scandals and mortgage-interest disputes. Sometimes you may even get the feeling that customers are just there to serve the companies, the citizens to serve the governments, the patients to serve the healthcare sectors, and the students to serve the education sector, instead of the other way around. The world has gone topsy-turvy, I have ascertained in amazement, with a clear picture of *the path of humanity* in my mind. Even more examples: Today, the European Central Bank stands firmly opposed to people who save money in such forms as pensions (also a citizen/consumer role). Or take the regularly resurgent conflict of interest between patient associations and the pharmaceutical industries/healthcare complex: this is absolutely an unfair fight, precisely because the patients lack the organizational wherewithal of their competition. Or take non-standard students: they are occasionally crushed between the cogs of the education system, despite their talents. But wasn't healthcare originally about patients and people needing care? Wasn't education originally

about students? Didn't insurance policies and mortgages once revolve around individuals who could no longer bear the costs and risks individually? Wasn't the centre of societal life originally the hunter-gatherers, who developed into the many varieties of citizen/consumer they are today by walking *the path of humanity*?

The recent emergence of sustainable energy cooperatives in the Netherlands, in which citizen/consumers have joined forces to generate their own sustainable energy, is interesting in this context. It is in essence a reaction movement, an emancipation movement (see also the societal balance model in section 4.2 of chapter 4) of the citizen/consumer, in this case aimed at (or in response to) an energy supply that is governed by organizations and institutions (in both government and business) that are focused too much on their own interests and too little on sustainability. These cooperatives have a very important indicator function, as do experiments with new monetary systems (for instance, the blockchain-technology-based Bitcoin, and the 'Dam' – a Rotterdam 'money' system under the chairmanship of the very same Harry te Riele). Or take the fact that more and more people are preparing their own food with their own local ingredients, or the ones they can trace with their own eyes, because they no longer trust the global food supply chains and their inspection authorities (the increasingly frequent mishaps in the food system certainly raise concerns, and there is a clear analogy with financial rating firms). It will be interesting to follow these developments and see whether they are viable, and how these small groups intend to avoid enriching themselves the way so many banks, insurance companies, and other major institutions have done.[491]

Free rein for the penta helix!

The fact that, more than those of other actors, the interests of citizen/consumers often get lost in an increasingly complex society is not nice to hear, but it is easily *explained*. Of the five parties that make up the 'little guy', they are usually the least professionally organized, so their interests are least represented and looked after. It could be argued that hunter-gatherers, at least in our democracies, have continued to organize and refine their *citizenship*, delegating it to the government, and have surrendered their *consumership* to the business community. Naturally, they have choices, as citizens and as consumers. But the citizen/consumers have long since lost their hold on both of these key components of the *penta helix* (government and business community). They have even disappeared completely from the *triple helix*, and that is a bad sign of the times.

And that is why the citizen/consumers are raising their voices more and more in our late-modern age. They are being neglected. If you only want to focus on a *triple* helix, then it should be the one formed of citizen/consumers, government and the business community, the three central parties in developed economies.[492] Their mutual interconnectedness was already significant and continues to grow, but their mutual involvement in current societal

[491] After all, this will require a plurimodern transformation.

[492] I initially used the term *societies* instead of economies here, but that term did not make the cut.

practices keeps on getting weaker, while these practices continue both to grow and to lose their balance. All three increasingly taking a position as independent parties with their own interests, which need to be represented at all costs, even at the expense of other parties. This is precisely why a plurimodern transformation is so sorely needed.

If you want to change, innovate, and *improve* powerfully from a societal perspective, the components of knowledge infrastructure and intermediaries (the last explicitly being tasked with connecting and cultural interpretation) will immediately follow in the wake of this trio. They also often pursue their own interests, but they are necessary. 'The little guy', with its five focal points, makes much more sense from a *societal* perspective than the triple helix. The primary party, is not one of the three actors from the triple helix, but the citizen/consumer, immediately followed by the government and the business community. And to be able to operate as a complete representation of society, we will also need intermediaries and the knowledge sector. I was promoting this message in various lectures way back in 2000-2001, and I still stand firmly behind it. Free rein for the penta helix!

The citizen/consumer/voter

The layer of the citizen/consumer is poorly organized on the larger scales. At the same time, it is also the layer that involves the most intense interests: after all, profound happiness and deep misery are ideally shared with your loved ones, in your own home; in the old days, it would have been around the campfire, and today it unfolds at the kitchen table. As citizen/consumers, we are increasingly dependent on a formidable government bureaucracy as well as an equally huge private sector for important elements of our lives such as our food supply, health, and safety. As the checkers continue to stack up, roughly getting taller over time but with their ups and downs, as shown in the figure above, the distance to the individual kitchen tables is continuing to grow, and the engagement with the individual kitchen tables is lessening.

This applies to late-modern societies in general, but especially in non-democratic societies and detailed planned economies, where the citizen/consumer often comes in last on a *seriously* large scale. After all, citizen/consumers can deploy their countervailing powers in a democracy and in a free-market economy. They can radically vote out leaders they don't like, and refuse to buy products and services they don't like. Citizen/consumer/voter is an apt description of the role in this case. You choose as a citizen, and you choose as a consumer.

I have already expressed my doubts regarding the constrictive, generating, and constructive capacity of a democracy earlier in this book. These doubts did not just arise out of thin air. I have often referred to the nature of a continuous debate, the preferred form of communication in democracy, which is often focused on getting attention and votes in the short term, and possibly therefore is exhausting, petty, and always aiming to be right. I attribute this to the short-sightedness of late-modern humankind, or at least our

limited effort to anticipate future developments, precisely since the scope of growing late-modern societies is growing itself.[493]

However, *the corrective effects* of both the democracy and the open economy (consider Schumpeter as well, but now in terms of a type of democratic destruction) are unequalled, and for that reason, they are already preferable to all other forms of societal regulation. However, both require people in place with awareness and a wide-ranging perspective, who take exceptional care in dealing with those who are unjustifiably designated 'the losers'. This is once again a loud and unadulterated plea for a plurimodern transformation. It is understandable as well as ominous that populism is on the rise in Europe, as the populist voter does exactly that: correcting. The voting behaviour is the citizen/consumer/voters' response to the fragmenting societal arrangements, that increasingly are serving politicians and entrepreneurs much more than the citizen/consumers' *own* interests.

Citizen/consumer/voters invariably choose the lowest price, assuming equal standards of product quality in the strictest sense, and no longer see the inhumane labour conditions and pollution elsewhere in the chains. (This is inherent in the nature of chains, as I have explained earlier in this book: strict chains imply great imbalance.) The citizen/consumer/voters also demand attention for their immediate interests, one way or the other. The politicians who promise them that attention get their votes and the businesses who promise them that attention get their money. In one fell swoop, the political and economic voter who is disappointed in society is on the verge of throwing away the newly conceived baby of plurimodern society with the societal bathwater, fragmented as it is into experiential worlds.

However, it is not accurate to also name the citizen/consumer/voter as the *cause* of all of this. That attribution should go to the incomplete societal layers in which people with a citizen/consumer role also participate in entirely different roles. The populist behaviour of the citizen/consumer is a response to a government and business community that is performing poorly and is increasingly self-absorbed. I repeat: in this regard, our late-modern society is out of perspectivist balance, and even slightly schizophrenic.

This imbalance will probably not lead to the self-destruction of society. Our society will get back on track eventually, even though it can go terribly wrong, as the fascist and communist aberrations of the twentieth century have taught us, as well as the neoliberal aberrations at the beginning of this century.[494] Eventually, we will seek and find balance again, even though it is sometimes at the lower positions of the diagonal, and subsequently find our way back up to greater heights on the diagonal, as naturally as hamsters in a wheel.

[493] And again: this can be improved by explicitly focusing on it, by means of a plurimodern transformation.
[494] In this case, I am referring to the financial chaos since the downfall of Lehman Brothers, the effects of which still continue to linger, even though this crisis is mild in terms of human suffering, compared to world wars. The extreme poverty that over a billion people are living in is a much more dire example. After all, as soon as you are able to help improve the situation somewhat, you are basically co-responsible.

Our society continues to rearrange itself over and over. We are on our way to plurimodernity, whether or not we want it or are aware of it. Overall, more people are becoming aware of it, under its many different labels and denominators.

If there is unexpected short-term destruction of coherence on a smaller scale – Brexit is a good example, in any case the wholesale and radical departure of the United Kingdom from the European Union[495] – then *the path of humanity* and the perspectivist balance will fulfil their autonomous tasks of shaping society again sooner or later. In the United Kingdom, the voters who opted to leave the European Union were primarily the elderly and the disadvantaged. That fact should offer food for thought, both for the future of populism and for the way today's late-modern societies deal with the less flexible and the disadvantaged. In essence, societies that perform poorly on a large scale and populism are just two sides of the same coin.

In any event, balance eventually wins out and we feel the pull of the diagonal again. Although there are still huge societal leaps that lie ahead, we can take them by achieving societally complete coalitions (in essence a different definition for plurimodernity and perspectivist balance). A plurimodern transformation is the basis for unlocking all of this potential.

Mastering Three

In 2012 I wrote the book *Mastering Three* together with two of my colleagues at Nyenrode Business University: Anke van Hal and Joost van Ettekoven (both originally civil engineers).[496] At that time, I felt a great need to provide space for *societal* innovation, especially compared to the economics-dominated innovation methods more commonly and more widely used in the business sector.

To be honest, I felt (and still do) that the recent dominant corporate innovation practices, which is mostly set up to achieve economic product innovation and financial process efficiency, is very narrow and takes very little account of society. Do not misunderstand me: I consider a flourishing economy a cornerstone, even a *sine qua non* for a quality society. I consider creating value together more important than sharing value together, and creating

[495] I am certainly not opposed to a critical attitude towards European technocrats. I merely believe that the solution can be found in the ongoing plurimodern transformation of the European Union and the United Nations as layers of our global society, and not in dissolving or weakening these institutions. In fact, in the event that the European Union collapses and the United Nations continues to grow weaker, I even expect that history will prove me right: within a couple of centuries, and probably a good deal sooner than that, we will try again. *The path of humanity* will not be stopped, at least not systematically, and not for very long. That is a matter of perspectivist mass, entropy, and statistics.

[496] Henk Diepenmaat, Anke van Hal and Joost van Ettekoven (2012), *Mastering Three, A Threefold Method towards a Vital Building Practice*, Center for Sustainability, Nyenrode Business University, Breukelen, The Netherlands. (Also available in Dutch.) Thanks to Koninklijke BAM. Anke is a dauntless advocate of mentioning and facilitating the often subordinate interests of users and residents, in other words the citizen/consumer, in construction. Joost uses the same insights in his own practice as an architect.

value together is precisely what a responsible economy (and a society) does. (What would you share otherwise?) But I dislike the concept of 'economy' in isolation just as much, and the concept of 'social' in isolation as well. They are both flawed birds with just one wing, scurrying around in circles on the ground. Only in close collaboration can they truly take flight in a strong *societal* connection. The concept of corporate social responsibility (CSR) is the very first step the business community can take from here to plurimodernity.[497] Entrepreneurs therefore have a long way to go, but they cannot do it all on their own: they will remain fiddling on the sidelines as long as governments and consumers do not participate. There is also a lot of room for improvement in socially responsible policy and socially responsible consumption. Sustainable entrepreneurship, policies (and their implementation), and consumption have little chance of succeeding without mutual support. Since the connecting role that pre-eminently conveys this realization is that of the citizen, a plurimodern transformation may specifically require more of this connecting citizenship.

In the book *Mastering Three*, we cross-compared, cross-analyzed, and described three wide-ranging innovation approaches in relation to the shared backdrop of value development:[498]

1. process efficiency
2. product innovation
3. societal innovation

The majority of the business community arranges these three in two columns with societal innovation has been placed *next to* the other two in this triptych, because that is how it is perceived by. The overall picture that I have observed is this: the business community does have some sympathy for societal innovation, but does not particularly feel responsible for it. I have a different perspective on that side-by-side placement, though. I believe societal innovation is more the coherent efforts by societally complete coalitions (see the *penta helix*) to implement any kind of innovation to improve society. According to Anke, Joost, and myself, it was vital for integral innovation practices to use all three orientations in coherence. Hence the title: *Mastering Three*. After all, you cannot write a coherent book if you only have a few of the required letters or terms at your disposal.

Looking back with the wisdom of hindsight, my PhD thesis, *Clovers and Daisies*, and *Mastering Three* (as well as a strategy for the Port of Rotterdam, which I co-authored) had

[497] My response to entrepreneurs' doubts about corporate social responsibility is invariably: in what sense is *regular* entrepreneurship socially responsible?

[498] To me, writing the book *Mastering Three* was a stepping stone between my thesis and Section 3 of this book, which presents among other things a complete set of six innovative orientations, based on the pattern of an underlying three-dimensional perspectivist space. It sometimes takes a few decades before you can create a bridge between intuitions, first principles and existing pragmatic concepts, but when these first principles (in this case recursive perspective) make sense, it should eventually be possible. This section is a testimony to that.

been skirmishes, stepping stones to reaching a more complete understanding of societal innovation based on recursive perspectivism. Societal innovation, actors, and recursive perspectivism were related to each other: I could feel it in my bones. The first shreds of understanding date back to that hill just outside the mining village, when I was a child of seven or eight, standing on the sidelines of an imminent fight in a meadow, as a misunderstood third faction, looking on in sheer amazement and confusion at what was, in my opinion, a pointless, worthless, and useless parting of the ways.

9.1.2 Recursive perspectivism and societal innovation

As you know by now, we have been stumbling upwards along *the path of humanity*, mainly by accident, towards increasing coherence and cooperation, at least from a statistical perspective and in the long term. Once in a while, we also see some considerable regressions (mentioned in the introduction to this book). There is a regular improvement, often on a smaller scale but occasionally on the larger scale (the discrete inverse proportionality). We are smart enough to recognize improvements for what they are when they occur, whether intentional or not. They satisfy our needs and preferences (even when we only understand it when that fulfilment becomes possible or has even just emerged). Subsequently, we support, underpin, and distribute those improvements in all sorts of ways, to be able to enjoy their value in the future and elsewhere as well. We create methods, we establish them in our educational systems, we create the prerequisites under which they can come to fruition and be sustained in the form of all types of institutions, and we use many other versions of societal support.[499]

The path of humanity so far has been a sketch of the complete journey, and our current societies form the integral outcome at this point, the momentary total sum of this process. If we ignore a few details, it is a path of improvement. If there are sufficient changes in our society, if we work together seeking improvement in reciprocal responsibility and in freedom, the path that we will end up walking together will be somewhere around the most probable path, i.e. the diagonal in the perspectivist space. In a recursive perspectivist view, this is mainly a matter of statistics and entropy.

Perspectives derive their meaning from improvement, from experiencing value. Innovation aims for renewal. Where people speak of societal *innovation* (or societal *change*), I would rather speak consistently of *deliberate attempts to improve society*. (And the same applies to all forms of innovation and deliberate change.) After all, it is also possible to renew (the literal meaning of innovation is *renewal*) without any improvement. For instance, if you were to replace your old speakers with new ones giving a less-refined sound, that would be renewal

[499] In the years when I was actively collaborating with the Dutch Research Institute for Transitions (DRIFT) at Erasmus University in Rotterdam, I invariably called societal regimes (a term from the transition jargon that was developed there) 'supported societal multi-actor practices'.

without improvement, in other words, a downgrade.[500] Also, 'new' is a relative concept. What has been common practice in one sector may be considered new in another.

In fact, terms such as 'innovation' and' change' do not specify what they are all essentially about: *deliberate attempts at creating additional value*, in whatever shape or form people may experience that value. The creation of value takes effort. Something is better when it generates more value, and/or requires less effort than something else, and always according to the actors that are concerned. When something creates more value, it is more effective. If it takes less effort, it is more efficient. Combinations are also possible, of course. According to recursive perspectivism, innovation is the development of a 'better improvement perspective' by deliberately looking for it. In short:

> *Innovation improves improvement perspectives by and for actors.*

Not everything that is new, or that changes, is better. As terms, 'innovation' and 'change management' therefore miss the mark semantically. However, they are inevitable and by now deeply rooted terms. I will therefore not try to write off the term innovation as incomplete or sloppy, which would be an unproductive waste of my efforts. But do keep this in mind: when I talk about societal innovation, I mean deliberate, preconceived, joint attempts aimed at *improvement*, without a guaranteed chance of success. If we know we will succeed, then we do not speak in terms of innovative improvement, but routine improvement like repairing the roof, having a children's party – though that can go wrong, shopping for groceries, or manufacturing spades. To summarize:

> *Innovation is a preconceived attempt at improving improvement perspectives by and for actors, without any guarantee of success.*

I believe societal innovation has everything to do with the way in which societal actors deal with each other, each from their own perspectives, and with how more and more societal actors are deliberately trying to understand each other better, and based on that deliberately try to improve, generating increasingly more value working closely together with increasingly less effort. This is basically the term plurimodern transformation in other words. Because why would we want to limit *deliberately trying to improve* to smaller societal scales?

If we only want to use innovation on a limited scale, we will leave enormous opportunities for improvement unused. That is something we can actually no longer afford, especially considering the increasing complexity of our late-modern societies. But is large-scale societal innovation even possible?

[500] I am writing this while listening to J.J. Cale on the BBC on ancient English loudspeakers.

9.1.3 A leap of faith?

'Me, I'm just a lawnmower - you can tell me by the way I walk.'
Genesis, I Know What I Like

Innovation is a deliberate process designed to find ever-better perspectivist configurations. The key phrase in the relationship between recursive perspectivism and societal innovation is 'looking for societal improvement perspectives *together*, without knowing where you will end up'. You are constantly looking for societal multi-actor configurations that have maximum value, and minimal effort. They are, strictly from a statistical point of view, often closest to *the path of humanity* in its most ideal form, therefore along the diagonal of perspectivist space. It is therefore smart to use *the path of humanity* deliberately in societal innovation. Compare it to looking for water: water flows downhill, and it would be silly to look for water without using that insight. This does not mean that you cannot find mountain lakes at unexpectedly high altitudes, but our oceans are much larger. Similarly, innovation continues to seek and find points and regions with the highest improvement potential in the perspectivist space (even when we do not do that deliberately at larger scales). And *the path of humanity* is nothing but a mountain ridge of increasingly higher peaks, the highest peaks given the scope of perspective concerned. This is a trail of the most probable improvement potentials in the perspectivist landscape.

It is better to be at the top of a peak than at lower altitudes. People know roughly how high they are in their landscape, usually based on their personal experience. They have a general consciousness of the landscape around them, whether that awareness is sufficient or not, and the view is always better from higher up. Societal innovation requires us to use and develop these types of experiences on a much broader scale, and use this realization jointly and on a much bigger scale. We can sense whether something is right or not, and where it is better.

When something is truly right, or if we are extremely short-sighted, we do not perceive either opportunities for improvement or improvement perspective. That means we are at the highest point in the perspectivist landscape, in relative terms, and are unable to see higher points in the far distance. It is of course very possible that we are at the Holterberg, a hill only 60 metres above sea level, or atop the Zugspitze, the highest mountain in Germany, just shy of 3000 metres, near the Austrian border, surrounded by a dense fog. If something is not right, or if we are able to look far into the perspectivist landscape, we *do* perceive possibilities for improvement: We may be at a lower point at the time, or on a low peak, halfway up a slope, or even in a valley, but in any case, we perceive high points within our field of vision (or even only a glimmer of one). We can sense at that time, no matter how implicit they may be, that there are configurations that provide more value for less effort, and we can see the direction of the perspectivist space in which these improvements can be found. That sense, that urge for and towards improvement, is the driving force behind all human development. You just cannot stop it. Once you experience improvement

perspective, the genie is out of the bottle and you want to capitalize on the promise of value that the improvement potential represents.

We also see these metaphors of peaks, places where life is better than elsewhere, reflected in quantum mechanics. When Niels Bohr formulated his quantum-theoretical atomic model in the early twentieth century, the most prominent new insights had been that electrons circled an atomic nucleus in fixed energetic orbits, that being in these orbits did not cost *any* energy, and that because of these fixed orbits only *fixed* leaps of energy (quantum leaps) were possible. Bohr's theory was unprecedented. The peaks, in his case spherical shapes, were determined in advance, much like our perspectivist mountainous landscape has been determined in advance. It enabled him to explain the electron spectrum of the Hydrogen atom, comparable to how recursive perspectivism substantiates pattern laws, such as the laws of Benford and Zipf, and *the path of humanity* at a larger scale and level of complexity.

That was what led Ernest Rutherford, the inventor of Bohr's prevailing atomic model at that time (a positively charged nucleus orbited by free-floating negative electrons; there were therefore no preferred pathways) to an intriguing question: didn't this mean that electrons preparing for the leap had to have *knowledge* of the place they were going to leap to? Quantum theory deals with these types of questions statistically. With individual electrons, you *never* really know how they will leap, so we therefore do not assume that individual electrons actually 'know'. You cannot see the orbits until you have observed many electron leaps. All you know are average values and statistical chances of where it will be.

A comparable principle of means and statistics is also the foundation of positions and leaps in the perspectivist space. The unit of movement in perspectivist space is (recursive) perspective. If a societal practice develops itself (moves, 'leaps') from one position (one perspectivist configuration, one starting situation) to the other (the resulting situation), you do not know exactly how that leap will go in individual cases, or how big it should be. There is an intrinsic uncertainty; at best, you can only approximate it. That uncertainty does not decrease until we reach large numbers of leaps. At that point, you will know the average leap, and thus you will gain statistical certainty. Hence the pattern laws again. They are only visible with repetition; they show up statistically in sufficiently complex situations, and are never exact.

That is what a specific societal practice at a specific position of perspectivist space needs to learn to live with. Every societal innovation is a unique leap, and will change an initial societal configuration into a resulting one. However, a society only jumps once each time. It would like to know about a nice new position for it to be in after the leap, to 'hang out'

somewhere where things are good again. Unfortunately, that luxury is denied to society; it is already difficult enough to know where society stands right before it takes the leap.[501]

It is an intrinsic property of innovation at any scale whatsoever that there will be an intrinsic uncertainty inherent in each individual leap. That is why we call an individual innovation process uncertain, and why it could fail: the individual process explores largely unknown territory. Compare it to a single throw of a dice. But that is precisely why we need to structurally invest in innovation: we know the landscape, and the innovation process pays off, statistically speaking, at any scale that statistics can do its work.

That is an intriguing aspect of innovation: you start an innovation process from the solid conviction that there is room for improvement, while venturing into unknown territory. That seems absurd, a leap of faith. But the nature of perspectivist space, with its three dimensions of society and the value balances, indicates why there are always people who will take up that innovation challenge each and every time. Strictly from a statistical point of view, there is always a possibility to achieve a better resulting configuration, if you continue to use more perspective in constantly improving coherence and cooperation, and therefore also roughly follow the diagonal of *the path of humanity*. That will only stop once you have reached the optimal configuration of all possible available perspectives.

As far as we understand the universe, the nature and number of *possible* perspectives are unlimited from a pragmatic point of view. And our consciousness, within its pragmatic capacity limitations (for example, that each individual can have an average number of perspectives), is seeking increasingly higher positions on the diagonal. People who see these peaks in the distance – visionaries – set out on their uncertain path with strong conviction. You might well break your neck in a gorge, though, so you need to be careful. Therefore people who do not see these peaks – conservatives – like nothing better than to stay where they are, and with just as much conviction. That is where Thales and the Thracian maid differ from each other.

In individual cases, you do not know exactly if that better point, that new peak, is close by or far away, and if you will find it and not fall into a canyon instead. You will need to look for it. But as the perspectivist landscape shows, statistically speaking, you may assume that it is there. That is a very hopeful thought, which suddenly makes the leap of faith a whole lot less uncertain, and a great deal more appealing. Seek, and ye shall find. At least, you have an excellent chance, especially when you are not only inspired, but also start looking in a

[501] It is characteristic of such a leap that it changes an initial position into a resulting position. To that end, perspectives are added or removed, or the ratio across the dimensions is shifted, or a complex combination of these. In addition, you can also leap from one position to different positions, or leap from different positions to one position. Or from different positions to different positions. Whether that is also interesting with regard to value and effort depends, statistically speaking, on the degree of symmetry (closer to the diagonal is better) and the distance from the origin (further away from the origin is better).

professional and systematic way, with others. That is no longer just a matter of faith, but mainly one of statistics.

That hopeful thought applies to individual innovation at the very small perspectivist scale, such as a child who learns how to tie their own shoelaces (practice makes perfect). It also applies to much larger societal scales, even to all of us together as the whole of humanity (on our way to Team World). It is useful to seek out the diagonal, and follow it upwards as high as possible. We only need to stop doing so when we have more or less balanced out the available perspective in terms of our capacity. We are distinctly out of balance and thus still far from that point in this late-modern age. And even when we reach an approximate balance, we can still improve considerably by substituting better perspectives for the worse ones. It will be worthwhile for humanity to start looking for *the path of humanity* together and following it into the future. In that process, we cross the threshold together into unknown territory, in the knowledge that, at least statistically speaking, there are still big societal improvements ahead of us.

It is important that we are meticulous in dealing with the individual people whose process will *not* result in the desired value. Quite wrongly in terms of society, we call these people losers; winners necessarily imply losers. But if we work in many teams in a search for nuclear fusion, travelling different routes in different directions, but still in conjunction, and one group succeeds, does that mean that the other ones have failed? Or compare it to finding a child who has gone missing in the woods, or someone lost at sea. The missing person is usually found by just one individual. In such a situation, you could say that the others have failed as individuals. But of course they have not failed at all, and especially not because they are culpably incompetent or just plain stupider (though generally speaking that might also be the case; here we are interpreting the content, looking at individual perspectives). That is just the statistical nature of the perspectivist game. 'They' do not fail as individuals, no, *'we' actually have greater success as a collaborating search party*. 'Failure as individuals' is actually a highly peculiar interpretation, and the success as a group is what should count from a *societal* perspective. Well-organized searches are a prime example of the perspectivist balance: they are an entire body (the search party), everyone does the same things (searching); and everyone does something completely different (in a different place), all in a good balance. In doing so, individual leaps of faith – individual quests for added value – are brought together to a greater extent, turning into collaborating, societally robust innovation paths.

Through modern to plurimodern benchmark: the camel

This huge potential for societal innovation and societal improvement is largely overlooked even by many of our leaders, who are therefore completely unable to mobilize it. How can we take full advantage of the plurimodern potential of *the path of humanity*?

Perhaps I should put my critical remarks regarding modernity into a bit more perspective. My experience has been that it can make exponents of modernity downright angry at times. Compared to our last episode, the city-states, modernity was definitely a step

forward. And unfortunately, I also do not have detailed *concrete* answers on how to capitalize on the promise of a better plurimodern future. That is not because I have not put enough thought into it, but because that is completely impossible in terms of content. We will have to deliberately and systematically deal with perspectives in coherence, with configurations of actors and perspectives, with multi-actor perspectives that much more explicitly also contain the perspectives of others. Using this approach, inspired leaders and initiators (from any position possible), and later on people in a variety of different roles, can also help shape the plurimodern transformation (even though the majority of people will not use this term as such, and may not even recognize it).

We have been able to reap the benefits of modernity for a couple of centuries now, and will continue to do so in the future, as part of a more differentiated societal planning. Allow me therefore to exuberantly praise once more and without a trace of reluctance the major benefits of modernity, viewed from such earlier societal phases as the hunter-gatherers, the sedentary agricultural societies and the city-states. After all, viewed from the past, modernity *was* a huge step forward.

However, it is remarkable that once you start having a better view of the contours of the plurimodern future (as soon as you start seeing the next peak on the way up), you cannot help noticing the increasing shortcomings of modernity. The multitude of huge, rigid systems, which relate to each other in abrasive and sometimes in outright conflicting ways, can seriously threaten even our environment on the global scale, and individuals (citizen/consumers) are most definitely crushed between their gears at more clearly discernible frequencies, e.g. in healthcare or education. It happens in democracies as well: if only a minority is bothered by something, democratic corrections will not work. Modernity leads to codified mediocrity, as an old friend of mine might call it. Modernity prunes and shreds the exceptions – the negative as well as the positive ones, I might add.

I therefore do not have any content-specific methods to bring plurimodernity any closer. What I *can* try to do is to contribute to the pragmatic set of innovative methods to bring plurimodern society closer. And that is exactly what I will do here.

In their *general* forms and semantics, these societally innovative methods are not all that special. Many people can be found, and many sources can be consulted, that mention and use elements that are discussed later on, and may even consider them comparable in some areas and use them as such. I am talking about things like variations on stakeholder analyses, innovation methods, and administrative arrangements. Duly noted!

But again I must confess to being a reflective pragmatist. Societally innovative methods are only known about and being used on a limited scale for the societal scales I intended them for, and in the underlying coherence that I attribute to them, by people who can and should do something with it. And the recursive perspectivist foundation most definitely makes the set, which I shall present, more consistent, more complete, more coherent and potentially stronger.

First, a few examples to define the framework, because we will need to open our modern eyes, and wake from our modernist dogmatic slumber to be able to see the beckoning plurimodern perspective. I will start small. Just a few moments ago, I was sitting in my garden, at the edge of the woods in Zeist, enjoying a cup of coffee. I love sitting in my garden; the tall trees and the proximity of the woods give me a sense of tranquillity. But various neighbours are working in their gardens and on their homes, at various distances, with all sorts of snarling machines (sanders, hedge trimmers, I don't know what exactly). I am not currently adding to the racket, but often I do; my hedge clippers also make noise. In addition, the municipality is redoing the gravel sidewalks in my neighbourhood right now. My neighbours cannot beat that, nuisance-wise. Some kind of heavy road-paving machine is making such a terrible din and putting such filth into the air that I'm literally surrounded by a thick cloud of diesel fumes. As if to add the cherry on top, a moped races past. That combination doesn't happen very often, but it is possibly even more annoying precisely because of that. I know, I know, these are first-world problems, gentleman's troubles; what a complainer I am. But why do we have gardening tools that make so much noise? Whoever came up with the idea that machines that pollute the air so much still need to be used? Why is public maintenance work outsourced to such noisy people? What idiot allows mopeds capable of producing so many decibels?

I am not voicing these questions as some sort of obligatory grumbling from a well-off neighbourhood. I sincerely mean it: *why do we allow that, why aren't we doing something about it?* In this situation, we are much like the poor Mexican coffee farmers I mentioned in the methodology section: we do not have a clear understanding that we could be much better off, we do not know how we could organize things better, and therefore we rely on rather pitiful societal quality in this very small area.

Organizing things better is not an easy task by far: changing international laws and regulations is no trifling matter, and neither is changing our global production, retail, and consumption chains. Overall, thousands and thousands of actors participate in them (also consider Thomas Thwaites' toaster).

Compared to other Western countries, and especially compared to other countries with less-detailed laws and regulations, or those lacking them entirely, *we are not doing that badly at all* with regard to noise levels and local air quality. According to international benchmarks, we are probably doing quite well, as one of the world's wealthier and better-organized countries. I contemplate all this while surrounded by horrendous noise and an incredible stench. According to the benchmark, our performance is excellent, and apparently, that is sufficient reason to temper our ambitions. But if you stop and think how it could have been different, it actually is not 'quite reasonable' at all; in fact, it's downright awful. We are on an arid salt plain together with other late-modern organized countries. Surrounding us, hidden behind the clouds, there are high plurimodern mountain peaks, but we are not aware of them at all! This does not just apply to first-world problems like gardening and gravel-path maintenance but to practically all societal sectors and systems, and their mutual coherence. I just take another sip of my coffee, and hope all of that stench

and noise will soon be over. I cannot do anything about it from my garden chair. Actually, I can do something – it is relentless, so I just flee back inside. But does that also make my contemplations utopian?

When I take a look around at societal improvement in practice, limiting myself primarily to the Netherlands and the rest of Europe, I see many societal systems that function well by modern standards, especially when you compare them internationally. I do not want to speak of a general disqualification at all. But it must be said that I also see a great deal of conservatism and a focus on unadulterated self-interest. Many talks I have had with people from abroad have reinforced my idea that things aren't going so well in other parts of the world either, and often it is even worse.

In Dutch practice, innovation and improvement programmes are often collections of concrete projects, neatly stapled together, although I often find it unclear why precisely these projects deserve support while others do not. These programmes are provided with frameworks with versions of matrices (in the past) and road maps (today) that legitimize their choices and funding.[502] It is mainly *stakeholders from established modern practice* who pull the strings; after all, they are better organized than the rest and have the most time and money to spend on it. This characteristically *fin de siècle* situation, right at the end of the life cycle of a societal phase, is far direr in today's late modernity than in a societal episode in its prime. Aside from incremental improvements, these stakeholders will mainly want to continue and optimize the existing modern situation. *The path of humanity*, on the other hand, shows that we need to move on, up towards plurimodernity!

Whether today's late-modern systems perform well, and whether innovation projects are eligible for support by innovation funds, is determined by late-modern criteria, or through benchmarks originating from systems set up according to the exact same late-modern principles abroad. Therefore, a modern quality framework functions very dominantly and effectively as a brake on leaps in societal innovation on the way towards a plurimodern society.

I am going to mention a few other examples in a bit – pretty randomly, because a very wide selection is also easily possible here. My aim is not to go deep into details in these matters, or to over-criticize late-modern systems – they simply are what they are – but to clarify the general point I am making here. That point is, clearly explained:

1: Modern societies and societal systems are optimized using modern quality criteria.

[502] I use my 'staples' remark a bit bluntly sometimes, and according to programme managers I see things completely backwards. They insist that projects follow from matrices and road maps. The truth lies more or less in the middle, of course. I believe the crucial issue is that the modern status quo is too well anchored, and people are hardly really pursuing the plurimodern future.

2: Plurimodern societies and societal systems are optimized using plurimodern quality criteria.

3: In societal innovation befitting our late-modern era, we need to aim for transforming our late-modern societies and societal systems into plurimodern societies and societal systems. (Also see the societal sketches in Part 1).

4: And a transformation from modernity to plurimodernity therefore needs to be based not on modern quality criteria but on plurimodern quality criteria.

Let's take education. In the Netherlands, we consider ourselves quite fortunate that we have an education system that is, compared to international counterparts, modern (which is certainly true) and excellent (which is considerably less true). Average students come out of it relatively unscathed, while it costs relatively little money. A policy brief from 2011 issued by the Netherlands Bureau for Economic Policy Analysis (CPB) states: 'Dutch education attains a high level, but quality is decreasing. That is cause for concern, as the quality of education is decisive for the economic achievements of a country.' Although I have my doubts as to whether the economy should be the *only* cause for concern, it is of course relevant. This brief was written in a country where a by-now infamous basic maths test indicated that our youth and members of the parliamentary committee on education are collectively incapable of calculating-in-context. Now I do not want to pitch in with the outraged group of people calling this a disgrace. My point concerns the fact that it is possible that the quality of education can still be called 'high' in this respect. How can this be? Are people in other countries also incapable of calculating-in-context, so that this development has not led to any dips in the benchmarks? Or is it not measured at all? Are we collectively being lulled to sleep?

I understand that institutes such as the Netherlands Bureau for Economic Policy Analysis primarily receive well-defined assignments, for instance to compare benchmarks, and not to think outside the box themselves. And if you very carefully read that policy brief, the Bureau actually does state, though in a whisper that would be inaudible for normal people, that all is actually not well at all. But I just do not understand why an educational system, which so obviously fails in a crucial aspect as contextual mathematics, can still be called 'high level'. If our benchmarks indicate that, then it is high time to change the benchmarks. It is high time to no longer have quality be determined by education professionals catering to modernity, but to allow stakeholders to have a say: students, parents, culture aficionados, and representatives of the places where students end up in business and society. The education system should become plurimodern. The undignified power struggle regarding the maths test mainly indicated how hard it is to give direction to our education system, and how fiercely the existing modern education system resists interference aimed at improvement. This is illustrative of plurimodern transformation, I'm afraid, at least if we do not continue professionalizing our competencies in societal innovations.

As another example, let us take innovation. This is a crucial basic process for any country's economy. In particular, product innovation and efficiency improvement can expect heartfelt interest and support from the government. This interest is primarily aimed at the business community and knowledge parties. The triple helix reigns supreme, and the citizen/consumer is absent. I say again: the fact that we pay attention to it is very good, but it is not enough, and much too modern. How great would it be to live in a country in which we have an economy that serves society to the max? In which the air quality, which we suck deep into our lungs every minute, is excellent instead of terrible, or even toxic? Or do we just look at people in faraway countries, who wear face masks as they wander through the smog, and conclude on that basis that we're not doing so badly after all? Is our excellence based solely on being better than horrible situations elsewhere in the world? Is our benchmark the potholes in the modern salt plains, or the peaks we cannot clearly see yet, the plurimodern mountain peaks around it?

What would you think of a society that is not polluted, where there is no excessive noise, in which the vast majority of people contribute and take care of each other, and where the supporting systems try to meet the needs and preferences of people (citizen/consumers in all their variety) as well as possible? Couldn't all innovation eventually focus on that? And shouldn't it? Or do you believe that idea is too utopian? Do you think that we lack the knowledge to do that? Do you think that I underestimate here that people may actually want all sorts of other things? I don't think that at all, or – let me avoid unnecessarily making excessive claims – that it is not all that bad. I believe that if we achieve significant consensus, we can make a long list of societal improvement perspectives in which we are grossly underachieving today, a list that we could get started on as a society. To some extent, of course, these lists have already been made, but otherwise, hardly anyone is doing anything with them.

Our efforts to take the step from a late-modern society to a plurimodern one are obstructed by institutions (the ruling parties), by lack of vision (the parties who only have something to lose), and by fear (the conservatives). If international rules are obstructing a more visionary progress, then why don't we change them? If specific actors experience disproportionate, unreasonable, and unfair disadvantages because of these changes, then why don't we help them? If modern straitjackets obstruct us from taking more steps forward along *the path of humanity*, towards a plurimodern future, then why don't we cast them off? I have said it before: we have difficulty steering, and that is precisely why we forget that we actually shape our societies, individually and together, even though the largest-scale societal development so far has been mostly autonomous and emergent. That is precisely why we can improve that very same society even more vigorously than we currently think we can and are showing we can, even with our modern mindsets.

The same goes for healthcare. Let me be crystal clear: there is much in healthcare that is going well. Well-intentioned professionals work in the sector. But that does not mean that things cannot still be vastly improved. Time and again, dire situations have been exposed by the press: somewhere in the healthcare process – in which many entities participate –

care providers have lost sight of the patient, who sometimes literally perishes as a result (by now we recognize this as *modernist strain*). It usually hits the weakest and worst-organized groups: the elderly, the seriously ill, children, people who suffer from rare diseases (by now you recognize them as variants of *citizen/consumers*). This is perplexing, though, precisely because so much money is spent on healthcare.

For instance, the press has shown us that the way we treat elderly residents in nursing homes is appalling. There are well over 2,000 care institutions for the elderly in the Netherlands. On average, according to our modern conceptions of quality, these institutions receive good marks, it must be said: solidly above 7 on a scale of 10. On average, it is fairly decent. (This is not a tautology, but the maximum that modernity can bring us.) We must always work on addressing dire situations, but *according to modern quality criteria, our healthcare systems are not doing badly across the board.*

Doesn't this remind you of the quality of education as well, referred to as 'high'? I believe that a healthcare institution designed in a truly plurimodern way would be a real paradise for the elderly residents and their loved ones, compared to current modern institutions. Two core values of a plurimodern society are 1: observe and respect all legitimate interests of people for whom healthcare was actually created in the first place, and 2: organize a societal stratification that is focused precisely on these primary interests. I believe that this does not require any more resources than what is currently being spent in the geriatric segment of our healthcare sector, especially if we were to use the exact same amounts that our regular healthcare system allocates to all the current management layers, monitoring, inspections, policy, you name it, if they were all assigned proportionally to this plurimodern societal innovation.

The cry for more money from our dominant modern healthcare system should no longer be honoured, precisely because it continues to reinforce this modern system, and forms an obstacle to moving towards plurimodernity (I will explain this in more detail later on as a way of broadening the context). We use a modern concept of quality, and give good marks on average. However, *using a plurimodern benchmark*, we would no longer understand why our current geriatric healthcare systems should be given such high marks, or so I suspect. After all, today we would not give passing marks to plague quarantines of the sixteenth and seventeenth centuries, or the hospices of the eighteenth and nineteenth centuries – the predecessors of our current hospitals, founded in the eras of the city-states and the early nation states. People who fell ill were more likely to see their health deteriorate than improve in these institutes, even though they were the best available option in their times, even compared to international counterparts. We therefore need to realize that our modern healthcare systems are the plague quarantines of the plurimodern future.

Modernist systems profoundly dislike the transition to plurimodernity, and will maintain and defend themselves with various knee-jerk reactions.[503] Below is a list of a number of typical knee-jerk reactions by the healthcare system, without any pretence of providing a comprehensive list. I want to emphasize that we also encounter reactions like these in many other late-modern societal systems, such as education, the energy sector, and the banking sector.

1: The media blow things out of proportion. First of all, the media are blamed for blowing newsworthy things out of proportion (it is an undisputed fact that individual human suffering is newsworthy within procedural contexts). That may be true; the media are also guilty of inflating stories to get better ratings. But if there are no issues at all, there is of course nothing to overemphasize either.

2: Problematic situations are only accidents. Second, problematic situations are consistently called accidents, one-off mistakes, or local problems. With incidents and local problems, there is no need to either take a structural look at the entire system or to challenge late-modern professional strongholds. Although I do believe that accidents should certainly receive attention, and need to be resolved, I also believe that they are simply the excesses that are indicative of a much more structural problem. And that problem is the use of late-modern standards of quality to evaluate our healthcare systems in the first place.

3: Scapegoats. A third regular response from late-modern systems is to look for an individual culprit or group of culprits (the classic scapegoat) when there is injustice or worse. Consider poor performance by specialists in major firms, or terrorists, who are almost always lone wolves or separate cells, according to the law enforcement agencies responsible. By filing it neatly away as such, the system never needs to change.

4: Complexity as an excuse. A fourth reflex is to call the situation 'complex', and to emphasize that factors such as co-morbidity and multi-morbidity (roughly, the presence of multiple diseases in a single patient at the same time) and ageing make the situation quite complex. However, the circumstances of stakeholders and people involved in problematic situations are not complex at all; they are actually very concrete and quite clear. Schizophrenics need guidance on an ongoing basis, and the elderly need sufficient healthcare and attention. Why wouldn't you help patients who have three diseases at the same time, or schizophrenic young adults, if those are the things that are affecting their health? Of course, these situations require a multi-disciplinary healthcare provider, but they are not all that exceptional. Why would you continue following rigid disciplines if they do not correspond to the healthcare needs?

[503] You can see this as an application of the concept of regime positioned on *the path of humanity*, as developed in the transition theory of DRIFT (see footnote in 9.1.2 and others).

The actual problem is that the care system does not sufficiently correspond to the required care; it is not equipped for it, it is not designed for it, and it cannot exercise sufficient flexibility to tailor care to what is needed. Individuals find themselves 'between a rock and a hard place' because of the rigid modernist nature of both rock and hard place, and because of the lack of a bridge between the two that matches their needs. The primary problem is not that the need for healthcare is too complex. The primary problem is that the healthcare system does not have a plurimodern design based on actual needs, and that the people needing care have been rendered helpless, voiceless, and compliant.

5: Supervisory authorities. A fifth knee-jerk reaction is to add another controlling, directive, or coordinating body, authority, or person. As long as they do not protest, it is fine. Recursive perspectivism clearly indicates that this specific 'route to a solution' disrupts the already seriously disrupted balance between the three dimensions of society (p, s, and u) even more: there were already too many parties p compared to the other two dimensions, and that disproportionality is now intensified further. This additional party must now secure the interests of the care recipient in this fray – or rather, the impotent disinterest of the surrounding parties. In plain English, we call that putting the cart before the horse.

6: Using modern frameworks for quality. A sixth knee-jerk reaction, and this is probably the most hidden and tenacious one, is to compare the quality of healthcare institutions with other healthcare institutions, both on a national and international level, *which are based on the exact same modern principles.* I remind you again: the plague quarantines in the sixteenth and seventeenth centuries, and hospices in the eighteenth and nineteenth centuries, would have been considered good quality measured against an appropriate benchmark of their age. But just as plague quarantines were worse than hospices, current modern healthcare providers will be worse than the plurimodern healthcare systems of the near future. You only have to be willing to see and state the potential improvements. And then we have to work together to make them happen.

I have a great appreciation for many Dutch healthcare providers. They are dedicated and generally work very hard. They are also doing an excellent job, by modern standards and values. We must not disregard the interests of professional actors in our current healthcare system. But those modern standards and values no longer suffice; they come from an era that is increasingly far behind us. Do we really not see that there is only one primary interest at the basis of the healthcare pyramid, and that it is the interest of the people who need care? Things are structurally wrong in our late-modern systems, which can be understood better against the backdrop of *the path of humanity*, which is coming more and more into focus as we gain a better understanding of plurimodernity; we should no longer close our eyes to it. We are on the brink of a plurimodern transformation in healthcare. Some pioneers within our healthcare systems are already seeing it, and are trying to work on it. But they are not the majority, and they are swimming against the current. How can we help them? How can we support them? That is what societal innovation should focus on.

Or take climate-change-related problems, a completely different field. Perhaps it will not be so bad, but climate problems will most likely become much, much bigger than we can conjecture at the moment. Vast numbers of people live in deltas, vast numbers of people are dependent on local agriculture for their food, and this is where big problems and risks are emerging. Those are just two aspects where climate problems strike hard. The evidence is piling up that there is really something seriously wrong here.

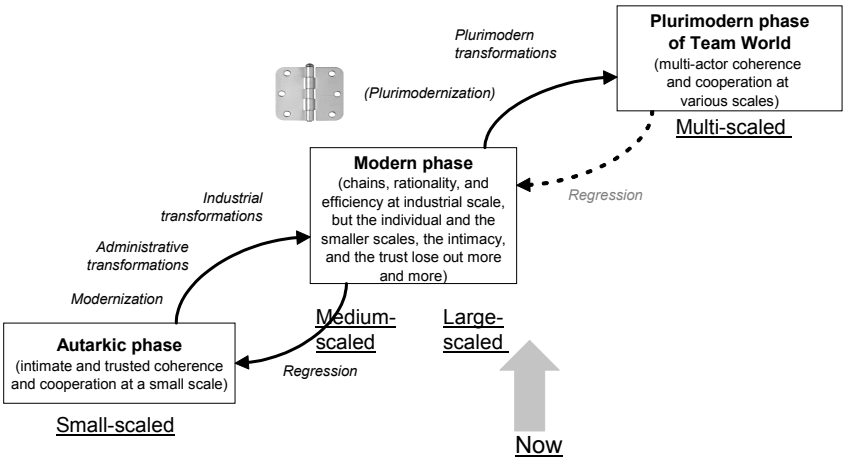
No one really knows for sure what chain reactions we are causing, not even scientists.[504] But the indications, uncertainties, and risks are so enormous that it is simply irresponsible to gamble and hope that it will not be all that bad. You simply do not take a gamble with your planet and all the people living on it, without having a fall-back mechanism. Although this fact may have eluded you, while we are talking about *reducing* CO_2 emissions, emissions of greenhouse gases in our atmosphere are still increasing. So although we have resolved to reduce emissions, we cannot even make that work, and then we have the nerve to package it as decisive policy. Just imagine if the Treaty of Versailles, after World War I (The Great War) had stated: we will reduce the number of young men killed in Northern France by 50% for the next 5 years. How could that be considered even remotely acceptable? Coming back to emissions, on top of setting an inadequate reduction as a goal, it seems we are unable to achieve even that much reduction. What on earth are we doing? In short, we are still taking an exceptionally half-hearted approach to climate problems. We still carefully avoid mentioning the sacred cows of our carbon-based economy, even though things do seem to be changing much too slowly here (as they are in healthcare). In this case, the old adage 'haste makes waste' actually could change to 'haste reduces waste'!

The late-modern multi-actor structures keep on becoming more dysfunctional over time. That applies to healthcare, the climate, and many other societal systems (also see the societal sketches in Part I of this book). However, it is too easy to lay the blame solely on weak politicians, or self-enriching education or healthcare managers, or profit-driven, fossil-fuel entrepreneurs. Consumers can be just as bad. As humans, as actors, we tend to be too short-sighted, self-absorbed in navel-gazing, focused too much on tiny details and our own self-interest.

Much of this behaviour may actually even be subconscious, and it is hard for us to act otherwise. From a strictly biological-evolutionary point of view, it is easy to point out excellent reasons for focusing on self-interest. It is generally not smart to focus your attention on perspectives in abstraction, or on the interests of a great many others, when there are cave bears in your own immediate vicinity, or when there is an imminent threat of famine. These reasons were completely valid in the time of hunter-gatherers, but they are no longer so in our late-modern age. *The path of humanity* shows us clearly that collaboration on quality is actually

[504] In their institutional and individual behaviour, scientists are actually the same as care providers, educators, entrepreneurs, consumers, politicians and civil servants. After all, we all suffer to a certain degree from cognitive dissonance and confirmation bias. In the days when I was still a young employee, I used to have a sign hanging above my desk with the text 'knowledge is bias' printed on it, as a persistent reminder for me (and my visitors).

sustained by a continually growing coherence and collaboration. It is all about perspectivist balance, and we need to work together towards realizing this.

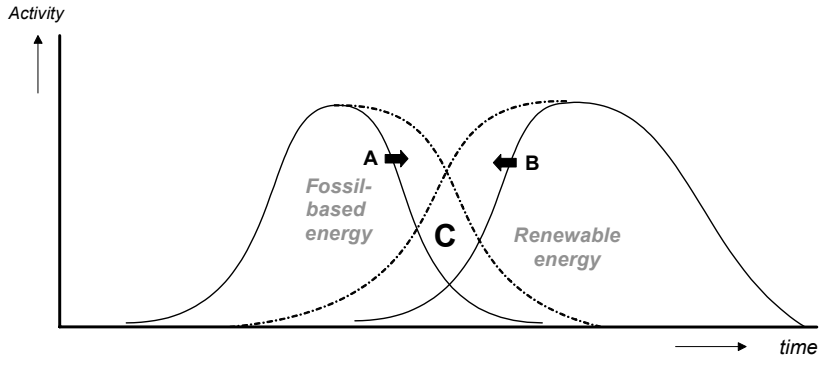


The modern phase as a hinge between small-scale autarky and multi-scale plurimodern coherence and cooperation.

We are now in late modernity (see the figure above from Part I, repeated). It shouldn't surprise us to see our systems increasingly bursting at the seams and malfunctioning more and more often; it is logical at the end of an era. Representatives of modern structures mostly see themselves going downhill. And in that situation, innovation remains limited to late-modern muddling in the margin, following late-modern requirements for quality and performance. Truly radical plurimodern innovation and pilots rarely get solid support, even though they are the ones who are capable of achieving huge leaps in quality.

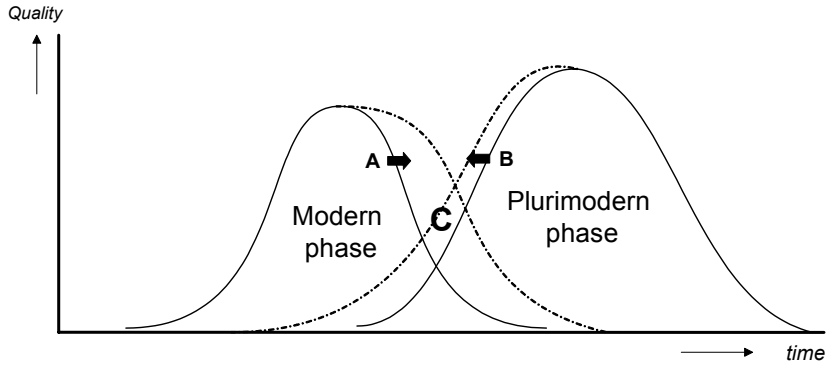
That is precisely why I advocate placing societal innovation radically in contrast to the backdrop of our desired transition to plurimodernity. In this time of transition, we no longer need to balance societal innovation against yesterday's cold, procedural, modern quality criteria (such as scale, efficiency, controllability, quantifiability, and costs), but against tomorrow's plurimodern quality criteria. It's all about resilience and flexibility in various places throughout the system. Once more, the focus will be on the needs and preferences of the various actors involved, with at its basis those of the citizen/consumer, the actor who once, when we were still hunter-gatherers, was the reason this all began.

The figure below from Volume IV of this series (*Multi-actor procesmanagement in theorie en praktijk*), nicknamed 'The camel', is a visualization of this.



The camel: the transition from fossil fuels to renewable energy. Activities A optimize and consolidate the fossil fuel system. Activities B explore the renewable energy system and bring it closer to reality.

In essence, 'the camel' sketches the plurimodern transformation, which transforms modern systems (left) into plurimodern systems (right). We could replace 'Fossil-based energy' and 'Renewable energy' with 'Modern system' and 'Plurimodern system', which would result in this overall impression:

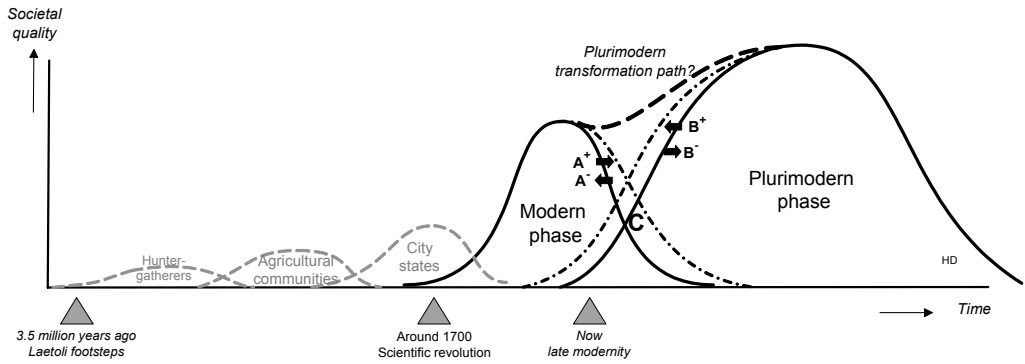


The camel: the plurimodern transformation from modernity to plurimodernity. Activities A optimize and consolidate the modern system. Activities B are exploratory and bring the plurimodern system closer to reality.

'The camel' shows how representatives of *modern* societal planning primarily try to prolong, perfect, and optimize modern planning (see A => an expansion to the right over time; optimizing behaviour), whereas societal innovation should focus more on realizing the future and much improved plurimodern societal planning and bringing it closer (see <= B bringing the plurimodern system forward: societally innovative behaviour; plurimodern transformations). In the context of fossil energy, for instance, the Volkswagen fraud case (manipulating emission levels recorded for diesel cars) could be viewed as an illegal version of an expansion of the fossil system. The strategy deployed by the automotive industry to reduce emissions – much too little and too late – can also be included in the expansion

mentioned under A. The same applies to the ideas for storing CO_2 underground (called 'Carbon Capture and Storage'), ideas that do not seem to really get off the ground. If they were to be proactively implemented and funded by parties who are currently still working with modern technologies, but are also decisively innovating towards and switching to plurimodern technologies, then storing CO_2 underground could result in a short-term transition period to span the gap until we have our plurimodern technologies in place.

If we do not see this, then we are merely prolonging a historical phase that certainly benefited us in the past, but which has now reached a point where the drawbacks are becoming too significant. We should thank these parties for taking us to the brink of transition. Whether you want to invest in perpetuating the status quo is actually up to these industries themselves. From a societal point of view, it is better to make investments looking ahead; modernity and its linear economy has already seen its finest hour. The burning of carbon-based fossil fuels entails activities from the past, from a system that served our societies well for a long time, but which is no longer societally sustainable. On the timeline of *the path of humanity*, their time is just about up. We can expand the picture above to the entire *path of humanity*. Then it becomes even clearer that we are leaving modernity, and that plurimodernity is our most promising future:



The transformation of modernity to plurimodernity along the path of humanity.

Activities A+ consolidate modern society. Activities A- reduce it. Activities B+ actually bring the preferred sustainable, plurimodern society closer. If we do that consciously and professionally, we will transform, preventing an interim decline. Activities B- slow down our plurimodern future. With scarce investment options, it is therefore key to take a good look where to invest in society. In terms of priority, this should be: B+, then nothing for quite some time, then A+ while removing sustainability drawbacks (such as Carbon Capture and Storage), then A- to the extent that it avoids the sustainability drawbacks. B- is never the right course. Mainly focusing on A+ is just more putting the cart before the horse.

Winner-picking strategies actually have limited strength on larger scales, both in space and time. The inventiveness and innovative capacity of mankind is truly enormous. Look

around you; you simply cannot predict that you will head in the right direction with detailed policy, even when you make it tangible and practical (SMART).[505] In terms of specifics, the technological predictability of societal development in the slightly longer term is very low. I have read predictions for the progress of technology in thirty years, written thirty years ago; they are quite amusing, yet from a content point of view hardly relevant. Aligning policy to that will only slow down innovation instead of accelerating it.

Making concrete predictions is very difficult. At the same time, in structural and perspectivist multi-actor terms, predicting long-term societal development is actually not that difficult at all. This is precisely what *the path of humanity* does, even though it is quite a bumpy road. It is logical that we will continue to look farther and higher overall to find a new balance, and the technologies that are required will simply be created, one way or another. The alternative is that we will stray from the path, regress, and look for the balance again at that lower point – and start all over again.

Moore's law is often named as an example that technology is in fact predictable. This law states that the number of transistors in an integrated circuit doubles about every two years. It held true from 1965 until today, but now the pace seems to be diminishing somewhat. However, Moore's law is not a technological law at all. It follows the increasing plurimodern need for connectivity and communication, which correlated with the dominant technological path of transistor technology. By now, we can recognize Moore's law as a pattern law, as substantiated by recursive perspectivism. The road to balance is defined based on the available technology. Our society is searching for the diagonal along the obvious perspectivist roads that are available, and the characteristic pattern of Moore's law is the result: a beautiful inverse proportionality. Transistor technology, initially discovered by Julius Lilienfeld in 1925 and after that by Bell Labs in 1947, was completely devoid of winner-picking; it was impossible to define the details and facilitate it at that early stage. Only when it fully took off as a successful technological process, driven by the perspectivist balance, was it acknowledged and supported by governments. From that moment on, innovation was mostly optimizing in nature, not extrapolating (I'll get back to this in a moment). But the predictability of the creation and early rise of transistor technology was practically non-existent. I suspect that as soon as it was really mature, it obstructed continued support, especially for more ground-breaking innovation, precisely the way the huge global monetary flows to fossil energy currently obstruct innovation in climate-neutral technologies.

[505] SMART is an acronym for Specific, Measurable, Achievable, Realistic, and Timely. It is a concise reflection of strong modern norms and values; it is an icon of modernist thinking. There is nothing wrong with SMART optimization of already developed, truly innovative systems. But SMART thinking in societal innovation actually means modern thinking, and in that same breath it means that you do not give plurimodernity any space. Relevant questions in plurimodernity are actually: why do we do what and for whom? Is that what they say they need and desire the most? What does that mean for other people? That means it is initially about reciprocal sensitivity. And by now you already know: too SMART soon becomes a bit stupid!

If the transistor had not been invented, we would most probably have had an ICT revolution based on a *different* technology by now, or in the near future. Moore's law would have been visible by means of another technological process, or it would reveal itself later. Because coherence and cooperation are seeking the diagonal. A specific technology does not necessarily make it possible (we say it is not 'enabling'), but unabashedly jumps into the available niche, which results from the perspectivist balance and *the path of humanity*.

Broadly speaking, the societal improvement perspective concerning climate problems is also astonishingly simple: in the current situation, greenhouse gas emissions are high, but they will not exist in the future situation; the change in between makes that both self-evident and urgent. *If* there is widespread support for this approach, and if we can manage to set up a government framework providing incentivizing *conditions*, such a transformation can simply take place. So that is something we need to work on. That is why we should aim for generic policy aimed at reducing greenhouse gas emissions, and support anyone who aims to achieve that in any way. What is wrong with supporting a civic movement that wants to save energy? And not with pocket money, but at the same scale as the fossil energy industry, or perhaps of the current boom in wind farms. Only pay if and to the degree it holds water from a societal perspective, and that should actually apply to *all* cases, to the established order as well as the new players.

Instead of focusing on detailed innovation programmes, a societal innovation policy would do better to focus on unlocking the huge improvement potential we harbour as mankind. Link societal support for innovation to contributions to widely supported societal improvement perspectives. Improve opportunities to find each other and collaborate with each other. And allow that huge, partly parallel, partly serial improvement machine – which is first and foremost the essential nature of society – do its multi-scale work. After all, it has been doing that for millennia, even without any support. If we provide systematic support, it will do its work much better and faster.

The above can be summarized as two main points:

1: **Use plurimodern instead of modern quality frameworks and quality criteria for societal innovation.** Plurimodern criteria for quality are based on societal sensitivity to the actors involved, and consistently state the needs and interests of the actors. We need to stop benchmarking societal innovations and improvements against *strictly modernist norms and values* such as scale, price, and efficiency; otherwise we will not see the modernist deficiencies, and the modern systems will simply charge ahead, crushing citizen/consumers if that is most convenient. I described this mindset, exemplified by the SMART guidelines, in an earlier book as follows: too SMART soon becomes a bit stupid. We first need to take a close look around us before we start acting smart. The future is plurimodern, regardless of how we are going to shape it. And it is precisely this fact that sets the bar for societal innovation.

2: **Do not provide incentives based on a chosen content, but on plurimodern methods, ambitions, and success.** We need to stop thinking that we can make long-term and concrete technological predictions as to what the future will look like. Winner-picking is an illusion. Societal prospects need to present our transformation to a more plurimodern future in clear outlines. Every innovation that seems to make a significant contribution to that end deserves our full societal support. We need to restrain our belief that we are able to predict which technological routes are better for that purpose than others. Stop pursuing innovation programmes that are too concrete, stop managing based on the details of the substance, and start managing according to goals based on general societal improvement perspectives. To assess effectiveness, we have a fantastic laboratory at our disposal: our society. The parties that put it together can tell us everything we want to know, and otherwise they can develop it collaboratively. We need to handle it with great care, but our society can really tell us everything that is needed. It provides an excellent place for experiments and pilots in our search for plurimodernity. We only have to deploy this enormous potential for development to unleash an enormous plurimodern improvement potential.

We need to quit using modern quality criteria and content-based winner-picking, and start using plurimodern quality criteria and systematically supporting societal innovation in societally complete coalitions (consider the penta helix). An open and free exploration of possibilities to improve our societies deserves all the societal support we can give it. Now onwards to an outline of how we can methodically put this plurimodern and structural lever into action.

Methods for societal innovation

In the following sections, I will explain how societal development is, in my opinion, completely based on sustainable development as its guiding principle. Then I will introduce four sets of methods for plurimodern societal innovation, as follows:

0: Sustainable development in perspective

1: multi-actor process management
2: the improvement cube
3: the backbone
4: proficiency levels

Recursive perspectivism

0: **Sustainable development** is an often-used, but also poorly understood strategy for societal development. Because societal innovation relates creating value for as many actors as possible, including on grand scales of time and space, it is closely related to a key concept in our era: sustainable development. For that reason, I will explain the relationship between

recursive perspectivism and sustainable development in more detail before discussing the four sets of methods. It will become apparent that our late-modern journey along *the path of humanity* actually goes hand in hand with sustainable development, and that the Improvement Cube, the Backbone, and the proficiency levels at larger scales will all boil down to tools for sustainable development. I have adopted sustainable development as a guiding principle enabling us to leave late modernity as a society, and to enter the plurimodern future.

1: **Multi-actor process management** provides basic methods for working in situations involving multiple, possibly very many parties. It organizes perspectives into intentional actors, and organizes these actors into societal intentional networks (and vice versa). It provides a set of methods with which steps for improvement can be explored, analyzed, designed, developed, guided, shared, and supported within *every* societal improvement concept. I will provide a concise sketch later; a more extensive explanation can be found in Volume IV of this series: *Multi-actor procesmanagement in theorie en praktijk*.

2: The **Innovation Cube** (also known as the Improvement Cube or Value Cube) defines societal innovation as the deliberate use of a varying mix of six archetypal innovative value orientations in the perspectivist space.[506] It comprises three optimizing value orientations as well as three exploring value orientations. Each of these can be defined using a suitable array of supporting innovation methods:

1: Process optimization.
2: Utilization optimization.
3: Team optimization.
4: Product and service innovation.
5: Multiplication/upscaling.
6: Societal broadening.

The Innovation Cube or Improvement Cube puts broad intuitions such as the law of diminishing returns into perspective. It clarifies why consistently betting on one single horse is so risky, and ultimately even leads to inevitable destruction.

3: The **Backbone** organizes a complex multi-layered societal multi-actor improvement context (such as exists in relation to tackling climate change, or innovation management) into a body whose parts move in coherence. The Backbone distinguishes different vertebrae, populated by specific actors, and connected by a central nerve cord. As such, a complex societal multi-actor context, which is usually hardly integrally understood or

[506] In principle, any rectangular body shape would be possible, depending on its position in three-dimensional space. The cube shape is the most symmetrical of the cuboids. I deliberately use the word 'cube' because cubic symmetry provides experiential value equal to experiential effort, which is preferred on average.

managed, will take on a form in which coherent progress can perhaps be made, given multi-actor cooperation and coherence.

4: **Proficiency levels** in societal innovation may well constitute the most innovative method of supporting societal innovation. Proficiency levels describe to what extent a complex societal improvement activity complies with the conditions of successfully achieving societal innovation. These prerequisites are based on recursive perspectivism and the lessons that can be drawn from *the path of humanity*.

There are five proficiency levels, ranging from terrible to excellent. This is a normative framework, and that was a deliberate choice. I have found myself in the exceptional position of being able to fully participate in various large-scale innovation programmes and activities over the past several decades; from that position, I have been able to take a good look at them from the inside. These activities involved education, healthcare, approaches to climate problems, air quality in Western cities, incentivizing innovation, creating major infrastructure projects, innovation in construction, developing transport and mobility, and in many other economic sectors and contexts. Although these activities involve considerable amounts of money and energy, the results are often not impressive at all. I believe we can do much better.

It became increasingly clear to me that the most basic conditions of success for societal innovation were not met at all. The proficiency level was too low; consequently, the activities were almost certainly doomed to fail even before they started.

Why is that? People work hard in all of these sectors, and enthusiastically at that, so that is not the problem. And occasionally we do see some great examples of how actors *do* find each other, *do* take each other's interests into account, and achieve great societal improvements together. More often, though, we encounter protracted issues, problems, and case files that have been familiar for years, but which are terribly slow to get off the ground. Parties who are mostly locked in negotiation with each other, circumventing each other, or trying to prevent the other party from getting a bigger slice of the pie. What is usually lacking is coherence and cooperation. The experiential worlds of the various parties involved lack coherence, drift apart, and are unfamiliar to the other parties. In essence, proficiency levels describe to what extent a focus on coherence and cooperation is embedded in the approach to a societal innovation process.

We owe it to ourselves to *purposefully* unlock the huge societal potential of *the path of humanity*; I have added the proficiency levels specifically for this reason. They indicate to what extent a societal innovation activity meets the prerequisites for a plurimodern transformation.

Incidentally, I do not think in any way that the way I present the proficiency levels later on in this chapter is the only way they could be outlined. I do not pretend to know it all. I do believe that each step in dealing more professionally and more deliberately with the prerequisites for societal innovation is very welcome. My description of proficiency levels

should therefore be viewed as my contribution from recursive perspectivism and *the path of humanity* to help bring about a much better future for our societies.

The following sections will provide more detailed explanations of the five aspects introduced above.

9.2 Sustainable development in perspective

I devote this chapter to our era's central and crucial theme of 'sustainability', and its active form, 'sustainable development'. It may seem like this chapter is the only one I have devoted to sustainability, but nothing could be farther from the truth. Societal innovation, *the path of humanity*, the perspectivist balance and the concept of sustainability (and sustainable development) all share a close kinship with each other. A sustainable society is a high-quality society that is optimally maintainable over the long term. And the core of an optimally maintainable and sustainable society is that it is balanced: it is usually on or at least close to the diagonal perspectivist balance.

Every final stage of society along *the path of humanity* has its problems, its challenges, its own versions of imbalance at the end. That applied to the hunter-gatherers, the sedentary societies, the city-states, and the modern states. Society would not have changed its perspectivist structure if it were otherwise.

Our late-modern society is also increasingly exposed to major risks. That is precisely the reason why sustainability has become such a central theme in our era: we are leaving modernity and are therefore playing an endgame. The dominant form of that is unsustainability, and the question is if we will fall back, muddle along, or climb up. The final stage of a societal configuration is usually characterized by perspectivist imbalance. The societal reaction to that is to try to find a new balance, preferably higher on the diagonal (societal leaps), but possibly lower on the diagonal (societal regression). That also applies to our current position, at the final stage of modernity. The big challenge, the great imbalance, which we as mankind face in our late-modern age, has been designated as a growing unsustainability. As a consequence, our current pursuit of sustainability also involves finding our perspectivist balance again.

Sustainability activists generally warn of emerging or already unfolding problems. In doing so, they emphasize a downward societal potential that threatens to occur without appropriate intervention. By pursuing active societal innovation, we can also deliberately opt to take a sustainable development step, moving up towards balance at a *higher* level. Instead of a problem-driven sustainability strategy, we should use an opportunity-driven societal innovation strategy as a guideline.

This is being recognized more and more today. I mentioned earlier that there are societal improvement lists that we more or less agree on, or could agree on.

Specifically, I would like to bring the United Nations' *Sustainable Development Goals* (SDGs) to your attention. This list is probably the broadest of this kind. Incidentally, the SDGs essentially list the greatest imbalances in today's society, or possibly the greatest deviations from a balanced plurimodern society:

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts*

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

These goals are based on many sessions of wide-ranging global consultation and participation. Sensible people will agree with the goals to a large extent, even though

interpretations might differ at the level of details. But if that is the case, why is implementing them still moving so slowly, and how can we accelerate this process? As is often the case with great ideas, '*the devil is in the detail*'. This proverb is extrapolated from an earlier proverb, '*God is in the detail*'. In general, both sayings mean that we should take action with all due care and attention (which is completely different than moving slowly!) if we want to generate deliberate progress.

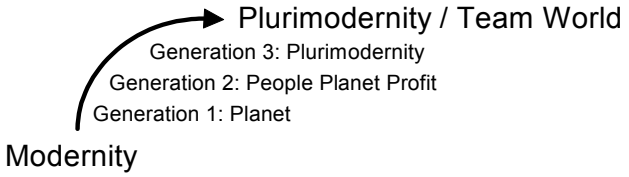
Recursive perspectivism provides a methodological vocabulary and the tools to do exactly this in societal contexts; this book can be viewed as one long plea to address this task with more conviction and professionalism. I will outline the plurimodern transformation and the perspectivist balance in terms of recursive perspective. The plurimodern transformation (see Part I) is in a certain sense a reformulation of the transformation to a sustainable society. The plurimodern society of Team World is a sustainable society that professionally and actively pursues continuously improving sustainability, and works towards continuously improving sustainability.

Sustainable development is plurimodern development. Societal innovation is an even more active form of sustainable development. Societal innovation focuses on actors and perspectives because precisely this angle provides the reasons and incentives for societal movement and improvement. Recursive perspectivism even provides a crystal-clear target: an increasingly higher perspectivist balance.

In that way, the use of sustainability is not just a way of maintaining societal quality, in the sense of preventing decline, but rather a proactive and continuous endeavour to improve society– as *the path of humanity* has already shown those of us who want to see it at a low level for hundreds of thousands of years.

9.2.1 Three interpretations, three generations of sustainability

The interpretation of sustainability that closely connects to the societal step from modernity to plurimodernity can easily be explained in more detail by means of a series of *three* generations, which I distinguish in my interpretation of sustainability. The figure below shows them against the backdrop of the step from modernity to plurimodernity. I will discuss them below.



Three generations of sustainability.

Generation 1: planet

The scope of sustainable development was *initially* mostly defined as dealing with problems in the physical environment, which had got out of control. That is not something that originated in the previous century; it primarily involves large numbers of people and relatively large-scale, poorly organized physical processes. Even in classical times, Rome was already known for its poor air quality, and charcoal making in the Middle Ages was recognized as a dirty job. The First and Second Industrial Revolutions provided a tremendous boost to both the concentration of people and the scale of physical production processes (which are of course connected).[507] These production processes developed according to the principles of modernity, which were explained earlier in this book. The worsening environmental problems are thus explained as a *characteristically modern phenomenon*: if there is an increase in the scale of industry and the number of people, then the scale of the related pollution initially increases as well. The terrible smog surrounding industrial areas and residential agglomerations in the nineteenth and twentieth centuries are eloquent examples.

Solving these environmental problems with interventions, and the increasing concern about their negative effects and how they have been intensifying, has put what we call 'planet thinking', the agenda of the classic environmental movement, solidly on the map. I consider 'the environmental movement' to include people who have been so concerned about the increasing pollution and overexploitation of our physical environment (why I call this phase *planet*) that they felt compelled to sound the alarm through communication and activism. They had and still have all sorts of good reasons for doing so, including phosphates in the water (increased use of detergents: canal locks vanished under several metres of layered foam), acidification of the forests, the hole in the ozone layer, climate change (caused by emissions of CO_2 and other greenhouse gases), air pollution in big cities (including particulates, SO_2, NO_2, CO, ozone, smog), pollution of the human environment in general (litter, 'plastic soup', pharmaceutical residues and other types of pollution in wastewater and soil), and the wholesale depletion of our natural resources.

A milestone in *planet* thinking was the famous 1972 edition of the 'Report to the Club of Rome'. Extrapolating these problems into a confrontational future, it placed the emphasis on the overexploitation of our physical resources, designating it an urgent global

[507] The First Industrial Revolution was all about the widespread use of coal and steam engines. The Second Industrial Revolution involved the emergence of the modern steel, chemical, and electro-technical industries. The Third Industrial Revolution marked the rise of modern information and communication technology and the internet. Some people describe recent developments as a Fourth Industrial Revolution, referring to the wide-spread use of robotics and artificial intelligence. 'Internet 4.0' is a part of this, and the term 'Internet of Things' is an associated term. I believe that the term plurimodernity and its meaning of finding a balance high on the diagonal will place the focus back where it should be: not on technology but on radical actors, and not on technical solutions but on the use of technical solutions by and for people for the purpose of achieving wide-spread perspectivist balance.

challenge.[508] It marked the moment when large parts of the world's population, at least in developed nations, first realized that we could just not carry on as we were.

To summarize the first generation of sustainability thinking, the first interpretation of sustainability is the 'planet' interpretation. It specifically emphasizes more attention to nature and the environment, and focuses strongly on preventing and remedying adverse interventions in our physical environment.

Generation 2: people planet profit (the Triple Bottom Line)

In the *second* iteration, the 'planet' idea proved to be much too narrow for many people. The business community started to feel the pressure, and emerged as a voice in addition to – and partly also in opposition to – the environmental movement. In addition to 'planet', the business community also demanded attention for their pursuit of profit and improvement ('profit'). That did not cover the full scope either, however; people also needed to be taken into account. 'People' was also added, covering such issues as inclusion (for instance, economic inclusion of people who are less well educated), and policies on development and poverty.

All of that combined widened the urgency-driven focus on *planet*, resulting in the well-known *Triple Bottom Line* of business: *people, planet, profit*, a concept that is currently still used, in many versions and on many scales, as a framework for sustainable development.[509] The idea is that equal attention to these three categories should result in sustainable development.

To summarize: The second interpretation of sustainability revolves around what is called the Triple Bottom Line. It emphasizes three sets of focus areas and therefore interests and domains: people, planet, and profit.

In societal practice, *people planet profit* thinking functions mainly as a way of creating space for the interests of people, nature, and the business community *alongside* each other. If you previously only saw *planet* or *profit* interests, as the stereotypical environmental activists (planet) and entrepreneurs (profit) did in the 1970s, and as some of the more rabid advocates still do, then that certainly means you will be broadening your considerations and therefore your decision-making processes. Those stereotypical rabid environmental activists and entrepreneurs are guilty of rigid, single-issue thinking. The great merit of the Triple Bottom Line is that it does away with that problem: you can no longer get away with merely focusing on one single issue.

Criticism levelled at the Triple Bottom Line

The Triple Bottom Line is also legitimately being criticized. I even suspect that it is in some way a real obstacle to the pursuit of a sustainable society. It is high time to get rid of it. That

[508] Club of Rome (1972), *The Limits to Growth: A Global Challenge* (Dennis Meadows et al.).
[509] See e.g. J. Elkington (1998), *Cannibals With Forks: the Triple Bottom Line of 21st Century Business*.

will surprise quite a few people, since the *Triple Bottom Line* is the holy grail of sustainability thinking in our time. For that reason, I will explain my strong and fundamental criticism in more detail. This criticism is based on two objections: the Triple Bottom Line has a tendency to stack interests, and it uses a conceptual basis that is becoming more and more outdated as time goes by.

The first objection is that the Triple Bottom Line often leads to stacking of interests instead of a balanced and shared vision of a preferred form of sustainable societal development. That type of stacking produces a top-heavy tower, and it leads to suboptimal considerations. That tower of stacked interests will just continue growing, and will therefore topple to the ground sooner or later. Let's look at a small example with big symbolic value: the noise barrier. Here and there in the Netherlands, neighbourhoods are separated from motorways by noise barriers; sometimes these structures even absorb air pollution from the atmosphere, or generate energy at the same time. This is an attempt to accommodate *people*, *planet*, and *profit* all at once. We can still have our cake and eat it too, more or less, is the thought behind it, but it doesn't really improve much. By now, it is clear to everyone that looking at a wider societal perspective facilitates much better considerations that result in clean, quiet traffic and healthy, pleasant neighbourhoods. The fact that we are not developing these initiatives is because we are unable to properly and coherently address the (huge) interests of residential living, working, mobility, and the petro-industrial complex and get them aligned. We are all caught in a huge socio-economic lock-in; we climb a few sub-peaks in the mountainous landscape, but to the far-sighted among us we are clearly on our way down to deep ravines. It is just too painful, and it takes too much effort; as of today, we are apparently not able to get out of this lock-in together in coherence and cooperation. That is why we allow the systems to continue charging ahead, operating separately from each other, a typical *multimodern* approach (multimodern – meaning multiple modern systems, in friction with each other) and we stack the people–planet–profit trinity, muddle along in the fringes between them a bit, and ease the worst issues somewhat.

The noise barrier could therefore be generously viewed as a highly practical solution to a local and urgent problem within a stubborn and complex context. Such a solution has great appeal for many practical-minded people. But on a larger scale, it could also be viewed as a patch on a multimodern seam, or rather a multimodern fault line. The multimodern noise barrier symbolizes our current human impotence in achieving plurimodernity at larger societal scales.[510] It is precisely on these scales where Triple Bottom Line thinking offers very few solutions, and condemns us to merely muddling around.

The stacking of a trio of interests is typical for the Triple Bottom Line. It is leading to more and more friction now, and will not end well in the long run; we can all sense that.

[510] It has this in common with the Berlin Wall, the wall in Israel, and the border wall between the US and Mexico.

This leads to the second objection, an even more fundamental criticism in addition to the stacking aspect, and that is this. A number of very legitimate questions could be asked about the classification into these three categories. Later on, for example, people tried out the term *prosperity* instead of 'profit', but it remained fairly hopeless.

Everything comes down to three categories of interests: *people*, *planet*, and *profit*. When you designate them as fundamental (assign a priori importance), then you neatly circumvent any arguments about their relevance. That means you have then legitimized those three sets of interests, each with their own underlying domains; they are exempted from any discussion. You have solidly anchored them, declared them sacrosanct; they are no longer eligible for further revision. But philosophically speaking, you could legitimately ask yourself why *profit* is not a *people*-related interest, for instance. (And if it is not, then what is it?) And what else is the *planet* interest other than an interest that binds *people* to their environment, because it implies a certain *profit* (value)? And can you honestly say that prosperity has nothing to do with a flourishing economy?

The underlying question is therefore: what is the compelling basis of distinguishing precisely *these* three categories and their underlying domains? Why are they the only three that are entitled a place at the bottom line? I understand perfectly well that in the heyday of the modern age, it was the environmental movement that was in solid opposition to the business community, and therefore *planet* versus *profit*. That is the classic Hegelian pattern of *thesis and antithesis*. If entrepreneurs and consumers overreach their claim on material resources and our environment (which was the logical consequence of the industrial revolutions of scale that accompanied modernity), environmental activists will rise to restore balance again, and the entrepreneurs, in turn, will respond to *that*. However, that does not seem to me to be a fundamental bottom line, but rather normal societal day-to-day business, a characteristically temporary, practical, and solvable problem, which Hegel foresaw as being solved through *synthesis*.[511] After all, there are virtually no environmental activists who do *not* use the benefits gained by modernity, and there are virtually no entrepreneurs who want to earn a profit *at the expense of their own* human environment. Of course, they are still living too much in their own experiential worlds, and thus they are still too far removed from the balance axis; I believe I can observe that quite clearly as well. But this is precisely the kind of situation that a plurimodern transformation will rectify, and it appears to be cautiously beginning.

Looking at the Triple Bottom Line from the perspective of *the path of humanity*, we see that devoting attention separately to people, planet, and profit is a characteristically modern choice. This is because historically speaking, the divide (and the sequestering and

[511] According to German philosopher Georg Wilhelm Friedrich Hegel (1770-1831), a monumental proponent of antidualist thinking, many developments can be characterized by the sequential pattern thesis => antithesis => synthesis, where synthesis cancels out the tension between thesis and antithesis. Several sources cite that these three, thesis-antithesis-synthesis, did not originate from Hegel but from Johann Gottlieb Fichte. According to Hegel himself, he derived the concept from Immanuel Kant.

compartmentalization) between these three domains and categories has never been so large. In these modern times, humans' economic activities, meeting their primary needs (such as food and shelter), and caring for their environment have been driven far apart. This is a serious form of imbalance.

Hunter-gatherers did all three of these on their own, and kept it all very close to them, literally holding all they possessed in one hand. But modern people now work for a living (the classical 'labour' of factory work), which does not directly provide food and shelter. As a result, we are forced to *buy* our food, our shelter and, in a broader sense, our prosperity and well-being. This makes it crucial to have enough money, and therefore to have a paying job – so employment opportunity is crucial. If there is a lack of jobs, then there is nothing left but poverty, and that very same economy collapses. This is why we seem to have accepted the ruination of our environment. What else can we do? Not have a place to live, or refuse to buy food?

This is the source of our post-modern unsustainability in a nutshell. Where the physical environment was the primary source of prosperity and well-being for the hunter-gatherers, it has become a low-priority afterthought to us as modern human beings, due to the enormous interlinked chains that have formed in our activities. It is not the scale itself that poses a danger, but the enormous chains that have emerged in production and consumption processes, the fragmentation that results from them, and the fact that we are barely able to escape these chains as individuals. We not only structure our production and consumption processes into chains, but also chain ourselves up with those processes as well. Consequently, we find ourselves far from the diagonal, as I've elaborated on in Part II, and are severely out of balance as a result.

This is why many believe that thoroughly tackling the climate problem is still not feasible (despite the intentions stated at the UN climate summit in Paris at the end of 2015). There would be too much resistance, according to them, it would be too expensive for business and the citizens, the economy would suffer, and mass unemployment would be on the rise. These are perfect examples of *profit* arguments. With some details changed, they would apply to every step towards more sustainability: too expensive, and therefore unrealistic. By now, this notion has been theoretically and conclusively disproven.[512] In the end, sustainability is always preferable to unsustainability at the societal scale. 'Preferring sustainability' is at its core a societal pleonasm;[513] it is food for thought that we often do not

[512] For an early example of refutation. see the Stern Review on the Economics of Climate Change (2006), which proves that preventing (mitigating) climate-related problems is less expensive than fixing them after they happen (adaptation).

[513] Pleonasm: Purposely adding additional emphasis to a quality (preferring) that is already included in the word after it (sustainability). For example: a grey elephant.

perceive it as such.[514] This is primarily because of the modern mental straitjackets we have managed to put on ourselves.

But imagine for a moment that the economists' premise is correct. Tackling the climate problem will be terribly expensive, to the point of unfeasibility. But is that really a reason to destroy our global climate in unpredictable and irreversible ways? Could the development of our economy and employment market be worth that price? Of course not, I say, and every sane human being would say the same. Letting this unsustainability continue would be very costly indeed. We don't allow ships to avoid installing lifeboats just because they cost a lot, even if there is fierce competition between cruise-ship companies, do we?[515] This is because human lives should be more valuable than the economy. We build and flesh out our society so that it serves us, and the economy is only part of it, even though we have lost sight of that realization more and more as the modern *Homo economics*. Eventually, the conscious human being (as an actor having experiences) always has the last say in things. And this is exactly the basis of *the path of humanity*. Human beings need a healthy and safe living environment as the base of the pyramid. You cannot randomly tinker with the citizen/consumer.

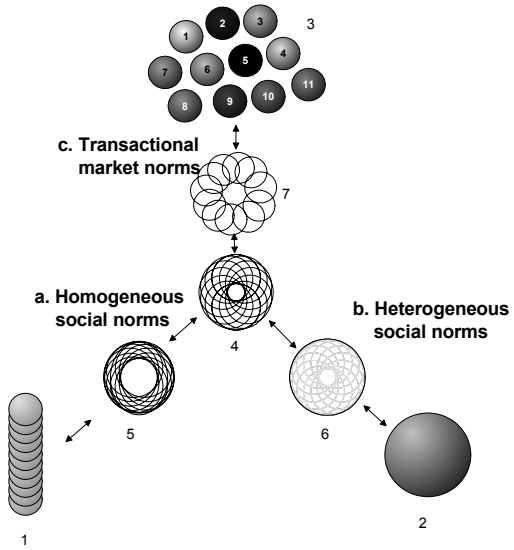
Adopting people, planet, and profit as three untouchable, sacred cornerstones of the Triple Bottom Line therefore is based on a typically modern interpretation of societal competence. In today's 'modern' view of society, the Triple Bottom Line is pragmatically feasible, to a certain extent. It's a modern framework for a modern problem. But we're actually leaving that modernity behind, because it's no longer balanced. As a result, the Triple Bottom Line is becoming more and more ill-suited as a template for sustainability; we can sense that keenly as we near the cusp of the plurimodern age.

We know we need less and less time to fulfil our primary (food, shelter) and secondary needs (see Maslow's pyramid); this is nothing less than the logical consequence and the expected achievement of our continued journey along *the path of humanity*. This will (at least in a general sense) only grow 'worse', and will therefore actually get better! For that reason, it would be better for us to stop interpreting, or even structuring growing unemployment – especially, but not only for people lacking a higher education – as an economic excluder and divider of life in society. We must see increasing unemployment as a growing availability of time that we are free to use for further societal development and innovation. From that perspective, growing unemployment would no longer be a looming spectre for our late-modern society, but in fact a huge asset to our future plurimodern society.

[514] This all has to do with our human short-sightedness (the issue of the experiential worlds being too small), the invisibility of *the path of humanity*, the current imbalance, and the urgency of a plurimodern transformation to tackle this imbalance.

[515] Monomaniac *profit* thinkers actually do that now and then, but they are only a small percentage of entrepreneurs.

There is nothing wrong with paying attention to and having a healthy awareness of economic relationships. The experiments with apes referenced earlier in this book, in which the apes worked together to drag a heavy box with fruit on top, speak for themselves. And the perspectivist balance makes it crystal clear that transactional economic relationships on any societal scale will continue playing their part and, on average and in the longer term, will be just as significant as their homogeneous societal relationships and heterogeneous societal relationships (see the figure below from Part II, repeated). As long as our journey along *the path of humanity* continues to grow towards larger amounts of perspective in terms of coherence and cooperation, our economic development will continue to do so as well. However, we must never make our economic development a higher priority than our social norms. After all, if we add up these social norms (a and b in the figure on the next page) in a situation of balance, they statistically and on average have twice the weight of our transactional market norms.



Three sets of behavioural norms, placed upon the team configurations (repeated).

We're already seeing the first indications of the rising of Team World all around us, but the fragmentation of the downward spiral is also present here and there (post-modernity in the sense of a fragmenting modernity). We find ourselves in late-modern times; in the long term, we will inevitably move on from this era, regardless of whether we're moving up or down on a vertical axis. Only time will tell when we will arrive in plurimodernity, but statistically speaking it will happen someday, because this plurimodern future will highly likely be better. Therefore, we might as well set the course and head towards it, full steam ahead.

Nothing is as invisible, deep-rooted, or resilient as culture; as a societal structure, that is what modernism is in its absolute essence. When we manage to see the modernist conceptual straitjackets (which we will only do when we compare them with other variants) and with *the path of humanity* as the backdrop, only then will we be capable of consciously judging them on their merits and ridding ourselves of the undesirable things. Then it will become clear that the Triple Bottom Line is a typically modernist interpretation of sustainability. Moving forward from there, we can start to consciously apply ourselves to finding plurimodern variations in meaningful ways to live our lives. We will have to discover together what those variants look like; your ideas on this topic are just as valuable as mine. However, it seems evident we should avoid using yesterday's concepts when shaping our ongoing societal innovation. We won't make it in a modern society by being hunter-gatherers. Similarly, we won't make it in a plurimodern future society as a modern *Homo economicus* either.

To summarize: The Triple Bottom Line – the people–planet–profit mindset – is no longer viable as a framework for sustainability. It leads to an enormous *build-up of requirements*, and designates *modern* categories as viable for our *plurimodern* future. Both are undesirable.

Generation 3: the multi-actor interpretation

The first generation of sustainability, *planet*, was an immediate consequence of accelerating modernity. The second generation of sustainability, the Triple Bottom Line of *people planet profit*, was a typically modern response to it. Modernity has peaked, however, and is well past its sell-by date. Personally, I believe that, following 'planet' (1) and 'people, planet, profit' (2), we desperately need a third interpretation of sustainability and sustainable development, one that supports our plurimodern future and therefore deserves to be chosen as the best option possible. This is the multi-actor interpretation.

Gro Harlem Brundtland, the former prime minister of Norway (back in 1987), mentioned this global trend in her report: *Our Common Future* (also known as 'the Brundtland Report').[516] In her report, at the beginning of Chapter 2, Brundtland and her co-authors stated what is probably the most frequently quoted definition of sustainable development to date:

1. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.*

[516] *Our Common Future* (1987), Report by the UN World Commission on Environment and Development (WCED), also known as the Brundtland Report.

The strength of the Brundtland definition of sustainable development is that it puts both needs and solidarity (the latter especially between current and future generations, and also between the poor and rich) explicitly on the agenda. Those are all human qualities.

Brundtland's approach can be extrapolated further. Brundtland mentions *needs.* Failure to fulfil needs will lead to problems. However, the upward extrapolation of needs is *wants*. If you can find ways to give people what they want, it creates opportunities. Therefore, you should expand your *needs* to include people's *wants*. Improvement perspectives entail both: they safeguard needs and make wishes come true (also see the typology of intentional logics in Volume IV of this series, *Multi-actor procesmanagement in theorie en praktijk*). In that case, it's logical that you would put the *improvement perspectives* of actors first, since improvement perspectives fulfil actors' perceived interests (now and in future).

And why should it be enough to simply avoid obstructing or endangering each other? The *'without compromising'* aspect of Brundtland's definition doesn't really set the bar all that high. NATO's peaceful co-existence strategy would then also qualify, even though it does not particularly excel in terms of coherence and cooperation.[517]

You can actively and consciously support each other in looking for coherence and cooperation, and thus generate more added value together. And you can also significantly expand the established technological and socio-organizational limits together. (These are mentioned in the second point of Brundtland's definition.)[518]

Continuing in the line of Brundtland's thinking brings us to the next step along *the path of humanity*: that of Team World. A balanced vision of good societal development should (in line with *the path of humanity*) be aimed at rediscovering perspectivist balance in multi-actor systems. This leads to the next generation of sustainability, ready for the plurimodern future: the multi-actor interpretation.

One purpose of this third interpretation of sustainability is that the multi-actor interpretation aims to fulfil the interests and needs of as many actors as possible (here and there, now and in future) by rethinking and developing societal practices and arrangements.

This third interpretation puts emphasis on improving multi-scale coherence and cooperation between more and more actors, aimed at regaining a perspective balance – whether it was lost or still needs to be developed.

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[517] There is nothing wrong with peaceful co-existence as a military strategy, but I have reservations about using it as a sustainability strategy.

[518] In that case, the aim is societal innovation, not just based on Brundtland's axes, but the technological axis (value orientations 1: process optimization and 4: product innovation in the Improvement Cube) and the socio-organizational axis (value orientations 3: Team optimization and 6: Broadening societal perspectives), but also from the central axis (value orientations 2: Capacity optimization and 5: Multiplication/upscaling).

As a result, the multi-actor interpretation of sustainability *directly* addresses the most important reason for the emergence of unsustainability. I believe there are still quite a few misunderstandings about the nature of and approach to unsustainability. Everybody understands that the ever-increasing global warming, the plastic soup in our oceans, the decline of our nature reserves, and the continued existence of crippling poverty and hopelessness are undesirable. This is why efforts to establish sustainability often involve appealing to people's common sense. Following from that, people are then asked to change their behaviour so that these unsustainable developments and phenomena can be stopped and reversed. The sustainability sector is brimming with well-intentioned but ineffective communications.

What this naive approach fails to acknowledge is that our current unsustainable society is the accumulated result of the improvement initiatives of all kinds of different actors. These people live their lives, take action, and make their choices based on what they themselves see as the minimum conditions and possibilities of their environment. They're not stupid or ignorant, in other words. And one can only guess whether just communicating a new perspective on possibilities in their environment will sufficiently change their perceptions. Simply put, it's far better – in the sense of easier, cheaper, cognitively less stressful, less risky (to a limited extent) – to use petrol-fuelled engines and gas heating and processed, packaged products and cheap natural resources. All of them are tried and tested, seamlessly functioning societal practices. And suddenly the conclusion takes on a very different shape. Unsustainability isn't the result of undesirable activities practised by ignorant and unwilling people. Not at all.

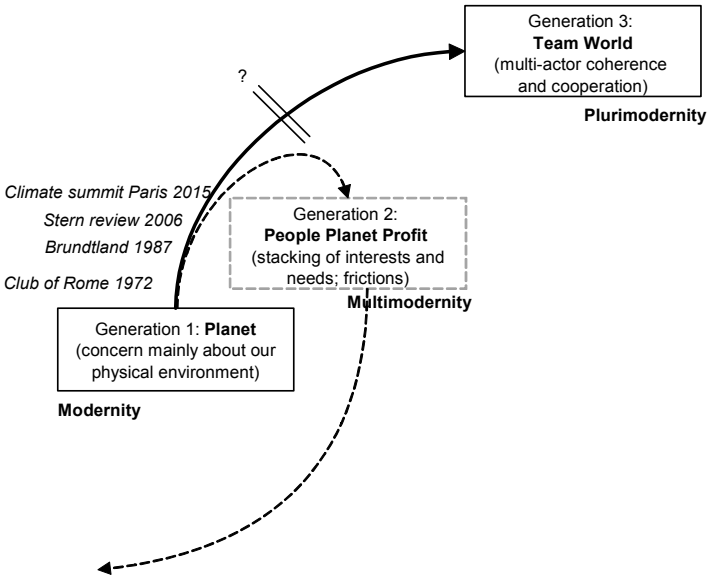
> *Unsustainability is in fact the accumulated result of the improvement processes of many intertwined, smart actors combined!*

Unsustainability emerges from, and this is the observation that necessitates a plurimodern transformation, a societal scale that significantly surpasses our normal experiential worlds.

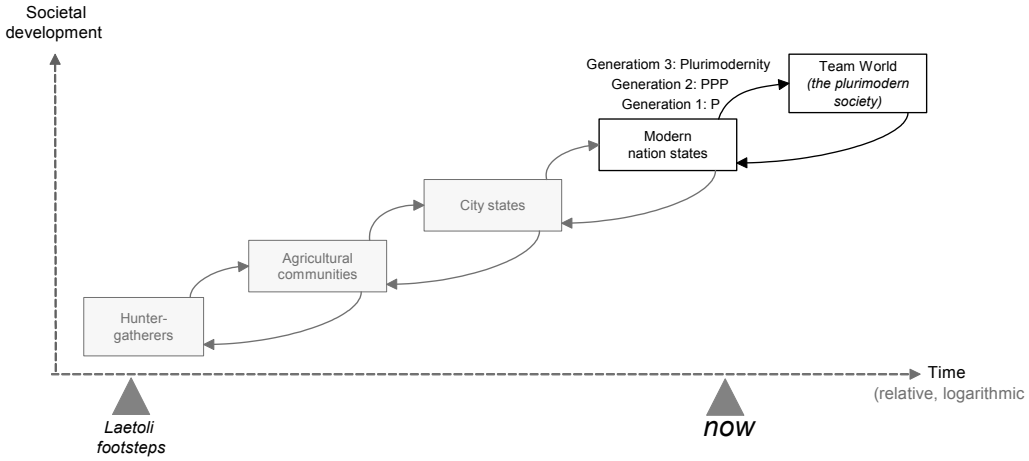
If we want to make the transition to a sustainable society, then appealing only to people's common sense will not be enough. Communication offensives are good for raising consciousness, but they do not do enough to change the experiential worlds, the context from which these actors achieve their improvements. Therefore, we will need to make sure that sustainable societal arrangements are perceived as better than unsustainable ones, from the perspectives of the component actors. We will need to genuinely change the nature and configuration of these multi-actor practices in such a way that the sustainable actions will actually improve from the perspectives of the various actors in society. And this is exactly the focus of the third interpretation of sustainability: the plurimodern, multi-actor interpretation of Team World.

The two figures below summarize the three generations of sustainability and place them along *the path of humanity*. With the coming step upwards, they encourage: the transition from **modernity** (the growth of socio-industrial systems) to **multimodernity** (lots of social-

industrial systems stacked on top of one another, lots of friction and growing imbalance), to **plurimodernity** (perspectivist balance). Summarized briefly: sustainability evolves from only one P (Planet) to three Ps (people, planet, profit) back to one (but now that P stands for plurimodernity).



Three generations of sustainability and their place along the path of humanity.



From P (for Planet) to PPP (People, Planet, Profit) to P (Plurimodernity). In the plurimodern phase of Team World, 'sustainability' is no longer a separate movement, but is an integral part of the plurimodern perspective on our society. (The plurimodern transformation has happened; the aim now is to achieve balance.)

The balance interpretation of sustainable development

Actors use improvement perspectives to define needs. It is better to do so in coherence and cooperation, as attested by *the path of humanity*, than at cross-purposes with each other (or even in outright conflict with one another). Sustainability issues aren't just about *planet*, and not about *people, planet and profit* either, with the three domains stacked. The point here is societal improvement tasks and opportunities that arise from severe forms of imbalance between many actors, which can only be tackled in coherence and cooperation between those actors involved. Sustainable development is about regaining balance in multi-actor practices by using multi-scale, multi-actor processes. When we are able to heed the needs and wishes (the interests) of more and more actors on more and more scales, in the present and in future, then we'll be on a path to sustainable development. Also take a look at the plurimodern economic sectors, including healthcare, construction, and agri-food in Part I of this book.

According to recursive perspectivism, sustainability tasks are the result of an imbalance between the three basic dimensions (pluriformity, similarity, and unity) on a larger societal scale. Development towards sustainability will try to restore the balance at the highest possible scale. Sustainable development means development along the diagonal balance axis moving upwards.

There are numerous forms of societal imbalance, and in various layers. The graph below shows a couple of simple examples of balance and imbalance. The variant of unsustainability that is predominant in our post-modern society is (+ + --): pluriformity and similarity are relatively high on the scale and unity is relatively neglected (in bold type in the table). Many modern systems (+ for pluriformity) are very repetitive within each system (+ for similarity). You're forced to conform; they reek of the archaic thinking of the 1950s. But they're contradicting one another more and more (a -- for total unity, hence the adjective *multimodern*). Think about how our healthcare, our religions (Christian and Islamic), our education, our neighbourhoods, our mobility and transport infrastructures, and our communication infrastructures are organized as an array of systems, each of which is internally and dogmatically uniform, increasingly lacking coherence and working at cross-purposes to the rest. Slowly but surely, it's becoming better and more flexible, but we can still make enormous strides and leaps in this context.

Pluriformity	*Similarity*	*Unity*	*Characterization*
=	**=**	**=**	**Balance = sustainable**
--	+	+	Marching army unit
+	--	+	Coherent diversity, jigsaw puzzle
+	**+**	**--**	**Late-modern unsustainability**
++	-	-	Chaos, 'Every man for himself!' (liberalism)
-	++	-	Loose grains of sand (Communism)
-	-	++	Monolith (fascism)

Variants of imbalance

What happens with imbalance is that specific actors put their own needs above the needs of others (possibly also their own needs, but in a different way, or on a different time scale, such as with climate issues). This creates a situation in which no one takes heed of each other's needs or wants when fulfilling their own. The needs and wants of others aren't even often considered at all. The resulting imbalance, the increasing distance of the diagonal position, leads to tensions that obstruct prosperity and well-being and further development. If this continues, we will end up further downhill on *the path of humanity*. We're seeing these types of increasing tensions in all the major sustainability themes – the climate problem, the pollution of our global waters – but also on a smaller scale, such as the increased exclusion of our basic trade-school graduates from our metropolitan societal practices categorized predominantly according to economics (I've mentioned this earlier as an imbalance), poverty and prosperity in global North-South relations, tensions within the European Union, and many more examples.

This happens *within* societal layers (think of the classic Marxist class struggle), but as our societies grow in complexity and the stakes grow higher, this will also happen more and more *between* the layers. And at this point, in addition to the connections between actors at many levels, the connections between actors *between* those layers are especially weak. For example, there are politicians and managing directors in the Netherlands and Europe who are convinced they're the ones running society. At the same time, there are more and more people in the workplace and among the general public who are convinced that politicians and managing directors live in a parallel world that has very little to do with their lives; even if those worlds come in contact with one another, then it's usually in a negative way. Change, according to them, should come from the bottom up. Populists take full advantage of this sentiment. On a large, coherent scale, of course, it is not possible for both to be true. Have voters lost touch when it comes to politics and government, or are politics and government the ones who are detached from society?

Emancipation movements aim to achieve a better balance, working from an alleged imbalance from the perspective of the less-fortunate individual, group, or layer (see also the societal balance model from Part I). They can work in favour of the individual within a

class, a specific class within a layer, or a specific layer within a multi-layered society. But from a societal perspective, it is obviously not possible to see the classes and layers in isolation. In a democracy like ours, this room for politicians and governments to manoeuvre at the larger scales is determined by permission and agreement from the smaller scales, and what the smaller scale is able to do and is allowed to do is partially controlled by the larger scale.[519] Administrative aloofness, even arrogance at times, increases the gap between the layers, while populism muddies the waters, making an indeterminate puddle of mixed functions. Neither offers solutions for improving plurimodern societal practices. In any case, we have to do this in coherence and cooperation – *within*, but increasingly also *between* the societal layers of different natures and with different functions. And that takes pluriformity, similarity, and unity, in dynamic balance.

That balance is unmistakably extremely relativistic. Different actors will have different perspectives on it, which causes all kinds of friction and reprisals, but it doesn't mean that we cannot determine the balance together in coherence and with a bit of grace. The things we cannot agree on we can be kept pluriform; there's more than enough space as long as we respect the perspectivist balance. Ronaldo and Messi will probably have disagreements about which of them is the better soccer player, but they also differ in very important ways. And – to take an enormous leap – both the refugees fleeing from Syria to Europe and the vast majority of the Europeans themselves have no problem acknowledging that it's better here in Europe at the moment than in Syria, and that Syria is what we call a failed state.

The plurimodern transformation is nothing more than the necessary movement to significantly strengthen our competencies in comprehending, acknowledging and working according to the plurimodern balance of multi-actor coherence and cooperation. To summarize:

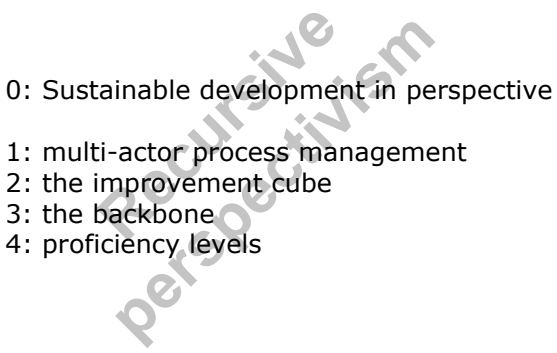
Sustainable development consciously follows the path of the humanity.

Sustainable societal development is therefore fully in line with striving towards and working on multi-scale plurimodernity. This is the point we have reached in the discourse on sustainable development against the background of recursive perspectivism and *the path of humanity*.

[519] I'm primarily talking about Western democracies, but am convinced it will *eventually* also apply to others, e.g. autocratic regimes. The higher levels may be out of sight and mind in a regime of terror, but the tides will eventually turn, as revolutions teach us time and time again. Either way, we shouldn't underestimate the enormous power of terrorism and oppression in any way.

9.3 Multi-actor process management

The very close relationship between societal innovation and sustainable development, in our late-modern age (as we progress from modernity to plurimodernity), was key in the last chapter. The coming four chapters aim to contribute to the arsenal of methods to address societal innovation together more decisively. I'll start with multi-actor process management.



recursive perspectivism

I'll limit myself purely to very general outlines, because this has been mentioned before in the Methodology section (at the beginning of this book), as well as in Theme II (Chapter 5) of this book, in the section on the radical actor thesis and intentional logics. The most important reason, however, is that I have also written other reference texts that explain multi-actor process management. The first is a concise and practical booklet, published (in Dutch) by the Learning for Sustainable Development programme. This easily accessible book is called: *Multi-actor processmanagement: een praktische introductie* (Multi-actor Process Management: An Introduction), and the reader can start using it right away. (A digital version can be obtained.) Volume IV of this series, *Multi-actor procesmanagement in theorie en praktijk* (an English translation *Multi-actor Process Management in Theory and Practice* is in preparation), also offers a complete multi-actor process management protocol for people who work in these complex playing fields. Besides positioning and introduction (which includes a discussion of the radical actor thesis and intentional logics), Volume IV contains a series of chapters in which the following methods are explained:

Method	*Focus*	*Metaphor*
1. The coffee list	Sketches a playing field as a rough list	Rough list of actors that gradually improves
2. The camel	Places improvements in multi-actor improvement perspective (broad lines)	Elevator pitch (Bird's eye view)
3. PAIR matrix	Powerful stakeholder analysis (intentional sketch *per* actor)	Telephoto lens
4. Intentional multi-actor models	Sharp picture of intentional relationships *among* many actors	Wide angle lens
5. Relationships	Analysis and guidance of the *ongoing* multi-actor process (dynamics)	Compass for the small scale

A coherent use of these methods will help to improve, clarify, and analyze a complex societal practice, and to envisage an improvement path and a better future together. The result is a multi-actor improvement perspective. And as soon as there is a similar improvement perspective that is competent enough, intentional logic will emerge and the genie will come out of the bottle. Accordingly, the path to a better society is:

develop multi-actor improvement perspectives.

I'll briefly explain three methods: the coffee list, the PAIR analysis and the intentional multi-actor models.

'The coffee list' is a rough first list of actors related to the improvement context you're working in, whether that's a negotiation, a project, a programme, a risk analysis, or a complex development process. You'll usually make this list together with others, or based on the ideas of others, and update it on a regular basis. A coffee list may contain a handful, dozens or even hundreds of 'mature and green' actors. Allow the most important actors to rise in ranking on the list, and then transfer them to the PAIR matrix (see below).



1: The coffee list (Rought list of actors)

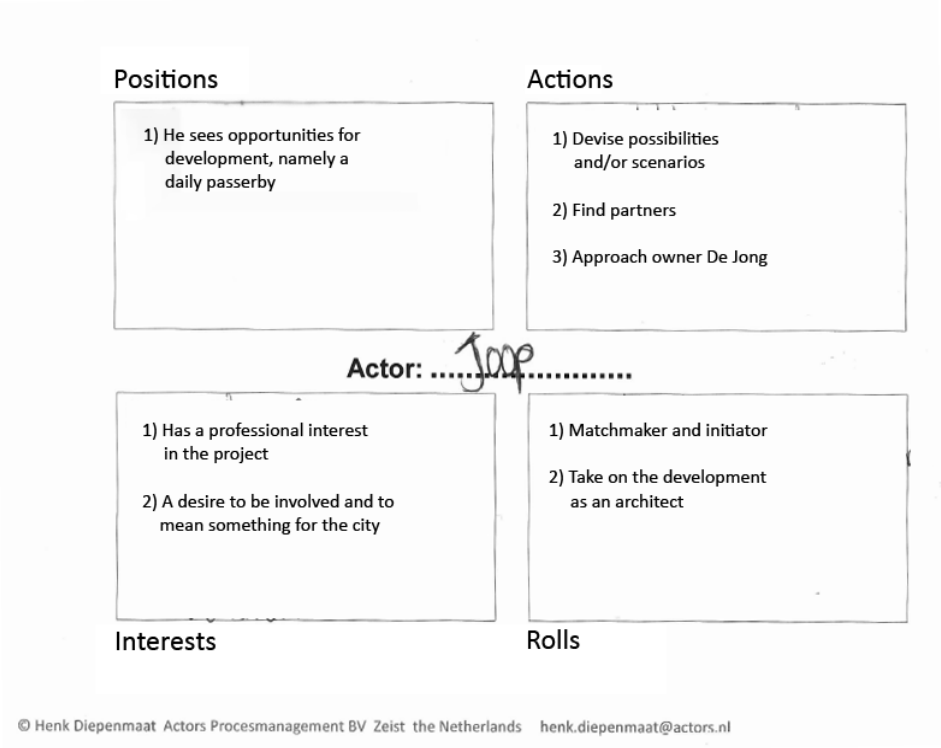
Project: .....

Family de Jong	Firm Correct	Building owner	
Family de Jong		The entrepreneurs	
Current user	=	?	
Neighbours	- direct	elderly, youth, families, ethnic groups	
	- district/neighbourhood		
Entrepreneurs	- direct	Caterers, supermarket	
	- district/neighbourhood		
Retailer's association			
Municipality	- district manager --> policy > social cultural		
	- district development --> economic		
	- district living environment --> mix of lifestyles		
Surrounding districts			
Cultural sector		potential new	
Health sector	(elderly)		
Architect			
Developer	own team	competitor	
Financer			
Advisors			
Municipality	Bowoto		
Fire department			

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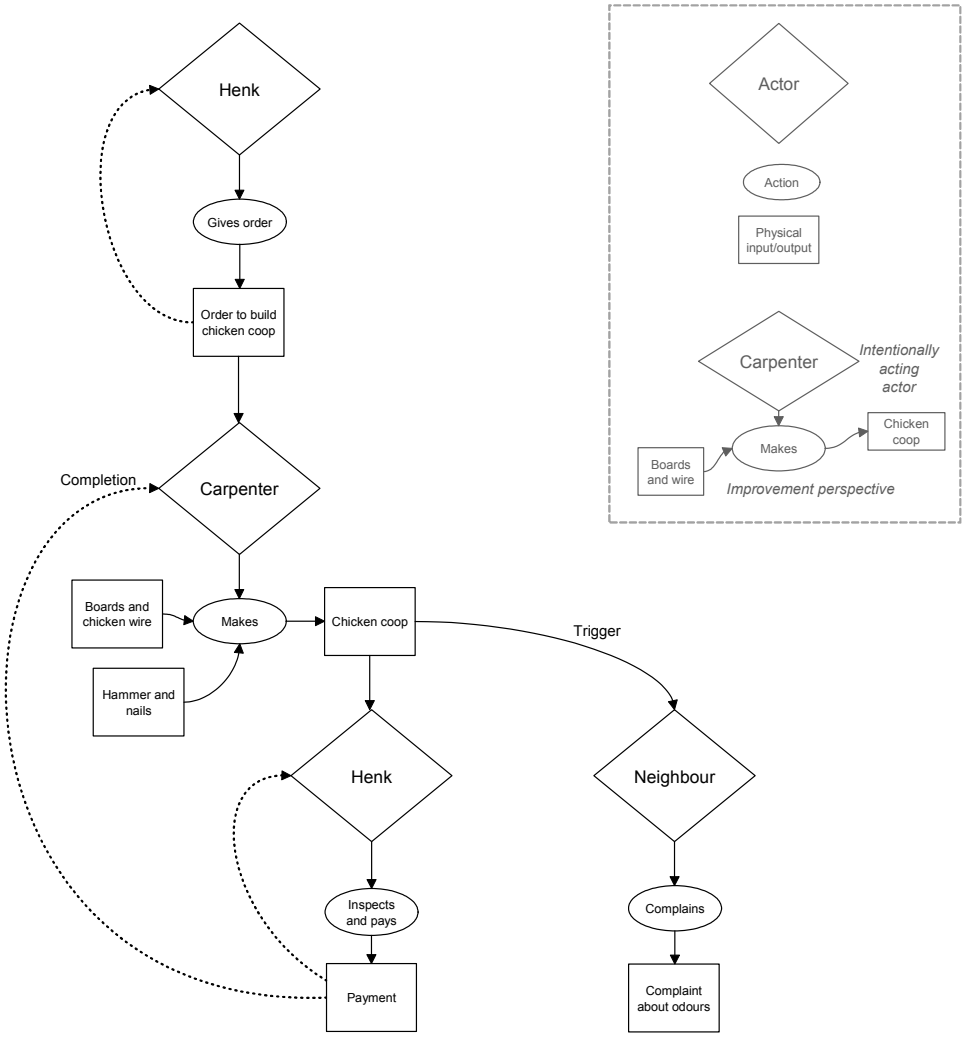
The first page of a rough coffee list (a list of actors)

'The PAIR matrix' is an exceptionally powerful, intentional variation of a stakeholder analysis. It focuses on positions, actions, interests, and roles (generating the acronym PAIR). These aspects turn out to have an important connection with each actor and between actors in your field of operation. It's your job to get a handle on this. You then need to develop a PAIR concept for each of the key actors on your 'coffee list'. It's impossible to avoid making assumptions at this point. If you work meticulously, you'll check your assumptions, but remember: this approach keeps you very close to the actors you're working with. A sample PAIR matrix is provided on the following page.



The very first draft of a tangible PAIR matrix

'Intentional multi-actor models' connect the actions of actors on your coffee list to one another through the developed PAIR system. By doing so, you are creating and modelling the three aspects of a societal improvement perspective in the shape of working or promising societal multi-actor practices: analytical (descriptive), prescriptive (prescribing, plan-based) and predictive (anticipatory), also in close relation to one another.



Switching between improvement perspectives by various actors.

Different process approaches are open to this, each with its own strengths and weaknesses. They include isolated, hidden and participatory works; trouble-shooting, backcasting, trick exploiting, stepwise improvement and flow adjustment; scenario and intervention approaches. They are discussed in more detail in Volume IV of this series: *Multi-actor procesmanagement in theorie en praktijk.*

9.4 The Innovation Cube

This section is about the second set of the four methods: the **Innovation Cube**; I also refer to it as the Improvement Cube. The optimal (most promising) path of humanity follows the diagonal in the perspectivist space. Societal practices and activities regularly lose their way, and become unbalanced. But it's becoming increasingly difficult for a growing societal practice to stray far from that diagonal balance axis. I've already compared this to rolling dice repeatedly: every new toss of the dice has an even chance of rolling all values 1 through 6, but in a long series of repeated tosses, the results progress along an initially fickle, but increasingly relatively evenly distributed stochastic balance of equal numbers of ones, twos, threes, fours, fives, and sixes.[520] Similarly, our improvement-driven societal development looks for and finds a higher position near the diagonal of *the path of humanity* in the three-dimensional perspectivist space.[521]

In the next section, I will list the six innovative value orientations that can be derived from the perspectivist space if you focus on generating value, and limit yourself to moving parallel along the three axes. The three dimensions are why I'm introducing here the Innovation Cube or Improvement Cube. This is based on a pragmatic actors' interpretation of the perspectivist space. I will explain this below.

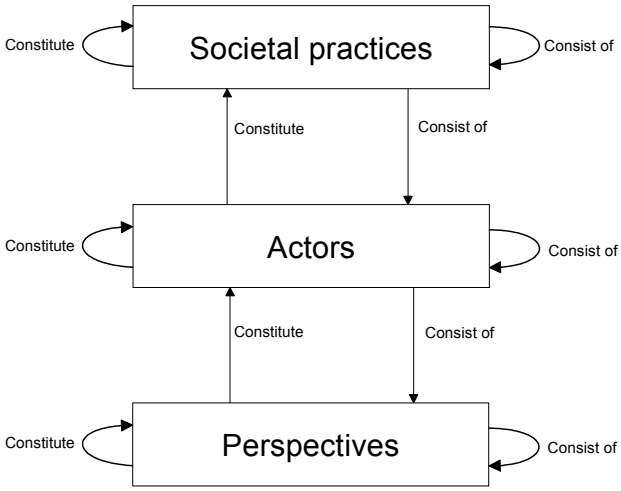
9.4.1 An actors' interpretation of the perspectivist space

Societal practices consist of actors, and actors, in turn, consist of perspectives. In principle, the concepts of societal practices, actors, and improvement perspectives are *internally* and *externally* recursive. I understand this to mean that perspectives can combine into bigger perspectives, actors into bigger actors, and societal practices can combine into bigger societal practices (and the other way around, perspectives, actors, and practices can include and contain smaller ones). Fixing a flat bicycle tyre can be deconstructed into a series of smaller improvement perspectives; the Netherlands as an actor consists of many actors (and layers of actors), and 'healthcare' as a societal practice can be unravelled into a large

[520] In absolute terms, the difference is definitely growing, in any case on average.

[521] There are various ways to seek a better balance in the perspectivist space for a societal practice. For instance, if you have a more or less fixed number of perspectives that are extremely out of balance, you can reconfigure them to a position closer to the diagonal, and therefore more in balance. You are then following an isosurface, which can only be done in leaps. Think of the Cro-Magnon, where some hunters developed into weapon-makers (functional specialization). The inverse route of the diagonal path also exists (it's about statistics, after all): the balance declines, societal practices fall apart because the participating actors no longer perceive the added value of cohesion when they are far removed from the diagonal. At that point, those actors seek their own balance, a lot lower and close to the diagonal. These are trends we're seeing in Europe at the moment.

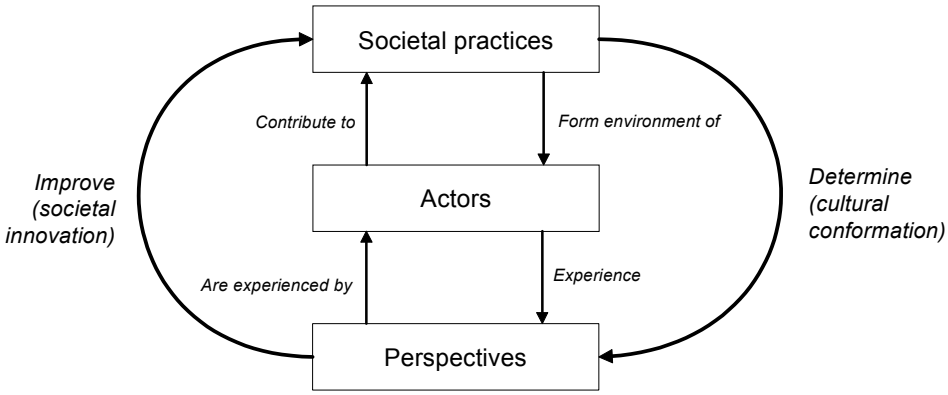
array of societal sub-practices. That continues all the way to pragmatic limits (limits that can still add sufficient value).



Recursive relationships between and within perspectives, actors, and societal practices.

Recursive perspectivism exists in (emerges in, consists of) a perspectivist consciousness. Perspectives, actors, and societal practices derive their pragmatic value from each other in this consciousness (see figure above and below). A perspective is relevant *because* it is experienced by an actor, after all, and an actor is relevant *because* they experience certain perspectives. The same goes for actors and societal practices: an actor is relevant *because* it participates in a societal practice, and a societal practice is relevant *because* it means something to an actor.[522]

[522] There is a transitivity: a perspective is therefore relevant because it plays a part in a societal practice, and a societal practice is relevant because it means something to a perspective.



The ambitious route: we place societal practices in a societal improvement perspective (the left curved arrow). For example, a society struggling with a greenhouse effect is being transformed into a climate-neutral society by global environmental policy.

The crux of a conscious societal innovation is that *less well* functioning and *better* functioning societal practices are placed in a large-scale improvement perspective with a societal improvement process in between (see the left curved arrow in the graph above). It is evident that this requires a plurimodern transformation (see Part I of this book): we will need to see through the perspectives of many actors in correlation to different scales (this is discussed in Volume IV of the series *Society in Perspective*: *Multi-actor procesmanagement in theorie en praktijk*).

Actors constitute the link between individual perspectives and societal multi-actor practices. You could see them as 'containers' of recursive perspective. This recursive perspective comprises the experiential world of that actor. The name of an actor will be the label on that container, a marker referring to a specific part of the entire network of perspective that comprises the societal practice. Actors experience their own experiential worlds, and specific experiential worlds contain only a part of the societal multi-actor practice.

If you use the context of recursive perspectivism to look at a societal practice of a significant size, you'll always see these three levels (perspectives, actors, societal practices). At the most abstract level, actual practice is viewed as a single societal multi-actor practice. At the most specific level, it consists of complex networks of perspective. Overseeing all of this perspective is impossible.[523] But you may have some idea: after all, at the interim level, you can recognize experiential worlds, which you attribute to the contributing actors. In that way, the actors become a pragmatic pivot point, an interim layer to influence and

[523] See also *the cognitive threshold* in my thesis, a threshold that I would no longer consider a cognitive threshold, because perspective can take on many shapes. However, the principle that our perspectivist capacity is limited and restricted does not change because of that.

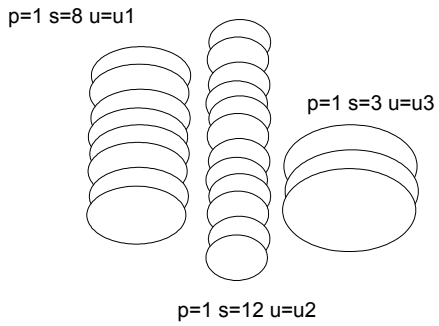
designate coherence and cooperation (or coherence and conflict) in a practical way among all those perspectives.

On the basis of this explanation, we now can pragmatically point out the three axes of the perspectivist space in terms of coherent actors.

Let's say we have a societal practice that consists of a quantity of perspectives *q*. We can distribute this number of perspectives across the experiential worlds of the actors that make up the practice together. In accordance with the perspectivist dimensions (pluriformity, similarity, and unity), we can look at:

- the number of *different* actors, i.e. actors with different experiential worlds (pluriformity, for example bakers, politicians, and butchers),
- the number of actors on an *equal* footing (similarity, the number of bakers, the number of politicians, and the number of butchers), and
- the average perspectivist scope of these different experiential worlds (unity).

The following figure shows an illustrative but not very realistic image:[524] the societal practice in question here consists of three different actors (pluriformity), with 8, 12 and 3 identical members respectively (similarity, which we summarize in one position as the estimated average), and per actor a different number of constituent perspectives (unity, where we also take the estimated average).[525]



A societal practice in terms of actors and perspectives.

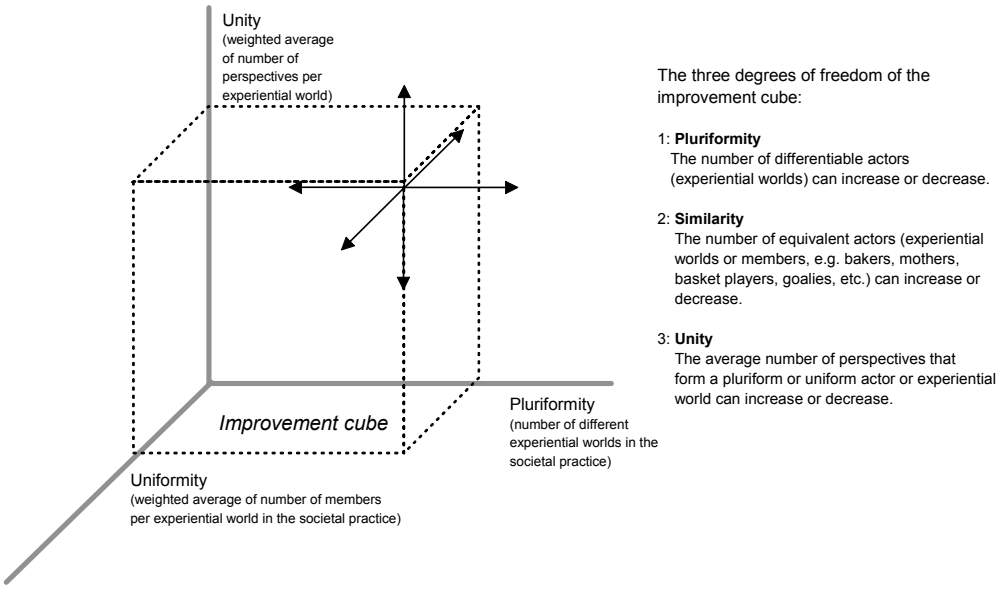
Pluriformity now designates the number of different types of experiential worlds distinguished in a societal practice, while similarity specifies the estimated average

[524] Generally large numbers of perspectives are involved.

[525] It is a pragmatic approach, as is evident from the fact that the actors should overlap in order to achieve a coherent societal multi-actor practice. In complex situations, you do not know the exact number of different actors, nor the number of members per actor, nor the exact size of the actors. You place the practice in an approximate context and accept that it's delocalized.

number of members and types of actors, and unity defines the weighted average perspectivist size of the experiential worlds per member. So q=p·s·u still holds true.

A point in the three-dimensional space places a societal practice according to the characteristics of its actor configuration (see figure below). If p is high, many different types of actors (easily distinguished from one another) will be participating. If s is high, it involves large, homogeneous groups (evidently similar individuals). If u is large, it means that the experiential worlds are expansive and complex.



The Innovation Cube (also called the Improvement or Value Cube)

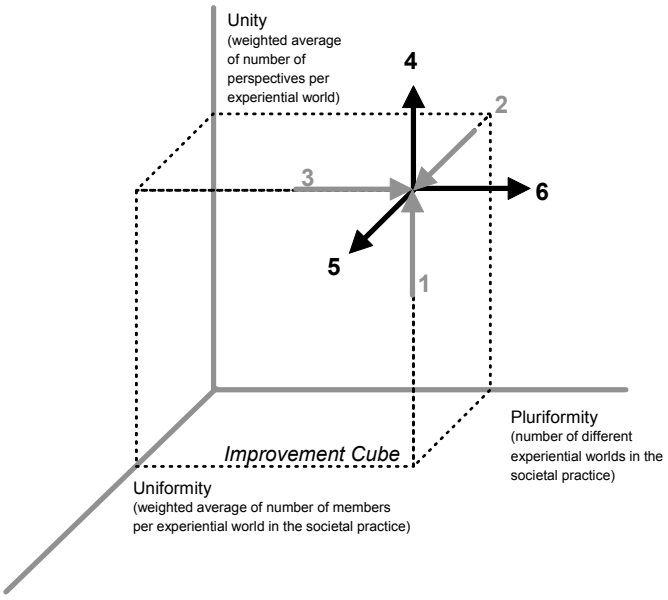
Each axis provides perspectivist degrees of freedom in societal multi-actor practices. You can increase or decrease the number of *different* actors who participate (along the pluriformity axis). You can increase or decrease the number of members per type of actor (along the similarity axis). You can increase or decrease the average number of perspectives in experiential worlds (along the unity axis).

The three most extreme interpretations are those in which p, s, and u respectively are equal to h (and the two others are equal to 1). The intervening points are in the isosurface shape p·s·u=q. Statistically speaking, that cubic symmetry (average balance between the three axes: p~s~u) is what yields the best value-effort relationship.

9.4.2 Six value orientations

The six positive value orientations are related to the six vectors in the figure above, but not identical to them. They are displayed in the figure below (the numbers correspond to the arrows in the figure). They describe the different possibilities we have to achieve

improvement in societal practices. This is possible by deploying *more* (exploring, optimizing) and/or *better* (optimizing) perspective in coherence and cooperation. They each increase the value content of the cube (the amount times the quality of the perspectives deployed in coherence and cooperation) in their *own* way, and that's why I call them the six *basic* value orientations.



The three optimizing value orientations:
(goal-directed, en route to a known peak, improving the existing value box)

1: **(Technological) Process optimization**
Delivering the same product with better technology (e.g. laboratory automation)

2: **Utilization optimization**
Delivering the same product more efficiently (e.g. load factor and capacity utilization to 100%, cutting losses and idle time to 0%, shortening critical paths)

3: **Team optimization**
Delivering the same product with better cooperation. (e.g. better cooperation between first-line and second-line medical care, better cooperation among heart specialists)

The three exploring value orientations:
(goal-seeking, searching for a new peak, extending the value box)

4: **Product/service innovation**
Developing technologically improved products and services. (e.g. telemonitoring cardio, amplifierr with better S/N ratio)

5: **Multiplication/upscaling** (expansion, growth)
Enlarging work force and production capacity, *more* of the same (e.g. more people and equipment, more beds in a hospital)

6: **Societal broadening**
More parties and interests considered, greater inclusivity. (e.g. independent living for the aged, health care nearby))

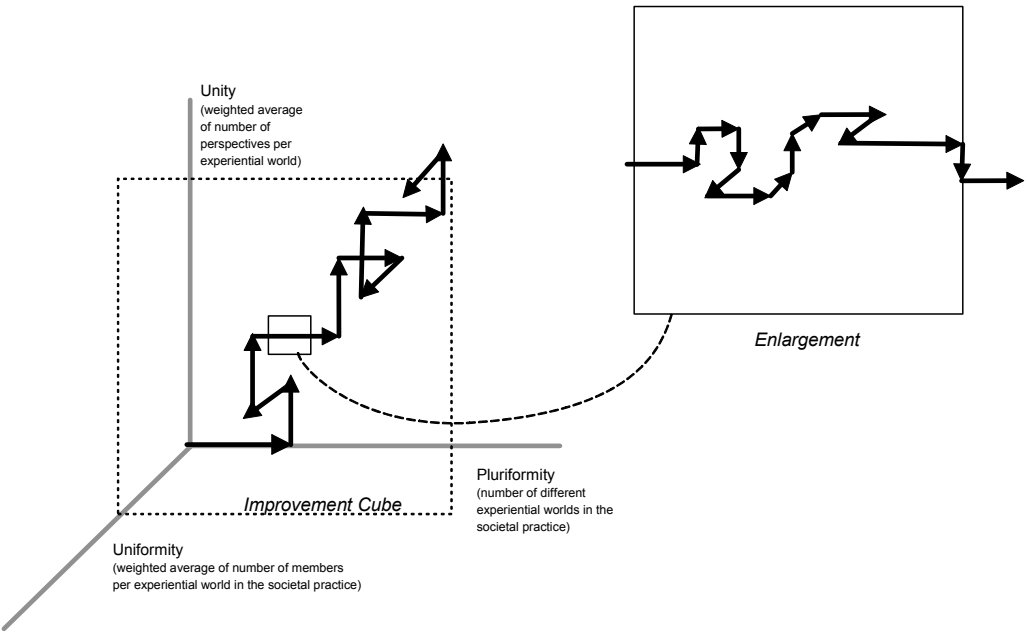
The Improvement Cube leads to six innovative value orientations.

If you deploy only one value orientation, you are following a monostrategy in innovation. This rarely ever appears in its purest form: we are talking about easily recognizable basic value orientations (a bit later, we'll characterize a few aspects of each of them), but in practice they'll mix (therefore the *diagonal* path of humanity). If you zoom in, you'll see that it's very rare for there to be a very long repeat of just one orientation.[526] This would be similar to tossing dice repeatedly and rolling only sixes. Examined in detail, you'll see

[526] The six value orientations are not independent from one another in societal use. There is a certain pull to the diagonal, as if they were tied together with a rubber band. The increasing over-deployment of one through five value orientations leads to an ever-greater 'pull' from the missing five through one value orientations. This means there are strong dependencies and statistical preferential routes, depending on the position in the space.

incremental progress with a varying interval, depending on the number of repetitions and the extent to which they are average (since perspective is fractal, recursive).

The six mono-strategies are combined into e.g. double, triple, and complete value strategies in innovation (examples will be discussed below).



Recursivity in value orientations: fractal incremental progression on various scales (for example extrapolation).

Mono-strategies

The three optimizing value orientations are based on the *same* outcome (the same output), but try to achieve this (1) technologically, (2) in terms of efficiency, or (3) in terms of cooperation in a *better* way. 'Better' in this case means: by using better-quality perspectives in your creation process, since they generate the same output with less effort.

1: **Process optimization.** The end product of the process does not change, but we want to improve the technological process that produces it. This is the hinterland of technological process efficiency. The effort required to deliver the value needs to decrease. Examples: Business process redesign, laboratory automation, from batch processes to continuous processes in chemical production.

2: **Utilization optimization.** Although our goal does not change, we want to make more efficient use of the existing actors, techniques, and equipment. We want to minimize underutilization, unoccupied buildings, stagnation, unnecessarily long lead times, unnecessary stock, in short all variants of underutilization of the existing processes and

resources. The technological resources that are already present and being deployed need to generate more value. Examples: load optimization, Just In Time warehouse management.

3: **Team improvement (optimization).** The goal does not change, but not everyone on the team is already optimally attuned to one another. 'Team spirit' could be stronger. The human resources that are already present and being deployed need to generate more value. For example, a group of cardiology specialists are unable to work together effectively. Two sales managers are competing fiercely against each other. Innovation, production, and sales do not understand one another and work at cross-purposes. Healthcare and well-being are at cross-purposes. A positive example is the way all stakeholders work together to remedy hospital infections.

The three optimizing value orientations actually are aimed to improve the output: technologically (4), in terms of volume (5), or by allowing more people to participate (6, inclusion). The output is better because it represents increased value.

4: **Product and service innovation.** We want a new product, service or product-service combination that represents more value than the existing generation of products and services. We collectively set higher standards, even if we don't know where we're going to land just yet. The *product*, the *output* improves. For example: the development of better treatment methods for existing healthcare issues; developing amplifiers with a noticeably more neutral sound.

5: **Multiplication/upscaling.** Doing something that we are already able to do and were doing on a larger scale, thanks to replication (doing the same thing more often, frequently in parallel). For example, we had two production lines; now there are going to be six. We serve 200 customers every month; we're increasing that to 400 because we're doubling the front and back offices.

6: **Societal broadening.** We're trying to generate *more* value for *more* actors; by defining *more* interests in greater detail, answering *more* questions, and defining needs that had been *latent* till now. Thus it's about *inclusion*. There are more people who experience value, and the number of goals we are setting is increasing. We are seeking a socially fairer approach that offers more inclusiveness. *Social innovation* is a good match. Examples include the healthcare innovation programmes focusing on topics like 'ageing independently' and 'care close by', and neighbourhood improvement programmes in and around 'fixer-upper' houses in Rotterdam.

Double strategies

Many paired combinations are possible. The three most obvious ones, paired by the three axes, are discussed below. In a nutshell, 1 and 4 (the unity axis) are about technological solutions, 2 and 5 (the similarity axis) are about resources (utilization), and 3 and 6 (the pluriformity axis) are about people.

Technological solutions. (1) Process optimization and (4) product-service innovation primarily encompass the possibilities for technological innovation. Resources and people are not at the forefront.

Resources. (2) Utilization optimization and (5) multiplication/upscaling primarily encompass better utilization of *existing* resources (knowledge and resources). This is a powerful value strategy, because it involves upscaling tried-and-tested methods. Resources are key, while technological aspects and people take a back seat.

People. (3) Team optimization and (6) societal broadening: these two cover the interpersonal dimension, such as cooperation within the team and developing cooperation with new partners outside of the original team (new coalitions). The people involved are key, while resources and technological aspects come second.

Triple strategies

Here, too, I'll only mention the most obvious (any combination of three can be used, after all).

(1-3) The first three are the three *optimizing* value orientations: Process optimization, utilization optimization, and team optimization. In principle, the existing configuration is the context here. They try to more rigidly *exploit* the *existing* Value Cube by introducing better perspectives (often through substitution: you replace pieces of perspectivist fabric with better ones). That's why they are usually more detailed, incremental, and goal-oriented in nature than the other set of three (see below). The goal (the output) is already known and does not change, but they try to achieve this goal more effectively (1) in terms of process, (2) in terms of utilization, and (3) in terms of teamwork.

(4-6) The second set of three – product-service innovation, multiplication/upscaling and societal broadening – are *exploring* value orientations. They require a distinctly more complex configuration. They try to increase the existing Value Cube by reaching outwards (generally involving addition). Consequently, they are more process-based, leap-based, and goal-seeking in nature. They look for a more complex stable actor configuration and try to broaden it by (4) product-service innovation, (5) multiplication/upscaling and (6) societal broadening, respectively.

Combination leads to societal innovation

Double, triple, quadruple, quintuple, and sextuple strategies are all combination strategies. The sextuple strategies have a special status, which is why I'll discuss them separately in a moment. But in all other instances, combining innovative value strategies involves the simultaneous emergence of an advantage and a disadvantage.

The advantage of combining is that you have access to various improvement mechanisms. That means that your innovative toolbox is fuller, and filled with all kinds of different tools.

The downside of combining is that you may introduce a 'moving target' or an unstable hybrid: since every mono-strategy changes the societal practice in an essentially *different* way (relocates it), you have to do your very best to keep everything in coherence and on course for improvement. You have to be adept in handling all these different tools, and you need to know how to do that, since they are not compatible in each and every combination. Exploitation (1-3) and exploration (4-6) do not mix well, for instance: if you carelessly combine them, you may well get a lot of frustration, irritation, and loss of value. People focused on exploitation and efficiency have a passionate aversion to the uncertainties involved in innovation and change, and vice versa. Technological experts don't always have good people skills; conversely, people managers are not always great technicians. Value orientations designate different improvement mechanisms in relation to each other that in many ways are like oil and vinegar. You can definitely make a delightful mayonnaise with those ingredients, but you have to know what you're doing and you have to add something (eggs). This takes a thorough knowledge of ingredients, and the steady hand of a skilled chef. Later, all six of the basic value orientations will be characterized based on twenty aspects, identifying and explaining their fundamentally different nature in comparison to each other.

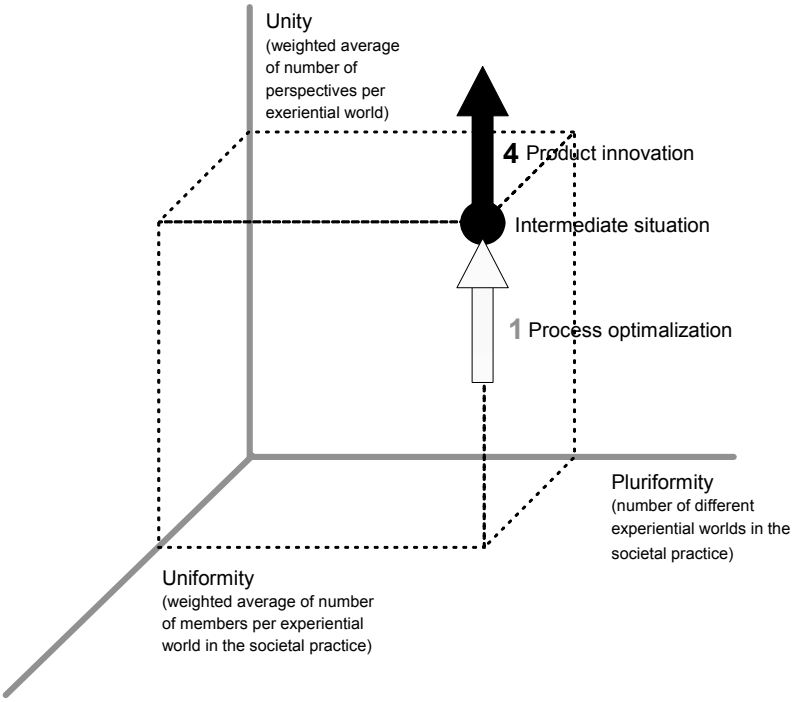
If you use smart combinations of value orientations, however, and make good use of their common interfaces, that will also give rise to the most impressive innovative societal improvement perspectives, which will be able to achieve significant improvements in the actor space. Many combinations occur in actual practice. I'll discuss a few that lead to innovative improvement perspectives.

For example, the two dominant technological value orientations, (1) process optimization and (4) product-service innovation, both use the unity axis: they aim to generate a powerful, coherent, strong value-generating network of perspectives (as a unity together), and they have relatively little concern for the people axis or the resources axis.

- If you deploy both process optimization and product innovation at the same time (in parallel), it creates a serious problem, because nothing is as frustrating as optimizing a changing whole. As soon as you've fixed it, it starts to change again.
- If you only focus on one of the two, your luck will run out soon enough: you can only 'squeeze' so much out of it before it runs dry; if you continue to focus on innovating, you'll never get around to exploiting it. (See the value paradox, which will be discussed shortly.)
- But if you schedule them in sequence, and possibly even let them gradually flow into one another, you create beautiful and powerful combinations. I'll describe them below, and provide a graphic representation in the actor space.

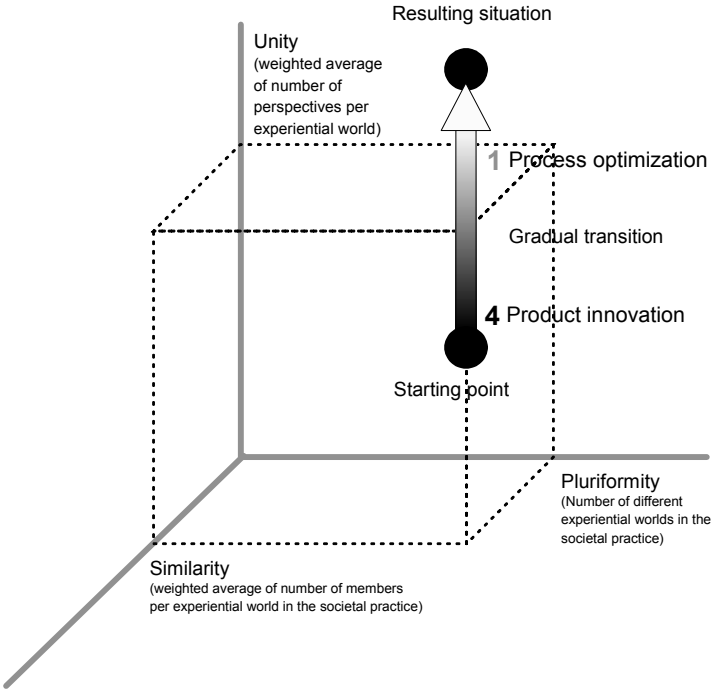
Let's say you start with process optimization. That generates value, and so you continue. However, slowly but surely, the profit margin decreases. Improvement slows down to a crawl. It's about time to move onto product innovation, because there's a real chance that that will be the right path to even more added value. You start with almost complete

optimization, stop when it starts to yield less profit, and move onto product innovation. If you optimize first and then move onto optimizing innovation, a point will occur where you switch (i.e. where your optimization yields less and less, or even stops altogether if you wait too long).



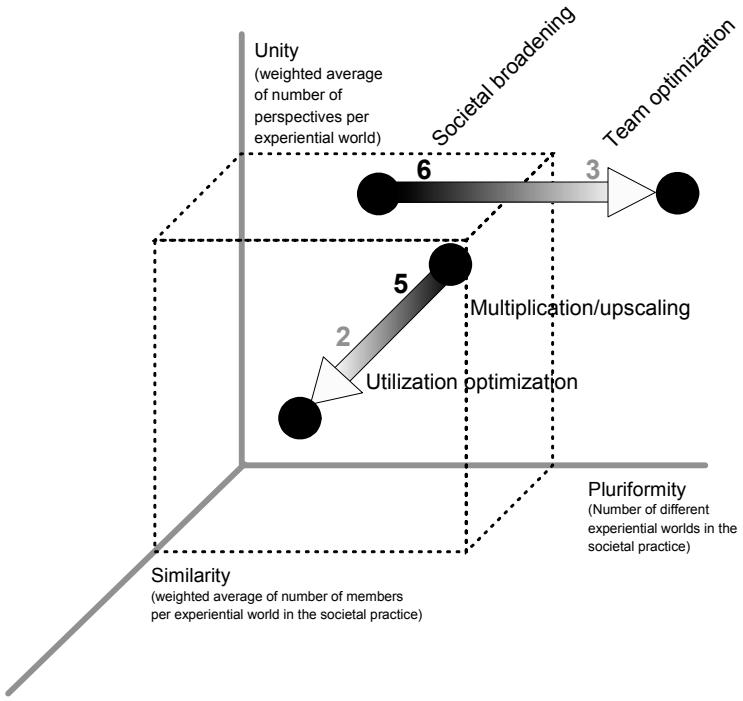
Process optimization (1) followed by product innovation (4) requires a transitional situation. (The same goes for 2 and 5, and 3 and 6.)

If you switch this process around, a more gradual innovative improvement perspective will emerge. Your starting point is a baseline in which you efficiently create a product. You think that the product could improve (*why* you make something), so you start by implementing a powerfully exploratory product innovation. At a certain point, the contours of your innovative product gradually become clearer. The nature of your improvement process changes: you gradually move from exploratory product innovation (*what* are you making) to process optimization (*how* do you make this). Eventually, you end up with your innovated product. (However, moving in the direction of just one axis is difficult: the diagonal will eventually start pulling!)



Product innovation (4) followed by process optimization (1) moves gradually, and changes a starting point into a resulting situation. This causes an innovative societal improvement perspective that moves from goal-seeking to goal-achieving.

For the other two pairs, the situation looks like this:



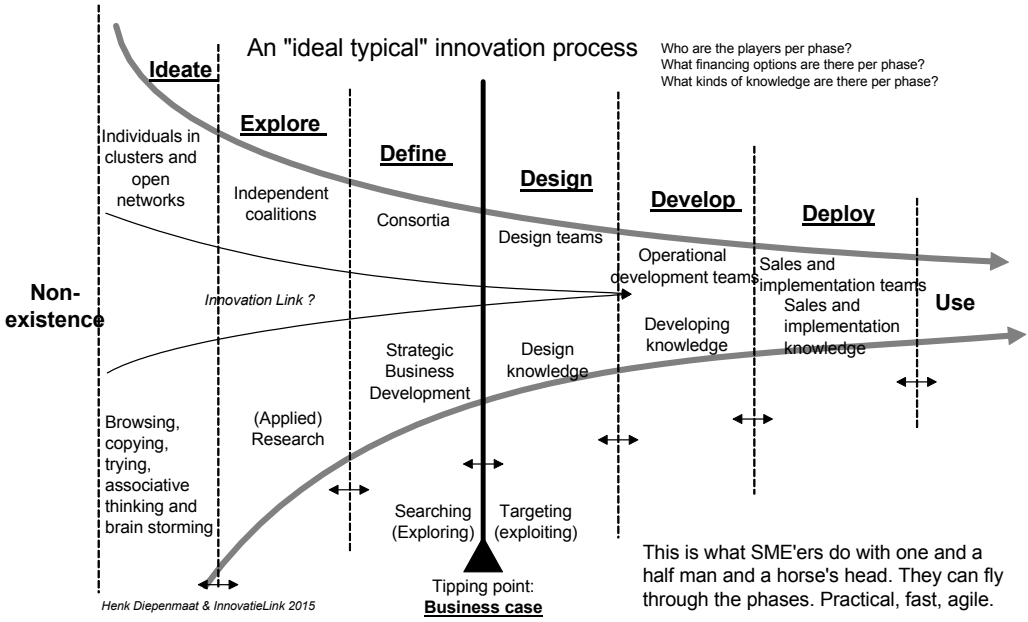
The other two single-axis innovative societal improvement perspectives.

In these innovative improvement perspectives, we see the gradual transition from exploring unknown territory (outside the box, goal-seeking) to optimizing within known boundaries (inside the box, goal-achieving). This gradual transition is known in a whole spectrum of innovation theories as the innovation funnel. The idea is that as you continue to progress, the nature changes from exploring to exploiting, and only a small *percentage* of the ideas will eventually make it to the end of the funnel. Together with colleagues from InnovatieLink, an organization that improves on innovation among small and mid-sized enterprises in the Dutch energy and chemical sectors, I've configured this funnel as follows, based on many examples drawn from common sense and experience (see figure on the next page).[527]

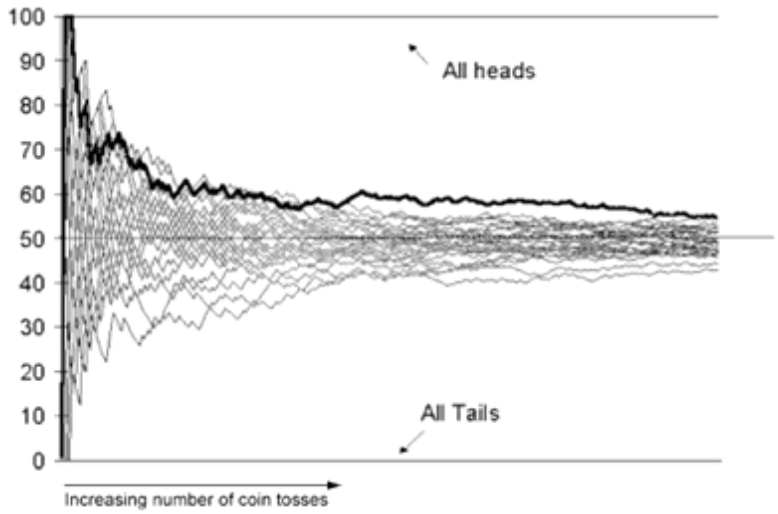
The similarity with tossing a coin is striking (see also the graph below the funnel). The two figures are related: if you consciously try to innovate, you'll end up at a balance in a process

[527] Amongst others, with Chris Bruijnes. For many other possible sources, see e.g. the Wikipedia entry for Design Thinking, and search for *innovation funnel*. It's of course no coincidence that this funnel strongly resembles the way that the two-dimensional situation of tossing heads or tails settles towards an average (see chart earlier in this book). Every little step is either successful or not.

similar to tossing heads or tails. If you do this unawares (random), then the figure is similar, but it will take longer (more steps).



The funnel: an idealized innovation process that goes from the first early idea to completion, in which the improvement searching space continuously decreases.



The innovation funnel is closely related to the stochastic process of tossing a coin (figure repeated). By designing your innovation strategy consciously and cleverly, you can defeat the stochastic restriction

process, but the defeat also takes place stochastically. Your journey through the funnel takes less effort and/or generates more value. (You could say that you pass through more quickly.)

Integral strategies and societal perspective

A professional innovation practice of some complexity, whether it is societal, organizational, entrepreneurial, personal, or whatever, *combines all value orientations* that are appropriate and therefore wants access to all available tools from the innovation toolbox. It searches continuously for the highest position on the diagonal, the highest quality perspectives, and the best balance on average. The innovation strategy that is therefore far more superior to all others, including the mono-strategies, the double strategies, the triple strategies and any other non-complete combination, is the *complete sextuple innovation strategy*. This one uses all three degrees of freedom and all six of the value orientations, in a flexible, adaptive mix.[528]

This is how you seek the diagonal and follow it upwards, while playing on all the degrees of freedom in the Value Cube (Innovation Cube, Improvement Cube). It's a game of technology (1-4), of resources (2 and 5), and of people (3 and 6), and of optimization (1-3) and pushing the boundaries (4-6). Sometimes you focus on the existing process (1), and sometimes you innovate your product and/or services (4). Sometimes you use what you have (2) and sometimes you up-scale it (5). Sometimes you pay attention to your own team (3), and sometimes you scout for new players from outside (6).

We now also see where the diagonal stems from in a different way: if we deploy all orientations to about the same extent, the result approximates a path along the diagonal. And because we really cannot know beforehand which orientation is preferable (we use Occam's razor), that would be the most robust, strategy. That's why the keeper stands in the middle of the goal when there's a penalty kick. We see here a different expression of the fact that, on average and statistically speaking, perspectives tend towards average effort and an average value.

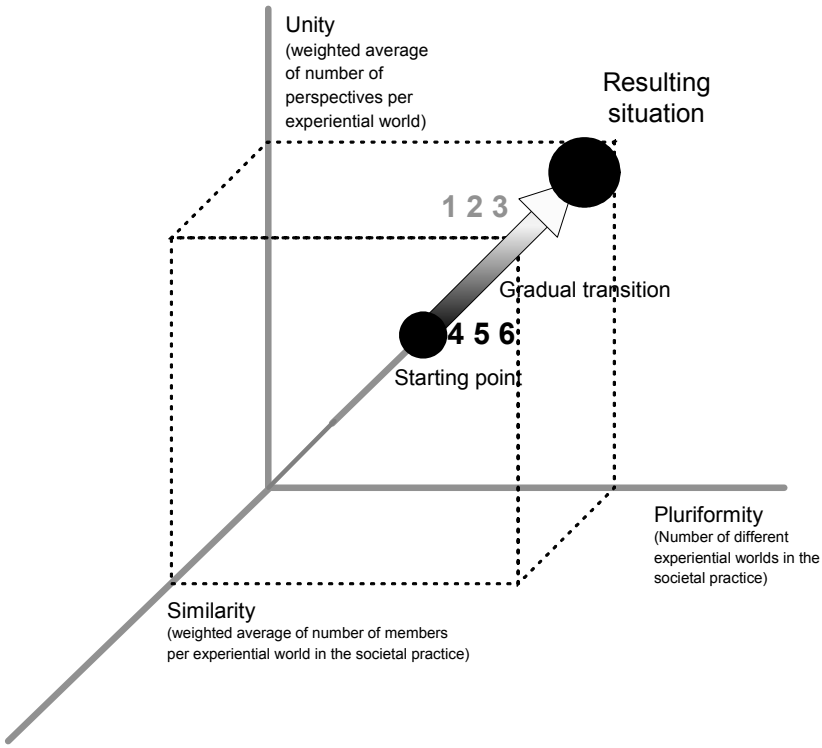
The innovative societal improvement perspective in six orientations seems analogous to the double perspectives, as presented above. Here, too, a societal practice *departs* from a position in the space (a societal starting situation), and it *arrives* at a different position in the space (a societal outcome situation). Here, too, the exploring outlook changes to goal-directed optimization. The only difference is that *three* exploring value orientations (4, 5, and 6) now dominate at the beginning, and *three* optimizing value orientations (1, 2, and 3) at the end.

We can now see how the three previous double examples (4 and 1, 5 and 2, 6 and 3) are distinctions of the complete societal improvement perspective that sextuple (six-value) innovation requires. They come into existence because specific variants dominate (and the

[528] A true integral value strategy not only uses the six value orientations, but also the six negative ones (you just reverse the arrows).

other two options are under-represented). The figure below places a complete innovation improvement perspective (a societal or multi-actor improvement perspective) in the actor space.

The difference between societal innovation and *the path of humanity* until the present day is that societal innovation involves explicitly and deliberately searching for improvement along the diagonal path, instead of letting it come into existence stochastically. In both cases, observed improvements are continuously supported and secured. But on average, the consciously innovating path will – as long as concrete winner-picking does not take place too early, i.e. in the exploring phase – defeat the stochastic path of humanity. Winner-picking strategies are after all predominantly optimizing and not optimizing. You could wonder whether they still deserve to be called *strategies*: they could more accurately be described as *tactics*, due to their more restricted nature.



Societally innovative multi-actor perspectives move gradually from a goal-seeking, optimizing mix (4, 5, and 6) to a goal-achieving, optimizing mix (1, 2, and 3).

Multi-actor perspectives as interdisciplinary bridges: S-curves

Multi-actor perspectives express far-reaching, objective improvements moving from a starting situation to a resulting situation in terms of far-reaching, subjective perspectives of the actors that are involved. This is no coincidence, since recursive perspectivism

positions itself, philosophically speaking, carefully between a sterile and indifferent objectivism (an extreme natural-sciences position) and an 'anything goes' and 'extremely bounded' subjectivism (an extreme social-sciences position), and rejects both of these extremes in their absolute limits.[529] Societal multi-actor perspectives connect object and subject: they function as interdisciplinary bridges.[530]

Successful realization of a multi-actor improvement perspective takes effort and causes a jump in value from the point of view of the actors involved, which takes time and requires change in the environment they share.

Absolute value (in euros or gold), objective effort (work done in Joules), and elapsed Newtonian time (planetary time or atomic time) are different from experiential value, perceived effort, and perceived time (Bergsonian time, *durée).*[531] Experiences fluctuate around an average – from an actors' perspective, nothing is objectively different from the situation that all actors experience – but may deviate dramatically from this average for individual actors. For instance, that average value can be approximated by assuming the average value per perspective for dimensions like time, effort, and value (see Part II of this book). This is actually an Aristotelian concept (see Aristotle's *Ethica Nicomachea*, in which he positions each virtue as a golden mean, an average between two vices).

In this way, we can create a value-time graph of the development and unfolding of an innovative multi-actor perspective, i.e. societal innovation. The beginning is characterized by significant optimizing and exploration using value orientations 4, 5, and 6 (see figure above). Many perspectives are tried and cast aside, and the method is downright experimental and outside the box. It means that the time (and the effort) increases significantly, while the value hardly increases at all yet. As time progresses, though, things become clearer, the goal is more clearly defined, and the optimizing orientations 4, 5, and 6 are gradually replaced by the optimizing orientations 1, 2, and 3. Optimizing perspectives start by quickly and efficiently generating value: the initial blows are worth taking, and the value curve accelerates upwards as time passes. However, that progression cannot continue indefinitely; at a certain point, the tap starts running dry. Time passes, but perspectives are cast aside more and more often. Value generation decreases faster and faster, until a new near-constant value is eventually achieved.

The value curve that is created in the time-value domain is the S-curve: a curve used by my former colleague Jan Rotmans,[532] and others to describe societal transitions towards sustainability within the field of transition management.

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[529] (see Volume I of this series, Diepenmaat 2009, *Een filosofie van de maatschappelijke praktijk*.

[530] Diepenmaat (1997), Trinity, Model-based Support for Multi-Actor Problem Solving, p. 35 (thesis).

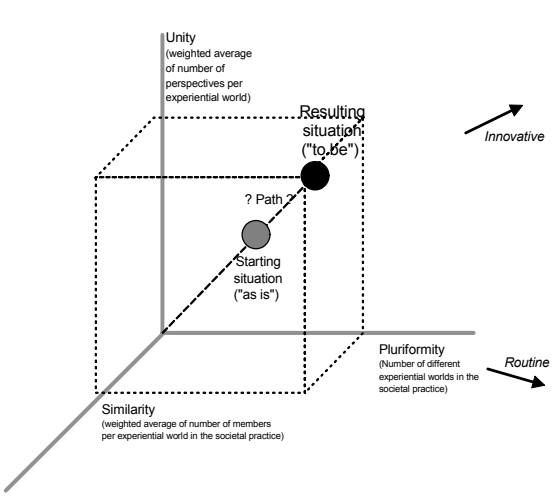
[531] Henri Bergson (English translation, 1910) *Time and Free Will: An Essay on the Immediate Data of Consciousness.*

[532] From DRIFT: the Dutch Research Institute for Transitions at Erasmus University Rotterdam, where I previously worked part-time.

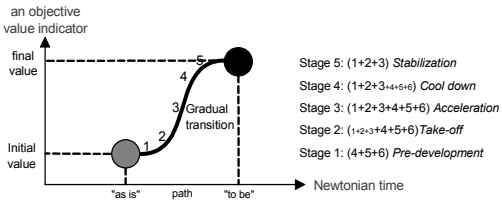
Rotmans distinguishes the following phases (they will overlap in practice; the text between the parentheses after the phases is my own):

1. **Pre-development** (a period of intense testing and experimentation)
2. **Take-off** (the promising developments manage to get off the ground)
3. **Acceleration** (the promising developments gain more and more momentum)
4. **Stabilization** (society has absorbed the promising developments and is reaching its saturation point)

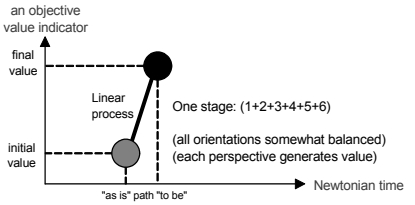
The figure below shows how the S-curve corresponds in the time-value domain with the perspectivist path of an *innovative perspective* in the actor space. Because of the exploratory nature of an innovative perspective, many sub-perspectives are not profitable at the beginning. The same applies to the end, but now because the number of possibilities for improvement decreases. These characteristics of an innovative trajectory create the characteristic S-curve. A *routine perspective*, by contrast, generates the same value for each sub-perspective, and nothing of value is lost to exploration (at the beginning) or depleted possibilities for improvement (at the end). That's why the routine path is roughly linear in the value-time domain, and the average value per perspective is perceived as fairly average.



An *undefined* process in the perspectivist domain
(the path is not yet determined)



An *innovative* process in the value/time domain
(the value per perspective is less at the start and at the end)



A *routine* process in the value/time domain)
(each perspective is necessary and hits the target)

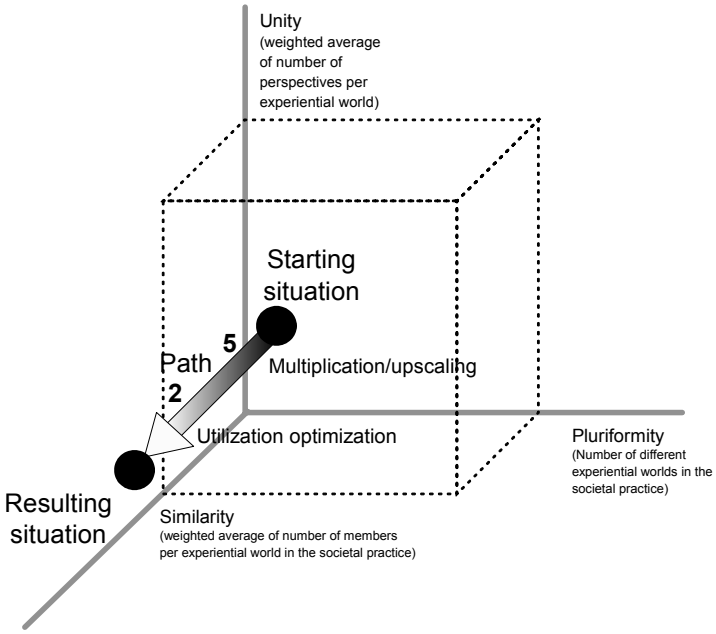
Differences between innovative and routine improvements in the value-time domain

It is not a simple task to find one single value indicator (the vertical axis on the value-time graphs) that is both practical and acceptable (objectively) to all the actors involved in a multi-actor perspective. This must correlate as seamlessly as possible with the entire content of the Value Cube, and that value covers the whole of many different – and often even opposing – interests. After all, value will *then* be experienced if an interest is *consciously*

defined; the bigger the interest is, the higher the value will be. Examples of proxies for objective value indicators that are used in society include euros, quantities of products sold, additional turnover, jobs, levels of education: all things that can easily be objectively quantified. However, none of these examples can cover all the interests of all the actors involved.

Large segments of modern societies accept financial-economic value indicators rather indiscriminately as leading, because financial-economic thinking, focused on the short-term and within strict frameworks, represents modernity at its best. But this mentality ignores the many essential interests that really matter, as is clearly evidenced by the growing concerns about our climate and environment, the exclusion of ever-growing groups of people (at this point mainly the less well educated), and the way that our economies are creaking at the seams. Value is inherently pluriform, because it has its deepest roots in perspectives, and therefore in actors, and therefore in a single, pluriform multi-actor society. The plurimodern view of Team World is based on this structure draws its consequences from it.

Back in the nineteenth and twentieth centuries, sociological research was done on the diffusion of innovations (the distribution of innovations) in which the S-curve came into existence, e.g. as used by sociologist Gabriel Tarde (1843-1904). The diffusion of innovations is about the fact that members of social groups, for example farmers, adopt innovations like new techniques or excipients, and how (and at which pace) they do so. Diffusion of innovations can be identified in the perspectivist space as an upward movement along the *similarity axis*. After all, the similarity axis designates the number of members, followers, and users of a specific perspectivist practice (see figure below). In terms of perspectivist structure, this practice is characterized by the other two axes.



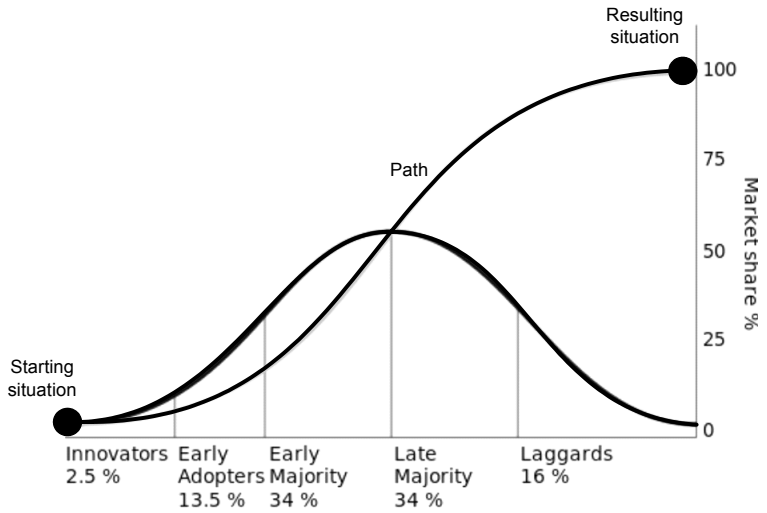
Diffusion of innovations in the perspectivist domain is about the upward movement along the similarity axis. If a worse practice is being pushed away at the same time, this one will move in the opposite direction.

The rural sociologist Everett M. Rogers collected over 500 sociological-empirical diffusion studies in many different domains (in the second half of the twentieth century), and used those to derive the S-curve as the dominant characteristic diffusion pattern.[533] Within a sociological group, there are of course front runners and those who have fallen behind in adopting an innovation, which prompted him to start defining various sub-types. The sub-types that Rogers defines are:

1. Innovators
2. Early adopters
3. Early majority
4. Late majority
5. Laggards

Their share and the resulting S-curve in the value-time domain are displayed on the next page.

[533] See the renowned book by E.M. Rogers: *Diffusion of Innovations*, 1962.



A visual representation of the innovation diffusion theory proposed by Rogers (source: Wikipedia; the two bold black dots and the text above the curves are my additions).

The general idea is that there will initially only be a few innovation-minded people who will adopt the innovation; after that, more and more will follow suit, because they see it increasing in value all around them and want to adopt it as well (in the context of statistical thermodynamics, this can be directly compared to an increased risk that types of molecules will collide). The curve goes up faster and faster. In the end, there will be fewer and fewer people remaining in the group to adopt the innovation (in the context of statistical thermodynamics, this is comparable to a chemical saturation effect). The curve will rise less and less quickly, eventually even levelling out. The result is the typical curved *S*.

With diffusion, we also recognize the difference between innovation diffusion (an S-curve) and routine diffusion (a straight line) in the value-time domain, analogous to the difference between *innovative* and *routine improvements* in three dimensions, three figures earlier. A straight line in the value-time domain means that the value generation in terms of the objective indicator is distributed evenly across time. The assumption that generating a unit of value costs a set amount of time and perspectives on average makes the most sense in the context of routine perspectives and very complex perspectives (in the case of the latter, the law of diminishing returns applies). It does *not* apply within a complex innovation (according to any path at all), where, on average, the S-curve emerges.

The value paradox implies a value balance

To properly estimate the value of the integral innovation strategy, which combines all six[534] basic value orientations in a flexible way, it is important to present the 'value paradox' and

[534] If you allow 'going into reverse', then there are of course twelve.

explain it in more detail. The value paradox is a statistically applicable (average) rule of thumb that is at the basis of *all* innovation, of *all* improvement. As a perceived phenomenon in economics, it is better known as the law of increasing and diminishing returns.

The *value paradox* relies on the recursive perspectivist space, and goes as follows:

> *In the short term, you can pursue a perspectivist direction that generates value. However, if you continue for too long with just one value orientation that initially generates value, the value will inevitably diminish more and more, sooner or later, and you'll be forced to switch tracks. This happens because you will irrevocably pass the diagonal (you may even start beyond it, in which case things will go wrong immediately), and then move farther and farther away from the diagonal, moving increasingly out of balance.*[535] *In a complex dynamic environment, every direction that generates extra value (every value orientation), if continuously implemented, will eventually result in the destruction of value.*[536]

At first glance, the value paradox seems to be a somewhat discouraging paradox. You've found a direction that generates extra value, and then you find out it's doomed to fail! But there is an unmistakable logic behind it. If you choose a specific direction, you give it extra attention, you utilize its value potential, but you will by necessity neglect to cash in on the untapped potential in the other directions. Sooner or later (averaging out proportionate to the number of basic orientations that you either focus attention on or neglect), you'll increasingly be worn out.

This knowledge is largely based on our experience. We therefore see the value paradox in action on all kinds of scales, in the shape of all kinds of life cycles and economic wave phenomena.

The economy is an epitome of choppy progress in and of itself. Economists try to identify patterns in economic trends, and they therefore like to speak of cycles and waves, such as pork cycles and shipbuilding cycles in sectors (see the Dutch economic and founding father of econometrics, Jan Tinbergen), economic cycles in national economies and economic power blocs, Kondratieff cycles in international production, kuznets, juglar and kitchin waves. There are also product life cycles, technology life cycles, economic ups and downs, the movements of the world economy, and the rise and fall of civilizations.[537] Another relevant application could be technical analyses on the stock market. (The supporting levels are caused by the peaks at different heights; from a perspectivist point of view, technical

[535] You will still encounter the quantum-theoretical fluctuations, but I'm speaking about an average here, and after that it rapidly goes downhill again.
[536] Every direction is parallel to the axes. The diagonal *path of humanity* is the exception to the rule, of course, which is why it emerges spontaneously.
[537] We may be mortal in the short term because of the value paradox, and are able to approach mortality in better and better ways by honouring more and more values in coherence and cohesion.

analysis suggests that we are moving back and forth on the path through the perspectivist landscape in a kind of 'dancing procession of Echternach'.)

I may not be an economist, but I believe that the cycles and waves identified by economists may be a solid theory. I believe that the economic cycles and waves (economic patterns) are directly explained by recursive perspectivism. In *equilibrium situations*, I believe they are based on the contours of the perspectivist mountainous landscape; it's about balancing movements (oscillation) around balancing points (mountaintops and peaks) on a certain perspectivist scale. Placed in a *more expansive path of growth or shrinkage*, they'll unavoidably run into the intrinsic changing characteristics of the perspectivist landscape, since we are moving from peak to peak. (This also applies to smaller scales; it's a recursive perspectivism after all.) That we generally recognize them, yet sometimes think we do not recognize them at all, that they offer some tangible handholds, but really not all that many, is – I believe – because of the exceptional combination of a stochastic path (the smallest steps on the smallest scales) in an a priori perspectivist mountainous landscape (the largest scale). Our paths are so windy because, as individual human beings – or as the whole of humanity, which it is doesn't matter to a perspectivist consciousness – we are moving blindfolded through a process of trial and error in a perspectivist landscape, and sometimes we wander around a little bit longer around a specific peak at a specific scale. Eventually, we will find our way upwards time and time again. After all, *the path of humanity* is based on the perspectivist landscape, and our nature as short-sighted improvers. Conversely, this also applies to all the parts of this path, as well as the economic paths.

The value paradox does not initially seem to offer much support. But if you look a little farther, then the value paradox isn't that disheartening at all, but in fact quite encouraging, even offering guidance. It harbours an amazing course. After all, you can change direction, change your orientation! And that's exactly what the Innovation Cube provides: it offers a complete set of six evenly distributed value orientations.[538] It offers an integral, adaptive strategy that uses all six value orientations flexibly; in the long term, balanced deployment of this strategy can definitely prevent inevitable decline. It will even lead to growth in value.

Therefore, you could reformulate the value paradox positively. In that case, you choose precisely the inverse of what you should *not* do according to the value paradox. This leads to the value balance:

> *In the long term, all basic value orientations will on average result in value equally often.*

The perspectivist process is the conscious experience of a flux of perspectives, including composite perspectives. Recursive perspectivism assumes that all perspectives are related to each other, and that there are therefore meaningful averages per perspective in terms of intentional characteristics such as effort and value (this is a reformulation of an assumption of purposefulness). If all orientations result in equal value, then there are just

[538] Evenly, because it makes minimal assumptions that could disturb this balance.

as many perspectives that have been 'travelled through' – i.e. experienced – in every orientation, and that they will result in equal value on average and added up. If you respect the diagonal value balance in the long term, then you'll therefore fare better on average, because then you are not neglecting any of the available value contributions.

That is exactly the reason why the diagonal shows up in the perspectivist space as *the path of humanity*, even though we the people have in no way been deliberately aiming to achieve that effect so far. As soon as we experience improvements while stumbling forward (learning), we secure and underpin them, which is why there's a 'pull' to the diagonal. The value balance applies to *deliberate* value-seeking processes. Here, too, these processes could have a positive or negative outcome (although the success rate will be higher than with purely random processes), so they would do well to deploy all available orientations. This is exactly why it's smart to work together, now and in future, at larger scales, to more or less aim for *the path of humanity*. You'll find steep high and deep lows, and the lows will become increasingly difficult to take, but eventually, there is always a higher peak along the diagonal (see also Chapter 3 of this book –Theme I, the prelude).[539]

If we deploy all six innovation methods just as much on average, we'll follow the diagonal upwards *path of humanity*. The diagonal course from the original path is the only course that can prevent *the law of increasing and diminishing returns* from taking effect, precisely because it respects the value balance. *The law of increasing and diminishing returns* is one of the aliases under which the value paradox occurs in economics and business management theory. Courses that intersect the diagonal increase the imbalance after the intersection: only a little at first, but as the distance increases it'll become stronger and stronger, resulting in an increasingly unfavourable relationship between effort and value.

That is interesting: the diagonal – in terms of business economics, but also in societal terms – shows the path that optimally avoids the law of increasing and diminishing returns. This path is based on recursive perspective (it's experienced by actors). If you aim for more balance (towards the diagonal), then the average value per effort increases. If you aim for less balance (away from the diagonal), then the average value per effort decreases. With this in mind, you can even calculate the average improvement potential for trajectories through the perspectivist space. As long as you are moving closer to the diagonal, you will see an increase in returns. For each number of perspectives, the optimum is as close as possible to the diagonal. If you tip that balance, then your returns will diminish progressively.

The statistical double hypothesis

'If you don't eat yer meat, you can't have any pudding.
How can you have any pudding if you don't eat yer meat?'
The Wall, Pink Floyd

[539] This of course is based on the assumption that there are infinitely more potential perspectivist configurations in the universe than what humans can comprehend.

Both the value *paradox* and the value *balance* contain an implicit statistical double hypothesis.[540] It is a hypothesis that we all build on, but it is by definition unprovable. In its purest form, it is based on the perspectives that we've *already experienced* (our past), and uses these experiences to make predictions about the perspectives we are *yet to experience* (our future). It's literally about the present, the *now*. Precisely because it connects our future through our present all the way back to our past, it circumvents the need for formal evidence. It's not water-tight either.[541] The double hypothesis derives its value from the fact that it is confirmed in practice: statistically speaking, it has pragmatically held its own so far, and that's that.

A consciousness plays with perspectives, following the statistical double hypothesis. It is about the game between anticipation in the short term and confrontation in the long term.[542]

That statistical double hypothesis goes as follows:

> *Perspectives offer an increasingly better foundation for concrete anticipation in an increasingly shorter term, but are stochastically divided and confrontational in the increasingly longer term.*

Perspectives in a consciousness thus deliver *precisely the opposite* of tossing dice: the latter are in fact confrontational in the short term, and a beacon of anticipation in the longer term.

We keep anticipating on the basis of experiences (and therefore the perspectives) that we've experienced so far. So in the short term and close to me, if few perspectives have passed through my consciousness, I expect that I *will* see a hiker with a dog in the woods near where I live, and I will *not* see a hiker with an elephant. That's why I *do* expect that my house will still be there when I return from said walk, and do *not* expect that it will be gone. That's why I *do* expect my coffee-maker to work, and do *not* expect that it's broken. That's why I expect, in the even shorter term, that there is a certain solid material environment around me that behaves in a certain way (the 'real' world).

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[540] Related assumptions occur in the fundamentals of natural sciences. Examples include the Ergodic Hypothesis from statistical thermodynamics, and the aforementioned argumentation by Boltzmann in which he essentially used a state space to explain why perfume vapours evaporate outside the bottle but never in it.

[541] Everybody who says they have a water-tight hypothesis is a fundamentalist, and should ask themselves how they can substantiate that it is based on such sure and uncontested foundations.

[542] 'Term' here does not refer in any way to Newtonian time, since that would imply an objective position, but to the total number of perspectives that are followed, experienced. After all, time and space are not a priori givens in recursive perspectivism, but emergent qualities: there is only the experience of streams of perspectives. As a result, a spatial experience (the emergent quality of 'space') runs in parallel to the emergent quality of 'time'.

Those expectations don't have to be correct, of course. There's a donkey sanctuary in the Zeister Bos nearby my home here in the Netherlands, which houses pensioned donkeys from Europe, so I do in fact regularly encounter a walker with an ageing donkey from time to time (an experience that I assume won't be quite as common in other places in the Netherlands). So why shouldn't there be an elephant sanctuary in these woods? Even so, based on my experiences, I do not anticipate such an encounter. Occasionally, a house will fall into a sink-hole and disappear; that happened recently in Germany. And my coffee-maker will, after an average but certainly large number of cups of coffee (although I do not know how many), eventually give up and die. All of this *could* happen, but again, on the basis of my experiences, I hardly anticipate that happening at all.

Conversely, in the long term and far away, as long as there's enough perspective that goes by, I could expect absolutely *anything*.[543] If I had been around to witness it a long time ago, I would have seen mosasauri in a tropical sea right where my house now stands. And who can say what the distant future will bring? The same goes for remote locations: who knows what happens in other places, or even other planets? We can only imagine this in terms of the rearrangement of perspectives that we are familiar with. Distant perspectives, whether positioned in time and/or in space, the maxim applies: anything goes.

A consciousness creates and selects its own perspectives. The double hypothesis mostly tells us something about how our perspectivist consciousness works, how the consciousness of 'self', 'us', or 'here' (connected to the this-now-here postulated by thirteenth-century philosopher Duns Scotus[544]) connects to an increasingly broader temporal and spatial 'environment' around us. Both this self-awareness and this environmental awareness are simply part of this consciousness. The self *exists*, as Heidegger would say: in a literal way, this means that it exists outwardly, directs itself outside, towards not entirely sure but not quite unexpected, partially anticipated and partially confronting experiences from the surrounding environment.

At the very shortest time periods, a consciousness assumes that things will stay the way they were, and will go on their merry way just as they used to, with almost objective certainty, because this is the way it's always been and always has gone. This coalesces into the *now*. In the shortest term, often even without a single thought, we anticipatorily use concrete perspectives; we generate value with them and therefore defeat the stochastic, the

[543] After all, time and space are not a priori givens in recursive perspectivism. There's only the perspectives you experience, and some perspectives are primarily experienced in terms of time, while others are primarily experienced in terms of space. However (congruent to the spectral and non-dualistic nature of recursive perspectivism), every perspective eventually takes a piece of spatial and temporal experience.

[544] The Franciscan theologian and philosopher Duns Scotus (from the Scottish Duns, 1266-1308), coined the term *haecceitas*, 'this-ness': the discrete properties, characteristics, qualities of a thing that make it a specific thing, distinguishable from a general thing (a class or category), such as the Bernese Mountain Dog next to me (Polle) versus a Bernese Mountain Dog in general. According to recursive perspectivism, both could be considered networks of perspective, but Polle adds many specific perspectives (and might also omit a few) to the general identity of a Bernese Mountain Dog.

coincidental, the arbitrary. We have an identity and knowledge, we walk on solid ground, and we live in houses. That's the first half of the double hypothesis; it deals with the shortest time-frame. To this end, a consciousness collects and compiles those perspectives over and over. The result? Things stay the way they were, and go the way they went. That is the unchangeable *now*, and the world that we understand in terms of content.

And what it will become in the very longest term, we have no way of knowing. The second half of the double hypothesis is about this longest term, and forecasts stochastics and confrontation. In the very long term, chaos reigns supreme.

But that certainly doesn't make us powerless in the medium and long term. In the shorter terms, we extrapolate our ideas about the situation around us. On average, those extrapolations will increasingly deviate from reality as the projections move farther into the future – just as the weather forecast for the coming week will become increasingly inaccurate later in the week, and become downright comical in the following weeks and months.

In the longer terms, the perspectivist space turns the *concrete* support of individual perspectives completely around to a *supporting perspectivist structure*. On this point, you can compare the six value orientations with the six values on the dice. You don't know what you'll roll, but in the longer term you can count on balance. As far as rolling dice goes, the more often you roll, the more balanced the results become. As far as the massive number of individual perspectives goes, the more often you experience something, the more balance will be achieved between the value orientations. And in terms of perspectivist structure, ordered chaos is the result.

The statistical double hypothesis isn't circular reasoning. When you use true circular reasoning, you base a consequence on a premise, but this premise presupposes the consequence. For example, suppose A => B and B=> A. What the statistical double hypothesis does is it divides the perspectivist experiences into two groups: what we can build on in terms of *substance* in the short term, and what we can build on *structurally* (*statistic-configurational*) in the long term. That should, formally speaking, never lead to a water-tight formal logic, but nevertheless it's not even close to circular reasoning. It's profoundly pragmatic. This again shows the pragmatic and spectral nature of recursive perspectivism.

The double hypothesis implies that we can build on our experiences so far in the short term, and that we need to seek value evenly distributed among all dimensions in the long term.[545]

[545] A weighting factor could be involved. However, from a perspectivist point of view, there is no reason to use a weighting factor to make one dimension count more than the other. Perspectives are actually distinguished as an average entity. Application of Occam's razor leads to an equal distribution across the perspectivist dimensions. Repeated application of the double hypothesis leads to the same choice: even if the dimensions temporarily diverge in terms of generation of value (and of course they do, that's why you seek

And that's why we can assume, on average, that following *the path of humanity* will also offer us additional societal improvement in future. Past results do not guarantee future performance – but they are definitely the best we have and can work with. Validated knowledge offers a virtually objective course for the short term. *The path of humanity* transforms long-term human experiences into a three-dimensional perspectivist space, and displays the statistical course in the long term. Any more certainty than this is impossible in the long term, but it's nevertheless more than enough to navigate societal innovation processes.

Of shareholders and stakeholders

The six innovative value orientations that I've highlighted here *enhance* coherence and cooperation, because the total number of perspectives (with orientations 4-6) and/or their quality (with orientations 1-3) increases. But you can also distinguish the six antagonistic (negative) value orientations, which decrease the total number (or quality) of perspectives in coherence and cooperation.[546]

After all, you can find the diagonal by either adding perspective or discarding it. Consequently, there are two basic strategies for the search for balance. The first is maximum solidarity, and it looks for the maximum inclusiveness of Team World, as high as possible on the diagonal. In this story, everybody is a stakeholder. The second is selfish, shows a minimum of solidarity, and seeks the minimal inclusiveness of the minority, the shareholders, a lot lower on the diagonal. This is based on the realization that a place a lot lower on the diagonal is perhaps valuable to far fewer people, but it's also a lot easier to achieve. And that may be seen as suboptimal when viewed from the collective, but for a small group it could be very lucrative in the short term, and that's a fact.

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direction and change course), in the long term, they'll eventually return to balance, just like the outcomes of rolling a dice. After all, you adjust your perspectives as well. A perspectivist consciousness doesn't make any assumptions at all in the long term, and in the short term it seeks certainty (objectivity). This can't be formally proven, and is only experienced in practice; see also the pattern laws.

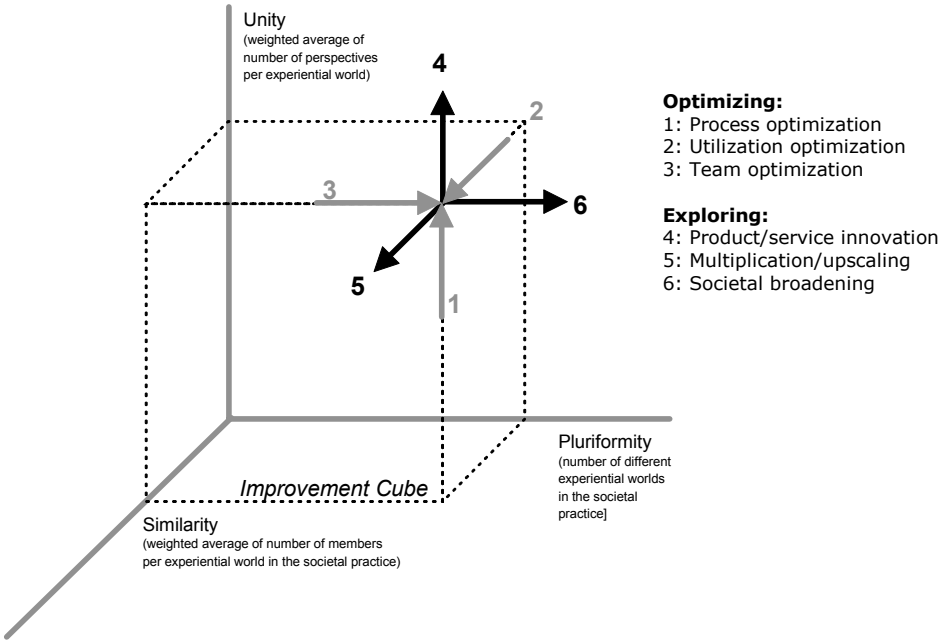
[546] We can also designate six reversed vectors, the negative value orientations simply by reversing the six positive ones. Think of a struggling company 'helped' by a manager firing loads of people, or a society falling apart. In both processes, the number of perspectives decreases. They appoint the 'losers' along *the path of humanity* (on whichever scale). Therefore the twelve value orientations, are designated as basic possibilities for movement in the perspectivist space. By combining them, you can map out random paths in the state space (the smallest step along every axis is 1), making it possible to take small steps, with strongly different intervals, though the perspectivist space. In general, the application of more perspective in coherence and cooperation is a much more positive activity than the application of less perspective in coherence and cooperation. As you get the hang of the first, the second will be needed less and less, since it's obviously all about deploying all perspectivist capacity optimally. The six perspective-reducing orientations always raise the question: what happens with the actors, the bearers of the perspective, that we discard? I'll specify: what happens to the individuals that we let go, the trade-school graduates that we exclude from our knowledge-intensive societies, or the people we discriminate against? Eventually, you arrive at the difference between stakeholders and shareholders. If you seek upwards along the diagonal, you're searching for the inclusive society of Team World. If you also pursue it downwards, you exclude people. That's why I have a preference for the six positive value orientations.

Similarly, the difference between selfishness and solidarity is not either-or; as we have seen elsewhere, the truth isn't dualistic in nature, but plurimodern. *The path of humanity* weaves more or less from the origin along the diagonal into the vast perspectivist space, and with good reason. That's the course that most effectively meets people's need to first take care of themselves and their loved ones, without abandoning the major advantages of coherence and cooperation. Just as you would sweep the stairs from top to bottom, that's how you build up the society of Team World from the bottom to the top, along the diagonal, from the ones closest to you to your fellow human beings, in increasingly wider circles. We've been showing that for millions of years. And that leads to Team World.

9.4.3 The six value orientations in more detail

The value paradox is resolved by using the value balance. You do so by loosely following the diagonal, in the longer term and on average. As you move forward, you constantly need to recalibrate, look around carefully and monitor everything, use your senses, mix and switch the value orientations intelligently, and be adaptive. The more complex the scale on which you work, the bigger the chance that the most value will be found in a harmonious balance between the six value orientations. (Remember the dice.)

Every value orientation has a different nature, and has a whole culture of its own, in a sense. The six mono-cultures don't fit entirely with each other. We all know this, intuitively and (therefore) based on experience: managers aren't innovators, optimizing is something different than exploiting or exploring, techies aren't that sociable, efficiency adepts are often appalled at continuous and large-scale changes, and vice versa. There are major cultural differences within the various value orientations, so you need to handle them wisely and with care: mixing demands care. Only in plurimodern coherence and cooperation is humanity capable of doing justice to the diagonal on a larger scale.



The six value orientations (repeated)

A skilled chef turns oil and vinegar, incompatible with each other on their own, into the best mayonnaise, while a bad chef will ruin it. Knowledge of the ingredients and how they interact with each other is vital. For that reason, I've described the six value orientations in more detail below.[547]

Superficially, this more detailed description mainly shows how the six orientations each have their own individual identities and create their own cultures. But every once in a while, the nature of these facets is comparable for two or three value orientations. I already mentioned a focus on people, resources, and technology for the various pairs (see the figures and the table below that summarize this). Optimization and pushing boundaries also constitute such a pair.

[547] For my first try at this, see my thesis (1997). For a second attempt, at that point still based on the three value orientations, see also Diepenmaat, van Hal, and van Ettekoven, *Mastering Three*.

Orientation \ Focus	*People*	*Technology*	*Resources*	*Optimization*	*Exploration*
1: Process optimization	weak	strong	weak	strong	weak
2: Utilization optimization	weak	weak	strong	strong	weak
3: Team optimization	strong	weak	weak	strong	weak
4: Product innovation	weak	strong	weak	weak	strong
5: Multiplication/upscaling	weak	weak	strong	weak	strong
6: Societal broadening	strong	weak	weak	weak	strong

Chart: Value orientations add emphasis (but are never absolute)

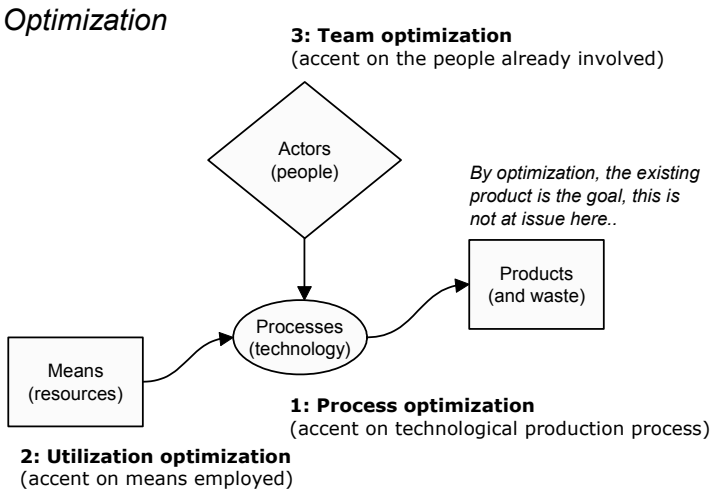
If a value orientation is strong in certain ways (facets), it obviously doesn't mean that it doesn't have the others at all. Value orientations are easily recognized, but focusing on one usually also means changing the others. If you improve your team (3), you'll unavoidably also get techniques (1 and 4) and resources (2 and 5), and you may broaden or narrow down your coalition (6). Or take a focus on process optimization (1): often you'll do that with innovative products made by others (4), your team will need to adapt (2), your own product improves (4), and you may be able to broaden your scale (5). In each case, it's about which one is dominant; the six rarely appear in their unadulterated forms.[548] To a certain degree, you can even choose how you want to look at a situation, and people will perceive different dominant value orientations. Let's take coherence and cooperation on a global scale. You could see this as an enormous expansion of your own perspectives, which means it mostly concerns value orientation 6: societal broadening. But you could also see humanity as this very marginally cooperating team, in which case it mostly concerns value orientation 3: team optimization. The name *Team World* essentially means that, forced by circumstance, we have been a team all along, even though we don't really realize it enough. And a balanced team knows how to deploy techniques and resources properly. Again, this is where we can really still make enormous progress.

If you tackle the technological processes, it often has consequences for people and products. If you scale up production processes, people and resources will follow. People, techniques, and resources are strong presences, dominant entities that emerge when certain directions are given preference in the perspectivist space. On average, these accents appear equally often. That's because the perspectivist space designates radical actors (see

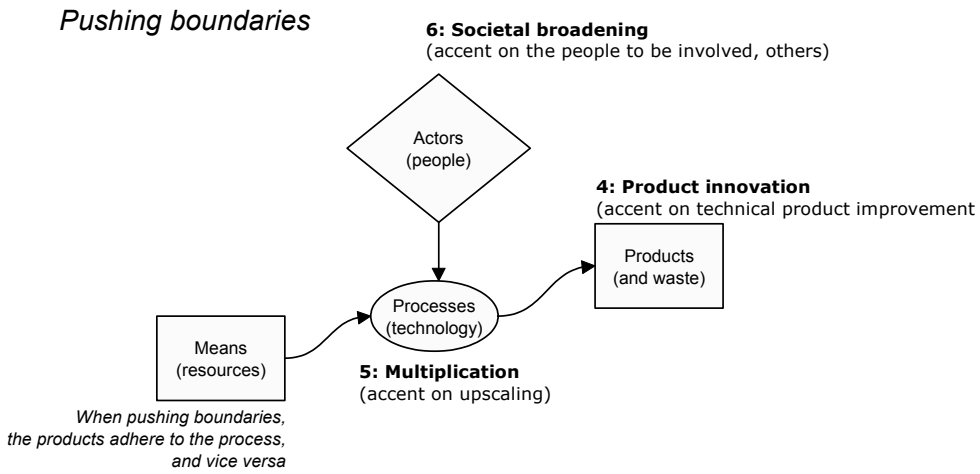
[548] Completely in line with recursive perspectivism, the occurrence of value orientations isn't hexagonal (the sextuple form of dual) but sextuply spectral. These are always hybrids; while the extremes may be easily recognizable, easily experienced, they are only found in their limitations.

the radical actor thesis, earlier in this book and this series). Averaged out across many radical actors, people, resources, and processes are balanced. For that reason, we always see dimensions develop alongside, even though it's sometimes barely visible.

In the end, *the path of humanity* will be drawn back to the balance: societal innovation continually requires input from all six orientations, and it roughly follows the average line of diagonal positions where all three axes attract with as much force as they repel. The radical actor thesis (see above) emphasizes how interconnected people, processes, and resources actually always are. But that is not initially where the attention is focused; we are drawn to dominant accents. That is also precisely why the diagonal will show itself, both in practice and in the longer term: the balance tugs us in, whether we want it to or not. If you neglect people, the technological process, or the resources for too long, sooner or later they will reclaim that attention again. That is why and how modernity will reach its end and why the environment has become a source of concern: we have neglected humanity in favour of resources and technology.



The radical actor and accents in optimizing value orientations



The radical actor and accents in 'pushing boundaries' value orientations

Below is a description of the same row of 21 aspects for each of the six value orientations. (This already shows that the six orientations are related to each other: after all, they share these aspects.) This results in six tables (one for each value orientation).[549]

The terms used will sometimes show that they originate from a more business-oriented way of thinking and looking. After all, business management is much more conventional than societal management. When used at larger scales, societal terms are often more appropriate (for instance: profit will then become *societal value*; efficiency will become *with less societal effort*).

[549] Based on these tables, I have made a poster that describes the six value orientations in summary, separately, and in their mutual coherence. This poster will be available at www.actors.nl.

Value orientation 1: Process optimization

1. **Focus on:** Technological production processes (technology)
2. **Description:** Increase product efficiency by improving technological processes. In general, this comes down to getting *the same* thing done as before by using other technical or technological solutions that take less effort (the result is not called into question).
3. **Examples:** Laboratory automation, from batch production to continuous processes, from suitcases being lugged by people to riding on airport conveyor belts, robotization, new chemical reactions to make the same products, etc.
4. **Central question:** How? How do we improve the technological aspects of the process?
5. **Sustainability view:** Efficient operational process
6. **Dominant organization form:** Chains
7. **Results:** More efficient, faster, and better processes.
8. **Goal-orientation/purposefulness:** Commercial use, technical and technological
9. **Dominant value strategy**: Operational excellence
10. **Business orientation:** Increase profit from existing products
11. **Process characteristics:** Technological development, technological attention for sub-processes and interfaces, testing, focused on technology performance
12. **Type of professionals:** Technical developers
13. **Methods:** Process diagrams, simulations, technological development, testing, etc.
14. **Apply when:** With current or prospective cash cows, i.e. repetitive processes
15. **Typical risks:** Nitpicking, 'penny wise pound foolish' solutions, no attention for exploration (the commodity trap: only able to carry out bulk processes focused on known bulk products, and losing out as a result), too narrow and therefore a weak strategy, people out of the picture, no attention for resources, navel-gazing, overlooking disruptive events in the surrounding environment.[550] In short: lack of attention for the other 5 value orientations.
16. **Suitable leadership:** Technological management
17. **Type of initiator:** Dynamic, practical-minded, technology-driven improvers
18. **Timeframe:** Short term
19. **Monitoring:** Key figures on technological aspects of process components
20. **Experimental environment:** From lab through pilot to real scale, near-reality pilots, trial projects, in the factory (in-house)
21. **Funding:** Personal, external private, subsidies, etc.

[550] Disruptive developments (also see Clayton Christensen, 1997, *The Innovator's Dilemma*) are missed by a lack of attention for value orientation 6 (societal broadening), as this value orientation determines your sensitivity to actors in your wider-ranged environment.

Value orientation 2: Utilization optimization

1. **Focus on:** Use of resources in the production process (the resources)
2. **Description:** Increase product efficiency by better utilizing the deployed resources. In general, this comes down to producing the same product with fewer resources, by eliminating all sorts of losses.
3. **Examples:** Reducing losses from waste, reducing redundancy, reducing dead time/downtime, reducing warehouse capacity and reserving stockpile money by implementing Just In Time principle, airports losing less luggage, etc.
4. **Central question:** How? How do we structure the utilization of resources more effectively in an organization (configuring)?
5. **Sustainability view:** Efficient operational process
6. **Dominant organization form**: Chains
7. **Results:** More efficient, faster and better processes
8. **Goal-orientation/purposefulness:** Commercial use, organizational, planning-oriented
9. **Dominant value strategy:** Operational excellence
10. **Business orientation:** Increase profit by improving deployment and use of existing resources
11. **Process characteristics:** Good analysis and organization of process, attention for sub-processes and interfaces, testing, focused on resource performance
12. **Type of professionals:** Technological developers, BPR specialists, etc.
13. **Methods:** Process diagrams, simulations, development, testing, etc.
14. **Apply when:** Repetitive processes with long life cycles
15. **Typical risks:** Nitpicking, 'penny wise pound foolish' solutions, no attention for exploration ('grey mouse' behaviour: only able to carry out standard processes, and losing out as a result), too-narrow and therefore a weak strategy, people out of the picture, no attention for technological improvements, navel-gazing, overlooking disruptive events in the surrounding environment. In short: lack of attention for the other five value orientations.
16. **Suitable leadership:** Planning, organizing, checking
17. **Type of initiator:** Target-driven administrator
18. **Timeframe:** Short term
19. **Monitoring:** KPIs (Key Performance Indicators), Balanced Scorecards, etc.
20. **Experimental environment:** Off-line tests, trial runs in factory (in-house)
21. **Funding:** Personal, external private, subsidies, etc.

Value orientation 3: Team optimization

1. **Focus on:** Excellent team spirit and maximum team performance (people)
2. **Description:** Increase performance by increasing existing collaboration. The general objective therefore does not change, but you want to get better at it as a team. There is a strong similarity to what people also refer to as social innovation.
3. **Examples:** Reducing costs of failure in construction (chain collaboration is in essence team-building, a search for more balance), preventing misunderstanding/miscommunication, preventing infections in hospitals, coaching sports teams.
4. **Central question:** How? How do we improve collaboration?
5. **Sustainability view: TEAM! (T**ogether **E**veryone **A**chieves **M**ore), social sustainability
6. **Dominant organization form:** Teams
7. **Results:** Higher returns through better coherence and better teamwork
8. **Goal-orientation/purposefulness:** Commercial use, team happiness
9. **Dominant value strategy:** Collaboration excellence
10. **Business orientation:** A visibly strong team is a team you want to do business with, that you want to belong to.
11. **Process characteristics:** People-oriented, focus on teamwork-related competencies and interactions, learning processes, training, measurable indicators, performance-oriented, continued improvement
12. **Type of professionals:** Coaches, trainers (analytical/diagnostic skills as well as team-building skills)
13. **Methods:** Collaboration, attention to each other, observing, talking, switching, practising, pointing out successes and celebrating them
14. **Apply when:** When a team does not come anywhere near getting the maximum out of it
15. **Typical risks:** Fixating on team, no exploration (4-6), no process optimization and utilization optimization (1 and 2). In short: lack of attention for the other 5 value orientations.
16. **Suitable leadership:** Coaching based on team interests
17. **Type of initiator:** Dynamic coach with analytical strengths and a feel for synthesis
18. **Timeframe:** Short term
19. **Monitoring:** Team satisfaction; team performance.
20. **Experimental environment:** 'Training field', in the factory, in the workplace (in-house)
21. **Funding:** Personal (people are already present), sponsors, etc.

Value orientation 4: Product innovation

1. **Focus on:** Excellent technological output, an improved product/service (the output, the product)
2. **Description:** Develop a better product / a better service / a better product/service combination than you had before
3. **Examples:** more-efficient LED lighting, better amplifier; new medicines, new housing concepts, new forms of mobility
4. **Central question:** What? What can we make that is better?
5. **Sustainability view:** Cleaner, healthier, or otherwise improved products, services and combinations
6. **Dominant organization form:** Small, flexible teams
7. **Results:** Excellent products/services/product-service combinations
8. **Goal-orientation/purposefulness:** Extrapolating, searching for new peaks
9. **Dominant value strategy:** Product leadership
10. **Business orientation:** Tomorrow's market share
11. **Process characteristics:** Design-oriented, technical and technological, experimental, challenges, output-oriented
12. **Type of professionals:** Creative, innovative, technical and technological specialists, designers, etc.
13. **Methods:** Managing, facilitating, and using creative, interdisciplinary creation processes between professionals
14. **Apply when:** In an innovative environment (to keep up to date), in a stable environment (because then it will become high time), therefore always.
15. **Typical risks:** Einstein behaviour ('lab coats'). Constant innovation without any commercial use (1-3). Lack of societal sensitivity (no feeling for the market, 6) and never scaling up (5). In short: lack of attention for the other 5 value orientations.
16. **Suitable leadership:** Visionary leadership, finding direction together as a team, and giving space
17. **Type of initiator:** Innovative entrepreneur, somewhat averse to rules and conventions
18. **Timeframe:** Medium term
19. **Monitoring:** Development in portfolio of promising products and services
20. **Experimental environment:** Laboratory
21. **Funding:** Personal, external private, crowdfunding, subsidies, launching customers, etc.

Value orientation 5: Multiplication/upscaling)

1. **Focus on:** A scaled-up output (more of the same, the production scale)
2. **Description:** Multiply your production capacity
3. **Examples:** More production lines, more hospital beds, more cars manufactured by factories
4. **Central question:** How much?
5. **Sustainability view:** Meeting an actual need
6. **Dominant organization form:** Team or chain replication
7. **Results:** *More* products/services
8. **Goal-orientation/purposefulness:** Extrapolating, searching for new viable production volumes
9. **Dominant value strategy:** Scale leadership
10. **Business orientation:** Increasing market share / growing the market itself (capitalizing on growth market)
11. **Process characteristics:** Replicating, carefully copying
12. **Type of professionals:** Roll-out experts
13. **Methods:** Replication
14. **Apply when:** When your market grows, or if you want to take market share from your competitors
15. **Typical risks:** Increasing growth in output (market oversaturation), no attention for product innovation (4; disruptive innovation will then take you by surprise) and societal broadening (6; special new target groups, i.e. lack of attention for the other 5 value orientations). Upscaling of poorly optimized processes (neglecting orientations 1-3)
16. **Suitable leadership:** Administration, inspection, confirmation
17. **Type of initiator:** Administrator, auditor
18. **Timeframe:** Medium term
19. **Monitoring:** Achievement rate of upscaling; production volumes
20. **Experimental environment:** New factories/working environments
21. **Funding:** Personal, external private, etc.

Value orientation 6: Societal broadening

1. **Focus on:** Actors in your wider context: inclusion, interests of more stakeholders (people)
2. **Description** Creates societal value by involving parties/interests in societal collaborations
3. **Examples:** 'Fixer-upper' schemes (reviving run-down districts by selling houses cheaply to affluent residents and obliging them to renovate), Public–Private Partnerships (not as a mechanism to shift risks but as a way to 'address societal challenges together'), growing older independently, healthcare at hand (from hospital to home environment), micro-credit, etc.
4. **Central question:** Why? For whom? Why does it help people and institutions?
5. **Sustainability view:** Optimal respect and active implementation of the needs and interests of (all) societal parties (beyond Brundtland)
6. **Dominant organization form:** Networks
7. **Results:** Value for more parties; inclusive systems, societal added value, concern for each other
8. **Goal-orientation/purposefulness:** Exploratory
9. **Dominant value strategy:** Societal intimacy
10. **Business orientation:** Value for many
11. **Process characteristics:** Transparent, curious, cooperative, intensive, dealing with split incentives, guarantees and settlements, focused on society
12. **Type of professionals:** Societally sensitive people, knowledge brokers, multi-actor process managers
13. **Methods:** Sensitivity to others, coherence and cooperation (= the plurimodern transformation). PAIR analysis (also see Volume IV of this Society in Perspective series), multi-actor models (ditto), settlement methods, (many) societal experiments, etc.
14. **Apply when:** Limited societal commitment/solidarity (e.g. refugee problems, unemployment among basic vocational school graduates, etc.)
15. **Typical risks:** Thinking that you can achieve societal progress with common sense and gut instincts (but actually achieving exactly the type of society we already have). Endless discussions (requires long attention span and externally focused way of working). Lack of commercial use (1 and 2 and 3), lack of product innovation (4, continual repetition of moves) and lack of upscaling (5, endless experimentations). In short: lack of attention for the other five value orientations.
16. **Suitable leadership:** Distributed leadership, distributed responsibilities (transitioning to collective self-management)
17. **Type of initiator:** Integrator, connector
18. **Timeframe:** Medium to long term
19. **Monitoring:** Number of parties involved; commitment, societal potential
20. **Experimental environment:** The societal setting itself in which the problem or opportunity (better yet: the opportunity for improvement) manifests itself

21. Funding: Personal but collective, partly external private, partly subsidies, etc.

	Optimizing						Example
	1: Process optimization	**2: Utilization optimization**	**3: Team optimization**	**4: Product innovation**	**5: Multiplication/ upscaling**	**6: Societal broadening**	
0							Societal stagnation
1	■			■			Process and product improvement (technological)
2		■			■		Economies of scale (resources)
3			■			■	Team improvement by means of inclusion (people/interests)
4	■	■					Increased efficiency in technological aspects
5	■		■				Technical and technolgical training
6		■	■				Efficiency training
7				■	■		Economy of scales due to product improvement
8				■		■	Product improvement by means of inclusion
9					■	■	Upscaling after inclusion
10	■	■	■				Integrated optimization (people, resources and technology)
11				■	■	■	Integrated optimizing
12	■	■	■	■	■	■	**Societal innovation** *(the path of humanity)*

A number of examples of combining value orientations. Per set of 2 – 6 value orientations, many combinations are possible in order, duration, and frequency of alternation. The table can easily be completed. Note how societal innovation (12) requires the use of all six, while societal stagnation (0) (the lack of improvement) requires the absence of all six.

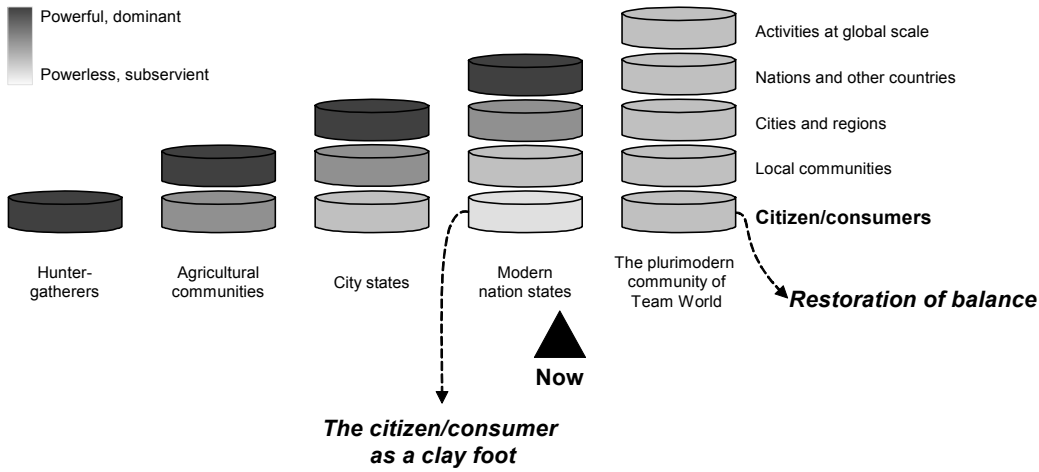
9.5 The Backbone

'Those who want to improve society will have to show Backbone.'

Societal layers

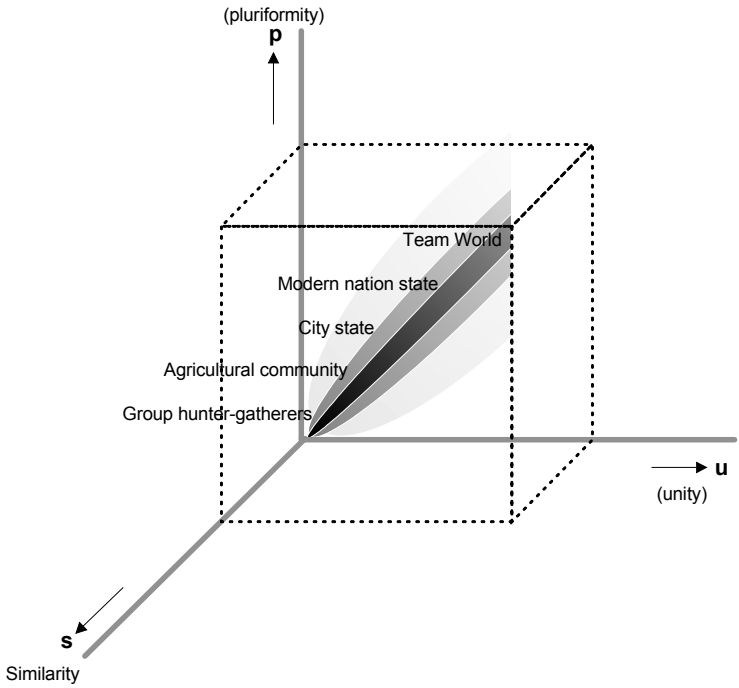
According to recursive perspectivism, societal practice consists of coherent and cooperating actors. Society arranges itself spontaneously as the composite outcome of many smaller deliberate and coincidental improvements, in layers. At any given time, a societal practice is a layered, intentional network of actors who in turn comprise improvement perspectives. Those societal layers are addressed in this book in at least three different ways:

1. Part I addressed societal layers in a qualitative, semi-historic description of *the path of humanity*. Layers were stacked higher and higher on top of the pre-existing layers in a non-monotonic process. The layers that now found themselves lower in the stack adapted accordingly. Nevertheless, the clay feet are created that way. The central figure is repeated below.



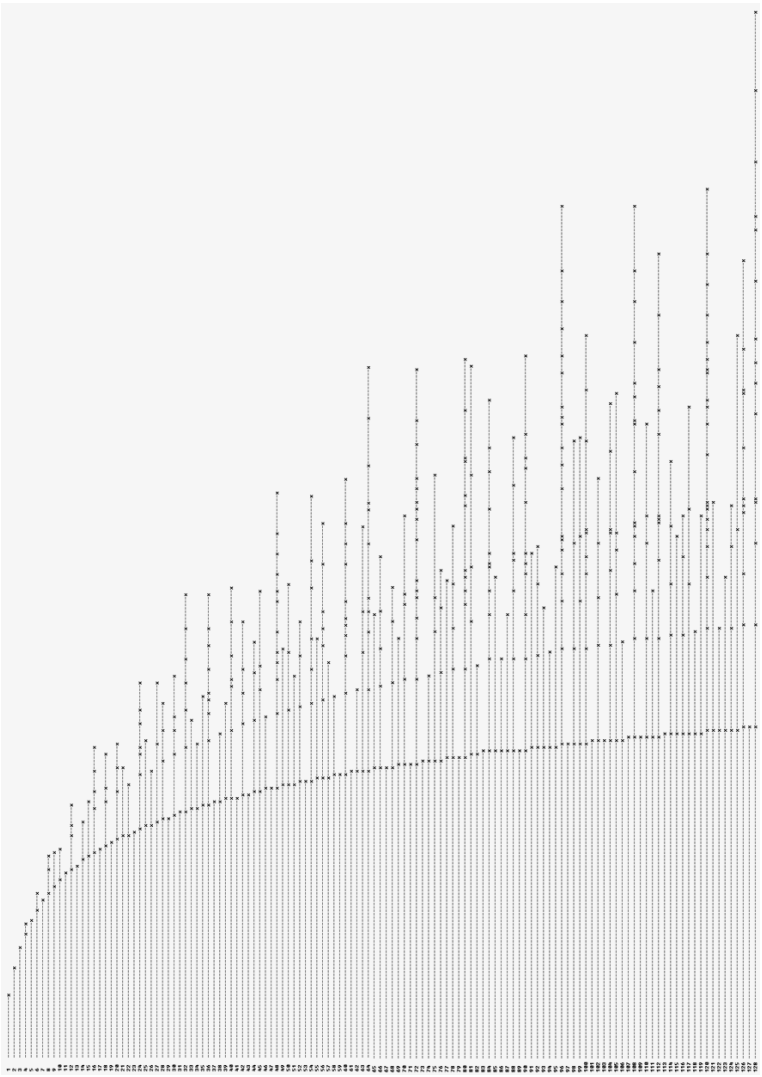
Societal layers stack along the path of humanity.

2. In Part II, the societal layers were added to the stack as a logical consequence of a balance-seeking process upwards along the diagonal in a three-dimensional perspectivist space. This also changed the original layers (after all, in essence, I describe the same process). The central figure is repeated below.



Societal layers along the path of humanity in the three-dimensional perspectivist space.

3. In Theme IV, the quantum-theoretical implications of recursive perspectivism were extrapolated. A perspectivist substantiation was presented for pattern laws: Benford's law, Zipf's law, and their biggest brother: *the path of humanity*, as the most extensive example that we can comprehend. The quintessence of recursive perspectivism is that each number of perspectives n has its own quantized configurational possibilities and impossibilities, and that, strictly statistically speaking, they determine the improvement potential (in advance) and the perceived generated value (the experiential value, in retrospect) of this configuration. Because societal practices are the most complex and extensive coherent and cooperational perspectivist configurations that we know, this insight can be used as a societal quantum theory. In the same way that atoms have various energy levels available for their electrons, societal practices having a fixed number of perspectives (a fixed perspectivist scope) have different levels of improvement potentials available. Deliberate, smart positioning, adjusting, and reconfiguring will determine whether the more promising levels can be attained together. The truly massive untapped societal potential is ripe for the taking here. It is up to us and the future generations to utilize this improvement potential (which is precisely what the Innovation Cube is aiming for). The central figure from section 8.7, showing the levels of improvement potential and (therefore) experiential value for an increasing number of perspectives, is shown again below.



Each amount of n perspectives has different possible improvement potentials (n increases from left to right).

Hidden potential

We do not deal well with this structured stratification, which has its origin in perspectivist configurations and the perspectivist balance. And the more this scale increases, the harder it gets. We all know that in the back of our minds. This reminded me of the endless series of reorganizations with my very first employer, which invariably resulted in the thought shared by everyone in the workspace: you may slice away a layer now, but it will inevitably resurface if you do not change anything else. The reasons for this have already been

described in this book in various ways. From the perspective of the desire for societal innovation, it comes down to the following:

Human actors mainly reason concretely, from their *own* personal perspectivist experiential worlds; from these experiential worlds, they use their *own* personal balances between value and effort, and adapt their experiential worlds in accordance with their own personal experiences and needs. We experience what we experience, and we improve things based on what we have personally experienced. That is what we do, as perpetual improvers who are preoccupied with the substance of things.

To use the related terminology of plurimodern transformation, we are actually no good at absorbing the experiential worlds of *other* actors into our *own personal* experiential worlds. That is partly inherent to the nature of societal balance: pluriformity (p) is one of the three essential structural ingredients of societal competence, along with unity (u) and similarity (s). Pluriformity is therefore something that most certainly should not be 'avoided' or 'solved' in some other way; it is actually a societal strength, as are unity and similarity, and we should take advantage of it. But if we assess the societal balance of humankind in 2018, there is not much to be proud of. Similarity and especially unity still lag far behind pluriformity, considering how rapidly the scale of humanity has increased. As a result, we are leaving a vast development potential untapped. I am certainly not advocating an overabundance of unity or similarity, most assuredly not. I am loath to see strong, macho men (or women) as leaders, putting their own nation first, nor would I want an excess of levelling and idealized equality. Then we would merely be replacing one imbalance (too much pluriformity) with another (too much unity or too much similarity). We need to make sure the pendulum does not swing in the other direction. We need to aim for societal balance.

That balance is not rigid and static, as the principle of discrete inverse proportionality clearly shows: people will excel at the top, and the more extraordinary they are, the fewer of them there will be, strictly statistically speaking. And the number of these increasingly less exceptional people is actually increasing. That is not because it is like that a priori; that is how a consciousness deliberately positions exceptionality in perspectivist terms. After all, in an all-white flock of sheep, a sheep with just a tiny black spot is already exceptional. In a more motley flock, that sheep would be considered white.

And the more of us there are, the bigger the differences. That is a matter of balance as well. The fact that the salaries of international CEOs, athletes, and performing artists are sky-rocketing as scale-ups and internationalization increase,[551] and that our basic trade-school (and even university) graduates are systematically missing the economic boat in constantly increasing numbers, are manifestations of exactly these scale effects; they are the effects of the balance. These observations put the growing populist tendencies in a remarkable

[551] Managing directors who state their *own* excellence, and subsequently reward themselves for it deserve their own circle in Hell.

perspectivist light. People who fear the pain will choose the smaller scale again, which is what they believe they understand better and will be able to use more effectively. They choose the idiosyncrasy that they believe they can comprehend. Although given the absence of an effective plurimodern transformation, it is easy to understand their choice, it does not offer a *structural* route to increased prosperity and well-being. On the contrary, it is a step backward in terms of *the path of humanity*.

The solidarity issue is therefore not as much about what the top layer of the hierarchy is allowed to earn, or what level of prosperity and well-being we accept as the lower limit. Flagrant wrongdoing must be tackled or resolved, but there can be exceptional standards for rewarding exceptional achievement from one's own efforts. The crucial questions revolve around whether we are able to jointly achieve a better balance between pluriformity, similarity, and unity in productive partnerships. The perspectivist balance prefers to avoid ideological concepts such as neoliberalism, communism, or fascism, but is constantly working in societal dialogue to seek a value-generating dynamic balance, based on the experiential worlds that are involved in that dialogue. In the longer term, in the absence of any further statistical differences, this will be close to the diagonal. And it is quite obvious to me that we are strongly *out of balance* right now.

Unsustainability, deprivation, and poverty are not unavoidable circumstances. Given the perspectivist potential of our current societies, they are an example of bad perspectivist configurations and of allowing a huge imbalance to exist or emerge. It is an imbalance that you can only see once you figure it out. It results from not being able to reach a plurimodern transformation.

If it sounds like I'm being derogatory about our current late-modern societies, that is certainly not my intention. We are certainly doing pretty well. I'll take modernity over prehistoric times any day. From a historical perspective, there has never been a time when so many people have reached such high levels of prosperity. But at the same time, we still have a long way to go; there are still enormous leaps we can take. It is also high time for a change of course, because we are increasingly getting out of balance; as a consequence, we are stacking crisis upon crisis. You have to be blind to believe that no further improvements are possible in such domains as poverty, sustainability, food provision, economic inclusion, education, and healthcare. Politicians, ministries, and other government bodies strengthen their profiles, companies compete, consumers compare on price, and researchers publish. Everyone is doing their own thing in their own worlds. The coherence, the harmony, the unity is precisely what is missing. We live our lives on separate or even colliding tracks, operating at on unnecessarily and irresponsibly vast scales.

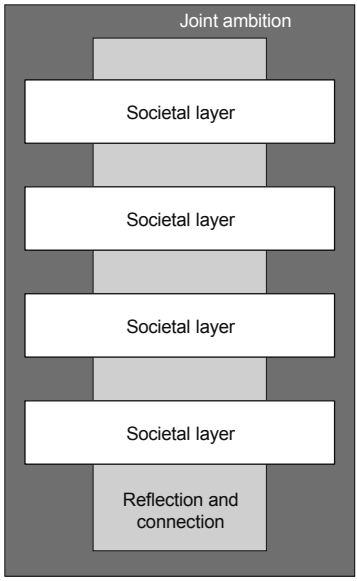
The more affluent countries benchmark their education, healthcare, and other systems against other countries. These countries use very similar approaches in terms of structure, since, the argument goes, there is no other way to make a relevant comparison. That sets us searching for the tiny peaks on the salt plains; we only use optimizing innovative value orientations 1-3, and is that even worth it under pressure from such significant and

increasing late-modern tension? It eliminates each and every incentive, each and every prerequisite for true innovation is eliminated that way. In this context, upward potential is of course perceived as minimal. When you hear the phrase 'We are doing all right', be cautious. This reminded me of terminology that was used in the 1950s, when Western countries were called *first*-world countries, the Communist countries were called the *second*-world countries, and the developing (in other words, poor countries) the *third*-world countries. The message was crystal clear: we, the Western countries, had actually reached the plateau already. The Communist countries merely needed to transform, and the developing countries just needed to sprint a bit, and then everything would be all right.

A Backbone takes societal stratification seriously

The course as a whole is crystal clear. As a society, we need to explicitly develop the currently emerging stratifications, so we can capitalize on a much bigger improvement potential. That is exactly what a Backbone does: it takes this layered actor-based structure seriously, and provides a way to look at and work towards exploring and taking complex action to improve society (e.g. solving sustainability *problems*, but also following an *opportunity-driven* course towards sustainable development) in suitable coherence and cooperation.

The term 'Backbone' of course refers to a spinal column. It consists of a number of different vertebrae, each representing a societal layer, which simultaneously cooperate in coherence to provide robust structure and flexibility to a societal body in motion. Another relevant aspect is the presence of a central nerve cord, which ensures reflection and connection. The following figure gives an initial overview.



A Backbone connects different layers of society.

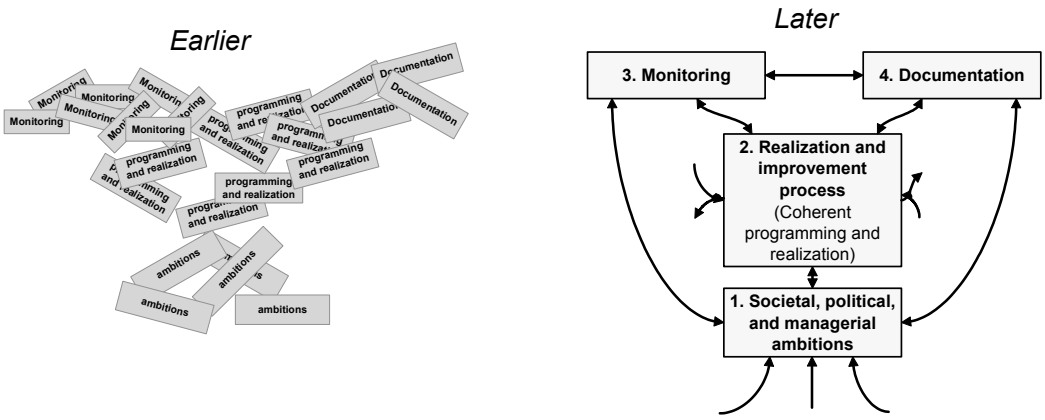
When addressing complex societal improvement, it is a good idea to work with a Backbone, because a) it suits the stratification of our society, and b) we are actually dealing rather poorly with these many layers and scales at the moment, as evidenced by the many multi-actor frictions between scales, but also within scales. Working with a Backbone – explicitly designating layers and relationships, interconnecting, and deliberately improving vulnerabilities and weaker relationships – is definitely not the usual approach right now. In most societal problems, we usually see the opposite: fragmentation and optimization by participating actors who are strictly focused on attaining their own interests and goals. A Backbone is therefore an important conceptual tool to aid us in our ambitions for continued improvement of our society, which is why I have used it in this section on societal innovation.

The entire multi-actor playing field, which is involved in complex societal problems and development (for instance the climate problem, or the desire for societal innovation by society or one sector), consists of a multitude of mainly self-directing actors. Were we to interpret this playing field as a single societal 'body', its movements would be downright hilarious to us. Some of its parts would just go various ways in a completely autonomous fashion, like limbs moving in completely uncoordinated directions, and the body as a whole would be utterly rudderless. Now, I do not need societal practice to march in tight formation along the road; in fact, I would prefer that it did not. But a completely wasted drunk, who stumbles and drifts down the road, collapses at random occasions, and has completely lost control over its limbs is an extreme that I would say we should avoid as well.

We need to do justice to all three dimensions of societability (pluriformity, similarity, and unity). Unity in particular is lagging behind. That is why the essence of the Backbone is that the playing field is characterized by a number of multi-actor layers who differ regarding nature, function, and working methods. The metaphor emphasizes these societal layers as the separate vertebrae of a Backbone that provide sturdiness and flexibility, and their interconnectedness through a central nerve cord (joint reflection and connection, knowledge of each other and the will to tackle things together, the joint identity). All of that is wrapped in a complex sheath of muscles (the societal body that can be put into motion as one pluriform whole). That is how you tackle societal problems – both within and between various layers – in coherence and cooperation. That way the societal body can make progress smoothly and dynamically with flexible and coherent coordination.

The need for an effective climate policy is incredibly urgent. The figure below shows the connections between managerial ambitions, the accompanying improvement process, monitoring, and documenting. People often respond, even somewhat triumphantly: 'But that has been around forever; isn't that what we've been doing for ages?' I am sometimes even accused of selling old wine in new wine-skins. I would love to debate this question with you. But do also take this into account: I will also ask what the observation that 'it has been around forever' is based on. We are more or less aware of some matters, but we are

very bad at putting them into practice. *'We aren't anywhere near done!'* And that is why the actual practice of societal improvement proves to be quite intractable.



The desired improvement perspective. It is all focused on an integrated realization and improvement spiral, based on coherence and cooperation, and arranged into a Backbone.

It is difficult to achieve development, improvement, and realization spirals, because of the dominant multi-scale, multi-actor signature, the intractability of complex societal processes, and the intrinsic unknowability of the future. Many people prefer a top-down interpretation or – in response to it – a bottom-up interpretation. I often hear the slogan 'Think globally, act locally'. I understand that it tries to encourage consciousness of the local context of many societal practices, and the perceived grassroots nature of societal competence. That is certainly an important aspect. But it is just as true that a sprawl of small activities, projects, and programmes, each of them focused but together lacking coherent focus, will never lead to an effective and efficient collaborative improvement process on a societal scale. The organization and duration of activities, projects, and programmes, by their definition and nature limited in attention, capacity, funds, time, and space, simply do not allow that. In isolation, 'bottom-up' is therefore just as flawed as 'top-down'. By society's standards, *small* does not by definition mean *beautiful*, any more than *big* is by definition *ugly*. *Small* and *big* are precisely what they mean: measures of size. If a scale fits the purpose, it is beautiful; if not, it is ugly. *'Think globally, act locally'* is a shaky statement; I would think it is actually smart to think at the level at which you are acting, for each relevant scale level as well as between them. If you only think on large scales, then who will act accordingly? And why should you not act on a large scale, or think on small scales?

I believe that both the top-down and bottom-up interpretations completely miss the point. And by emphasizing both *big* and *small*, we overlook the layered multi-actor signature of late-modern and plurimodern societal competence. The essence of a plurimodern societal Backbone is precisely that the parties involved contribute to a joint societal improvement process (an improvement spiral), in which each layer provides its *own crucial contribution* to

the whole, and is able to do that through an *adequate interconnection* (also see the discussion of the development of societal layers in Part I).We won't be blindly committing to one single higher purpose, but we'll also be taking into account the natural roles and legitimate interests of individual actors as part of the plurimodern interaction.

Societal layers (the vertebrae) are recognizable in politics, policy, public administration, and programme management. In an analysis of approximately 80 climate projects and activities in the Netherlands, specifically focused on energy conservation in housing stock, I also observed that – in the rare case of successes at even this small scale – various layers were usually fleshed out in the right ways, as well as properly interconnected. Conversely, in the absence of one or even more than one of the layers and therefore also their connections, the *bottom line* performance of the climate activities at hand was just plain bad.[552] Compare it to assembling an IKEA cabinet with some essential and sizeable parts missing, and with others sloppily cut or not connecting properly.[553] I'm afraid this metaphor often applies to tackling societal problems or societal opportunities.[554] In such cases, the process runs aground and dies.

Did I just become a social engineering adept? As a hard-core engineer in the societal china cupboard? I don't think so. I can certainly appreciate a nice engineering practice, but I wouldn't be able to do the day-to-day management. I'm mainly referring to managing and allowing things to emerge based on structure, and to the minimum prerequisites necessary to have an effect in extensive societal practices. I refer to intentional logics that need to make sense for there to be a correlating and collaborating process. All too frequently, these minimum standards are not being met in societal innovation practice, which is why the progress on climate issues (and other contexts) is so slow, even though there is a steadily growing realization that something needs to be done. Applying a Backbone is not a panacea for the process run more smoothly, but it does increase the consciousness of how high the bar needs to be for a successful approach.

People are bad at taking experiential worlds and other people's incentives seriously and learning about them, especially when it involves the larger societal scales, so that is precisely what we need to work on. Above all, a plurimodern transformation requires an increased sensitivity to the stratification of various actors as well as their experiential

[552] See the report 'Kansrijke aanpakken in gebouw gebonden energiebesparing: de particulier eigenaar' by Henk Diepenmaat, Anke van Hal, and Marlou Boerbooms, Uitgave Meer met Minder, October 2010. The Backbone was subsequently developed by me, with support from Chris Bruijnes and Niek Stukje.[the previous footnote wasn't translated, but since the report is referenced in this one as well, I think it's fineto leave it out – ACH]

[553] For that matter, such a thing *hardly ever* happens with IKEA.

[554] I am of course not blind to the difference between an IKEA cabinet and a complex societal context, quite the contrary. But complex societal multi-actor contexts can also be dealt with more or less professionally, and it is precisely on these larger societal scales that we are currently showing our subconscious incompetence.

worlds in our society. The lack of this sensitivity is why coherence and cooperation are lacking. The creation of a supported and concrete direction that makes sense, particularly on larger scales, has a far greater chance of success when we work on it deliberately.

Nothing is as tough and resistant to change as societal competence. Resistance usually comes from parties that have something to lose such as prosperity, autonomy, or a cherished culture. The actors concerned are not opposed to new developments as such; even the staunchest conservative wants to achieve something that they consider improvement, but they prefer their own current course of development. That will subsequently lead to both active and passive resistance; the attitude towards climate and waste controversies among conservative segments of the automotive, oil, and packaging industries, or standard education and healthcare are prime examples.

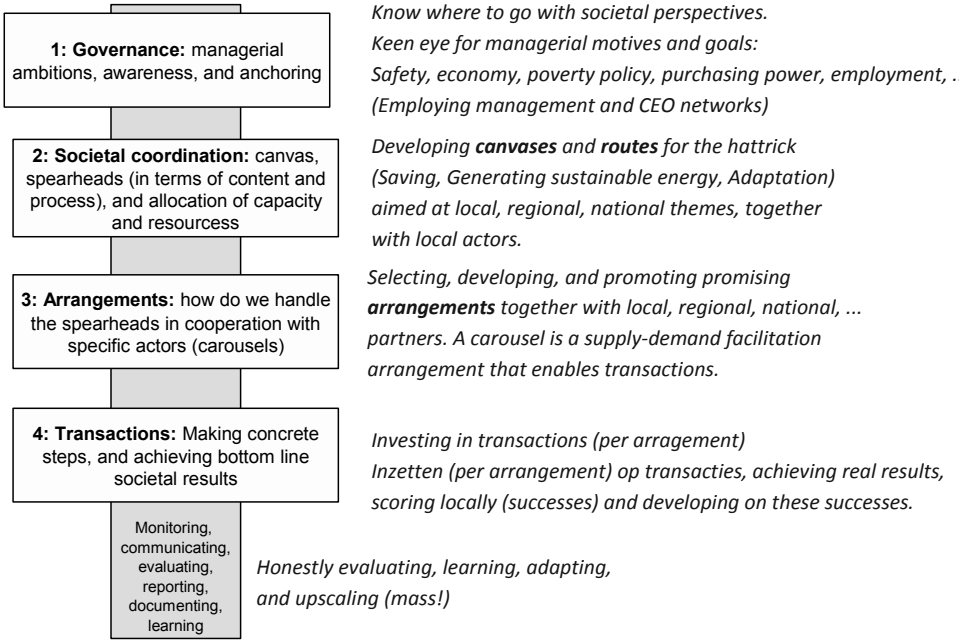
A much more implicit, and therefore even more tenacious resistance can be found in actors who do not even realize that they are at risk or have something to gain. 'No problem owner, no problem' was the third statement presented in my thesis. This concept is expressed in a lack of interest and engagement. Too many Dutch (and other) citizens currently lack interest and engagement in relation to the climate problem (and many more sustainability phenomena and opportunities for societal improvement). Neither our leaders nor our climate activists are capable of getting Dutch citizen/consumers actively interested in these issues on the large scale. This primarily has to do with experiential worlds. Actors are willing to do something if it will improve their own situation. It is that realization that our leaders and activists lack, in the context of many domains including climate issues. The strongest resistance and obstacles revolve around whether we as actors are willing to invest in a better understanding of the whole and of each other (other layers and other actors in our layer), whether we can develop genuine improvement perspectives, and whether we are willing to give up benefits that we are enjoying at the expense of other people. A closely related question is whether we are offering sufficient compensation or alternatives to the people we are asking to give up their own benefits for the sake of others, the latter often being a bigger collective. In other words: from a societal point of view, are we dealing with any losers decently? Consider the fossil-fuel industries: their time is running out, but is there any room for a new and realistic, genuinely conquerable non-fossil playing field for them? By now, you will recognize the prerequisites of a plurimodern transformation here. To put it more firmly: Schumpeterian destruction creates a future that does not appeal to anyone; as an individual, organization, or country, it is best to steer clear as far away as possible from that, even if the price on a global scale is a poisoned climate. After all, we have to see if that happens or not.

Backbone for the climate

The aim of using a Backbone is to make a complex and obscure multi-actor context more transparent and manageable. It supports and enables societal innovation. A Backbone was recently (2015) introduced as a strategic framework used by the Climate Alliance Netherlands, an association of approximately 150 local government authorities in the Netherlands who want to tackle the climate problems jointly. It seems that in this situation,

a Backbone of four vertebrae works well.[555] These comprise a *Governance* layer, a *Societal coordination layer*, an *Arrangements* layer and a *Transaction* layer.[556]

These four vertebrae are connected by a central nerve cord, which is mainly focused on *communicating*, *learning*, *documenting and reporting*, *evaluating* and *monitoring*. The resulting Backbone for climate policy is displayed in the figure below.

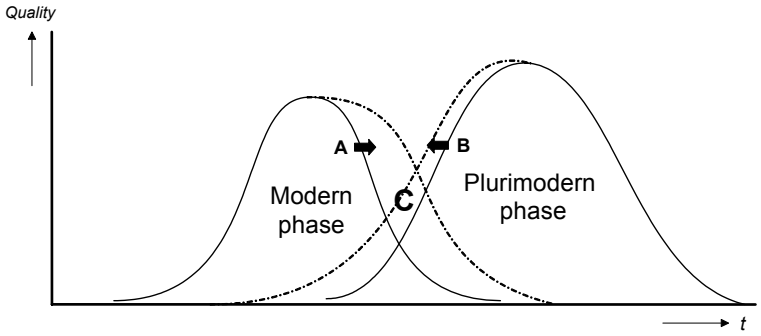


The Backbone of climate policy.

There is a need for integrated and supported management (**Governance**, vertebra 1 in the figure above). At a minimum, this is expressed by supported societal improvement perspectives in which the main points of the current situation and the desired situation are clearly defined. The societal perspective is simple enough, but that applies to most problematic societal improvement perspectives: we need to transition from a huge amount of greenhouse gas emissions to no greenhouse gas emissions at all, and from big societal risks to small ones – and quickly, too. If we place this in an even wider societal perspective,

[555] Originating partially from the aforementioned overall analysis of 80 climate activities.
[556] While this book finds its way to the printers, I am working on a report that is fine-tuning the Backbone for tackling climate problems. This policy paper has the working title: 'Backbone for climate policy'. Available on request from the author.

then we need to get from a late-modern society to a plurimodern society, and just as quickly. Also see 'the camel', repeated here:



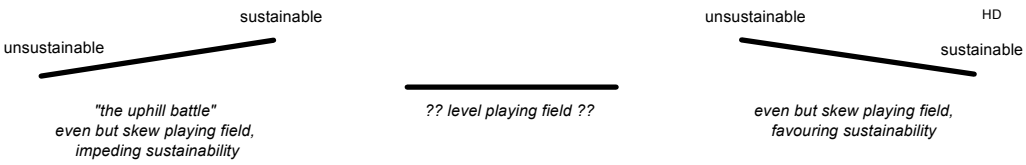
The camel: the plurimodern transformation from modernity to plurimodernity. Activities A: optimize and consolidate the modern system. Activities B: explore the plurimodern system and bring it closer to reality. Ideally, we help to scale down undesirable modern (unsustainable) societal practices from an integrated governance perspective (we reverse arrow A), and help to build up preferred plurimodern (sustainable) societal practices.

Supported societal improvement perspectives are recognized and actively supported by many citizens, and they are wholly supported, encouraged, and incentivized by managers (at the policy and company levels), resulting in a powerful, coherent, and supported realization and improvement spiral that can go the distance. We currently lack this situation regarding climate perspective. We have a Paris Climate Accord dating from late 2015, and a variety of municipal, regional, provincial, and national agreements and plans, even more programmes, and they create just as many anchor points. But climate problems are not even broadly perceived yet, so in fact efforts to tackle them have even less support. For many people, the climate perspective is still too far removed from their lives, the activities are still too weak and fragmented, and whatever happens is too little, too late. Perhaps, since the urgency is increasing, the next few years will see some swift action regarding climate problems.

An important task for Governance is removing system barriers. At the moment, sustainable alternatives are waging an uphill battle against the established unsustainable giants. Take a simple example like electrical heat pumps as an alternative for high-efficiency gas boilers. Gas boilers are a fully developed technology, provide excellent performance that is thoroughly proven in practice (aside from the climate aspect), and are very competitively priced. You can easily install a new gas boiler, fitted right onto the old connections: piece of cake. Heat-pump technology, on the other hand, is still new, has not been proven sufficiently in practice, and the pumps are quite expensive to purchase. The installation requires various actions, and may also lead to a higher price for your electricity connection

itself. And they are noisy. Does it surprise you that so many people still are buying gas boilers?

In the past, the entire business community was still a lot more defensive about sustainability than it is now, and they often played the 'level playing field' card. The same conditions had to apply to each player. This was often specifically targeted at foreign competitors. From a business perspective, that certainly has merit, because why should one country's business community have to suffer in isolation for an international problem? But the simple truth is that sustainable initiatives are already at a serious disadvantage with regard to unsustainable alternatives, even if it is just because they try to avoid shifting negative effects to others. That means that at the moment the playing field is not level at all for the sustainable alternatives (see figure).



Sustainable alternatives are currently fighting an uphill battle (left). However, an even but skewed playing field that encourages sustainability is crucial for a successful transition.

That is why the playing field at least needs to be levelled for sustainable alternatives, for instance by charging companies for shifting unsustainable effects to others. An example is the greenhouse-gas emission tax. But in actuality we need to adopt an '*even but skewed playing field*', giving sustainable alternatives more backing than unsustainable ones (see the above figure on the right). And preferably systematically, so it can help companies in making strategic choices and business decisions. A systematically 'even but skewed' playing field that encourages sustainability will get the transition ball rolling, even without governments and programme boards having to make concrete, preconceived choices.

There is also a huge need for tangible actions, activities, and processes to reduce CO_2 and other greenhouse gas emissions, resulting from **Transactions** (vertebra 4) between supply and demand parties (e.g. construction/installation companies and residents). As residents, we need to take an active approach to our homes, we need to work on the sustainability of our mobility solutions, our industries have to change from fossil-based to bio-based, our cycles need to close, we need to switch to sustainable energy, and a whole range of other things. Tackling climate problems requires tangible transactions between citizen/consumers, governments, and the business community. We are seeing far too few of them. For that matter, we know *exactly* under which conditions actors take action: when they experience improvement perspective. Conversely, when actors *do not* act, they lack improvement perspective. That means that the conclusion regarding the layer of transactions is that there are not enough tangible, enticing, and appealing improvement

perspectives that induce transactions. The solution here is not to identify this omission. On to Arrangements.

Our society does not gravitate towards reducing greenhouse gas emissions all on its own, quite the contrary. Precisely for that reason, the **Arrangements** (vertebra 3) has a prominent position in the Backbone. (We will skip the Management vertebra for a bit but will discuss it shortly.) An arrangement is a recognizable and pluriform combination of actors that can create specific value in sophisticated coherence and cooperation.

Arrangements usually lead to many Transactions (their ratio is 1:n). Powerful new societal arrangements create the necessary context for sustainable transactions at a sufficient scale. Take producers, contractors, and homeowners who work closely with partners to improve the energy efficiency of houses, and car owners, governments, and car manufacturers who continue to 'green' car-based mobility. If we see a lack of sufficient tangible Transactions (vertebra 4) this is caused by a lack of attractive arrangements (vertebra 3) for the actual or intended participants. That means that the Transactions layer hinges on the presence of vital sustainable arrangements. A vibrant sustainable arrangement is essentially an arrangement that is societally complete, in which the improvement perspectives and therefore the intentional logics of the participating players cohere into one big composite intentional logic (one big composite improvement perspective).

Currently, the sustainable arrangements that *are* working (such as solar panels or thermal insulation in homes) are now able to face the competition from non-sustainable alternatives or 'doing nothing at all' on their own, and will continue to be if the fiscal and other incentives at least remain stable.[557] But if they do not, the arrangements will have to be improved and the transactions will need to be made more attractive, in coalitions dedicated to this purpose. An entire policy and societal toolbox is available for that.

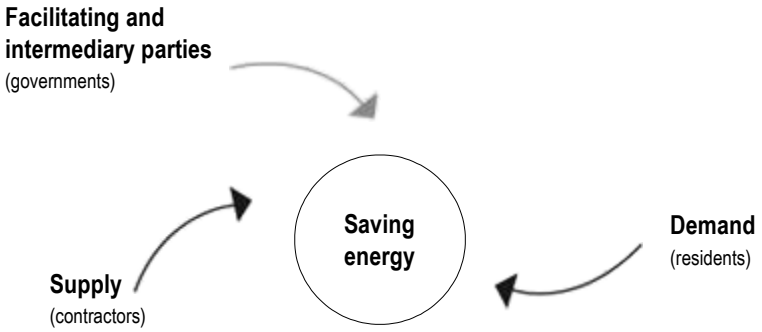
In Dutch municipal policy jargon, people like to talk about product-market combinations, which are theoretically also related as 1:n to transactions. Solar panels and private homeowners are an example. However, product-market combinations is a name that does little justice to the actual concept of arrangements. The term 'product-market combination' implies that it is the market that sets the course. A case can be made for that: if society wants to transition to sustainability, it is up to that same society to make that happen. However, exceptions aside, in the short term society will not transition towards sustainability all on its own. We tend to forget that the normal societal trend during modernity (with its large-scale, monomaniac, resource-squandering linear chains) is actually gravitating more towards <u>un</u>sustainability, and that turning this juggernaut around requires an active and structural reversal of the current course. This won't happen all by itself; it will be necessary to tackle the established non-sustainable improvement perspectives, and in our late-modern age we are still just learning how to do that. What will

[557] I refer here to e.g. the rules offsetting taxes on private PV installations and subsidies. For that matter, I do not expect them to become permanent, they are after all ad hoc for a reason.

give us the ability to enter into *Transactions* towards sustainability are complete multi-actor *Arrangements*, based on joint agreements, as part of a continuous vital improvement spiral (*Governance* and *Management*). Personally, I believe that skewing the entire playing field, by means of fiscal measures and/or capitalizing passing behaviour to others, even more towards climate neutrality (the aforementioned even but skewed playing field favouring sustainability, see previous figure with different slopes), is a managerial and governmental *sine qua non*. Societal arrangements must be jointly designed within a solid societal policy context (government, business, *and* consumers).

The carousel as a metaphor for intelligent arrangements

Thinking in product-market combinations makes the focus clear, but it is still not enough to trigger a transactional dynamic towards sustainability. That is why I came up with the metaphor of the carousel (see figure) as an expansion of product-market thinking at the arrangements level. Smaller playgrounds often have a merry-go-round or carousel with a ring on the outside, which parents or older children push to keep it rotating. It works best when several people push to the best of their abilities, and all in the same (the right) direction. When done right, it achieves a flywheel effect: it goes faster with less effort. When different parties are pulling in different directions is when things go wrong. When not enough parties are pulling, those at the ring have to work much harder. When more and more parties get involved, the added value eventually levels out. Just as each carousel has its own optimal push configuration at any given scale, the same holds true for an arrangement that, actually bucking the societal trend, has to achieve sustainable transactions. In any case, that requires supply, demand, and facilitating parties, as shown in the following figure.



But go one level deeper, and you'll usually open up a much wider playing field. And as long as the coalition is not societally complete, and therefore the required parties are not participating and the improvement perspectives are not properly aligned, the arrangement (vertebra 3) will be unable to achieve its ambition of realizing transactions (vertebra 4). I will give a few concise examples. In healthcare, the players can generally be categorized into the people needing healthcare, the healthcare providers, the insurance companies, and

the people involved in policy. For residential energy-saving measures, they are the residents, suppliers (often installers, contractors, handymen, insulation specialists, financial parties, and behavioural specialists), and facilitating parties (including policy). For waste disposal, it is households, waste collectors and processors, waste producers (packaging companies, manufacturers, retailers, etc.), and policy-makers. In all these cases, it also includes parties further up and down in the chains and networks, and on regional, provincial, national, and international scales.

The important thing is to bring the parties into a new composite intentional logic in which improvement perspectives are properly aligned. As soon as such an arrangement can 'work', we call it societally complete. If it doesn't work yet, then we need to go back to actors, improvement potentials, and intentional logics.

Carousels provide an initial, simple representation of minimum arrangements. However, developing vibrant sustainable arrangements often requires intervening simultaneously at multiple locations. That is why arrangements can be perfectly represented by means of intentional multi-actor models (see *Multi-actor Process Management* and Part 4 of the series *Society in Perspective*: *Multi-actor procesmanagement in theorie en praktijk*).

Which brings us to vertebra 2, **Societal coordination**: a both professional and sensitive management of the societal canvases. Supported governmental ambitions (Governance, vertebra 1) need to be converted to Transactions (vertebra 4). This requires, in between Governance and Arrangements, professional management, which in this case takes the form of Societal coordination (Dutch: *Regie*).

The current generation of sustainability programmes usually have a management function, designated to programme management and programme directors. It is based on a programme mission, a baseline measurement, and one or more ambitious, long-term roadmaps that legitimize and structure a project portfolio. Stakeholders on the advisory board, supervisory committee, or supervisory panel will then ensure that it is embedded throughout society and in relation to society.

In that case, programme management comes down to managing a project portfolio, with on top of that, a number of wide-ranging activities intended to help achieve the roadmap. At the small scale of programmes, climate problems could easily be tackled this way. But an intended sustainability path is hardly ever created with just one programme. At any rate, the term 'roadmap' suggests that there are multiple roads that lead to Rome (which is generally true). It also implies that the landscape does not change when you innovate. One thing that actually does change the landscape is a *societal canvas*. Our societies are always in flux. Societal innovation takes place against the backdrop of an undulating, vibrating, and sometimes even sizzling *societal canvas*. The societal canvas is the entirety of the *societal arrangements* (societal practices, interactions between actors) that make up our society. There are serious 'route dependencies', legacies, as well as full-blown lock-ins; in the

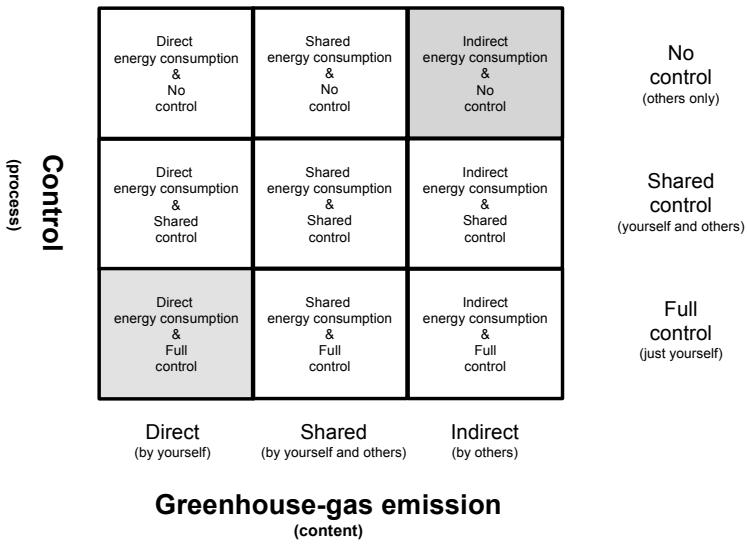
Netherlands, for example, the omnipresent natural-gas infrastructure obstructed and still obstructs any transition to other infrastructures.

If we look at the patchwork of sustainability and climate programmes and regulations, and compare it to the set of goals designed to get our society transition to a sustainable plurimodern situation, this programme-based management nevertheless comes up short. Some major steps really still need to be taken here.

Key aspects of professional Societal coordination are:

- Understanding the societal canvases that cover current greenhouse-gas emission processes and measures for improvement, and
- Developing the routes that indicate how these societal canvases can steadily improve by means of arrangements management (see below).

The following illustration shows a societal canvas for greenhouse-gas emissions.



An abstract but complete canvas for the emissions aspect of the climate problem, drawn up from the perspective of a specific actor (for instance a government or a company), which distinguishes process and substance in correlation.

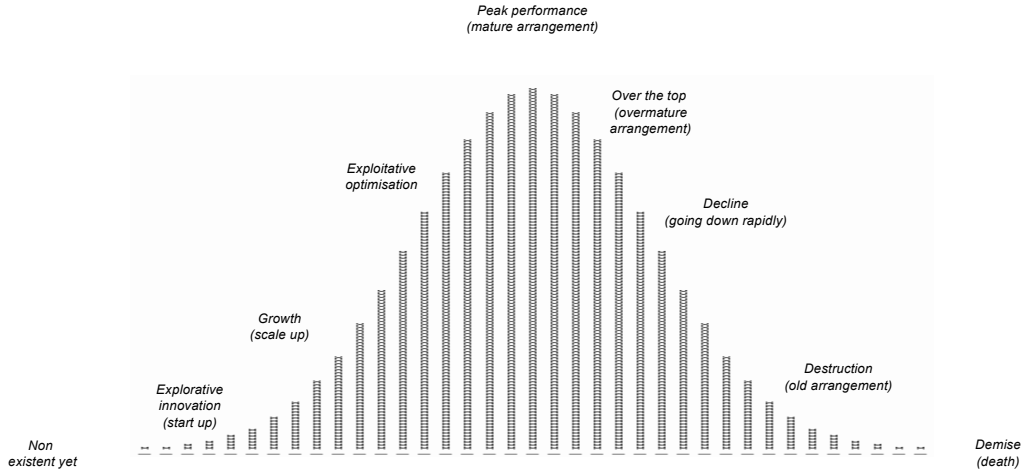
In any case, a significant percentage of what we now call projects should be developed into a professional and steady processing of societal canvases by means of arrangements, along with the ambition to develop them to the point where they are societally complete. A pilot should then focus on making crucial arrangements work, in whatever way necessary. The aim is that the composite intentional logics of the preferred arrangements must be correct and must work; only then will these arrangements be able to scale up. This generally

requires tackling system barriers and achieving an even but skewed playing field sustainability (see the previous figure).

It is therefore the key task of *Societal coordination* to focus governmental ambitions effectively and efficiently on sensible activities that will achieve these ambitions, and to support these activities. Professional management can structure the entire canvas into a number of clear, discrete arrangements. Particularly with societal innovation, sometimes the routes are obvious, but the concrete details of the changes are often highly uncertain. I already mentioned that predictions about the future made 30 and 50 years ago can be quite amusing. Our society has incredibly impressive, versatile, and unexpected improvement mechanisms. It would therefore be wise to show some restraint in winner-picking, and open up support programmes for *all* applicants who believe that they can provide significant support for the societal improvement perspective (see governance). In current practice, innovation programmes are often surrounded by insiders from the business community and knowledge infrastructure (the triple helix). To some extent, this is justified, but a much larger percentage of the programmes could be opened up to unexpected ideas from different angles.

Arrangements management, i.e. managing a portfolio of arrangements that cleverly respond to the changing of a societal canvas, is a crucial management task in societal innovation, as it is in climate policy. This is advanced innovation management, where the downside of innovation, i.e. dismantling, also deserves and gets explicit attention (Schumpeter's creative destruction is relevant here). A route is after all defined by activating and dismantling arrangements. See the following figure for an idealized representation of the life cycle of arrangements (various calligraphic curves occur, but from the point of view of recursive perspectivism, the binomial bell curve is an expected average shape).

In the context of the climate approach, various arrangements are at different stages of their life cycle. The fossil-fuel non-cyclic arrangements are in their prime, at peak performance (and some may have just gone past their peak). Many sustainable arrangements are at the lower left of the curve, and they are struggling. As long as we let modern and plurimodern multi-actor practices battle each other without clear governance, we will not make much progress on sustainability. But this is precisely why a societally supported improvement perspective and governance-level management are so crucial. It helps dismantle the undesired unsustainable modern arrangements, taking the losers into account, and building up the desired sustainable plurimodern arrangements. If you allow societal forces to do their work in the short term without any active, societally supported management – i.e. if you let the new plurimodern initiatives fight with the modern initiatives – we are only just a few steps ahead of the hunter-gatherers, who had managed to create a reasonable balance within their groups, yet also waged bloody and bitter wars between their groups, as prehistoric findings have shown. The plurimodern innovators will then lose, until it is no longer possible to do otherwise. That means that we will still have to hit bottom before we can reach the new, higher peaks of the plurimodern society of *Team World*.



The average life cycle of an arrangement. The concept of life cycle is also recursive, and can therefore be found at various scale levels.

A societally innovative management function, supported by a strong regime, is therefore crucial. Innovative arrangements must start and improve; ailing arrangements must improve along the way or stop; promising arrangements must scale up; arrangements that have reached late maturity must revitalize or get dismantled. And undesirable (unsustainable) arrangements must be dismantled expeditiously in order to make room for the new ones. The societal coordination function is therefore responsible for such matters as:

- describing in clear canvases, the parts of society that need to be societally innovated
- dividing these canvases into arrangements, and providing them with routes,
- selecting, supervising, and mediating in the dismantling of undesirable arrangements and the creation of desirable societally complete and promising arrangements,
- quickly testing the performance of the preferred arrangements regarding transactions under pilot conditions (after all, there is no shortage of megalomaniac plans, though there is a shortage of promising, scalable, and functioning arrangements).
- determining actual barriers (such as the lack of CO_2 taxes or other incentives for climate-friendly and wide-ranging sustainable solutions) and helping to eliminate them,
- supporting initiatives in various stages of the journey from conception to mature and scale-improving societal arrangements, by allocating support and resources

across all six innovative value orientations of the Innovation Cube, also in coherence.

This concludes the detailed discussion of the four vertebrae. They are connected by a **central nerve cord** that is mainly focused on *communicating, learning, documenting and reporting, evaluating,* and *monitoring*. I view these as vital but secondary processes intended to support the spiral of achievement and improvement, which is actually the central focus. I sometimes cannot help but think that the number of people who are occupied with these secondary processes is fairly high compared to the capacity and performance we achieve in actually reducing emissions. That is why I'm making an impassioned plea to place the focus back where it should be: designing and developing actual societal arrangements that actually lead to the reduction of emissions.

Let me summarize the Backbone.

In the **Governance** layer (vertebra 1), we need to work on *supported* societal improvement perspective, and its translation into a powerful spiral of development, achievement, and improvement. A basic Backbone will need to be established and reinforced from this layer.

In the **Societal coordination layer** (vertebra 2), we need to cut back on dictating which themes and which types of projects are eligible for support. We need to be cautious about winner-picking and riding our hobby horses, and actually be expansive in allowing the enormous power of societal innovation, motivated by widespread support (see point above), to do its work to the max. This implies a firm commitment to developing an overview of the present societal canvas, providing these canvases with new routes by means of arrangements, and supporting the development of arrangements of any sort or origin, which will promote transactions that aid in achieving emission reduction goals. Optimizing value orientations 1-3 will provide returns rather quickly, and improve existing arrangements. Optimizing value orientations (4-6) requires a longer development time and will result in new arrangements. A wide-ranging portfolio of arrangements, deployed early on and constantly evaluated and streamlined, and which gives newcomers maximum scope is by far preferable to an excessively early lock-in based on concrete policy choices.

In the **Arrangements** layer (vertebra 3), we need to work on coalitions (carousels), which lead to attractive improvement perspectives for all stakeholders. If transactions are not intrinsically attractive on their own, action by governments and other societal parties is required to jointly develop coalitions aiming for arrangements that *will* lead to transactions. Support with multi-actor models and a keen eye for composite intentional logics will ensure that these arrangements will also be societally complete (which means that no players will be missing).

In the **Transactions** layer (vertebra 4), we need to work on tangible and appealing improvement perspectives for the supply and demand sides. We must encourage supply and demand to converge, and ensure that the arrangements (vertebra 3) are of such quality that excellent tangible results and degrees of conversion are achieved.

The **Central nerve cord** that connects the vertebrae is not a goal in itself, but will act as a facilitator to the primary process as outlined above. It should therefore not become the main focus, and instead concentrate on *connecting, communicating, learning, documenting and reporting, evaluating,* and *monitoring.*

A promising climate policy pays attention to all these interconnected layers. The primary process towards climate neutrality needs to be able to develop flexibly in a continuous achievement and improvement spiral. A fragmented field with programme and project management will simply fall short here.

When working on societal tasks, even a badly conceived Backbone is better than the no Backbone, and a properly functioning Backbone will allow a societal body to move forward properly. As such, a Backbone supports the core of societal improvement according to a perspectivist multi-actor interpretation. It brings together the experiential worlds of different actors on different layers in coherence and cooperation.

Perhaps the most crucial requirement is that from day one you begin by acting in cohesion, on a large scale, on *all layers.* That is the biggest societal pathology and it pops up every time: short-sightedness, fragmentation, sub-optimization, and setting a course that only serves one's self-interest. This leads to a situation where there is activity in one layer, but not in the others, or where activities in different layers are poorly connected to each other. Once that happens, climate policy wobbles aimlessly like a drunken person. The same applies to any other desired societal development activity whatsoever; whether we *want* it, or whether we are able to *find the will*, or whether we can actually *do* it, that is entirely up to us. But there is one thing this does not affect: I believe we certainly *can* do it. We only have to take a look at those times and places where humanity has shown itself in all of its power and glory. Take a look at the reconstruction efforts after the World Wars and natural disasters.

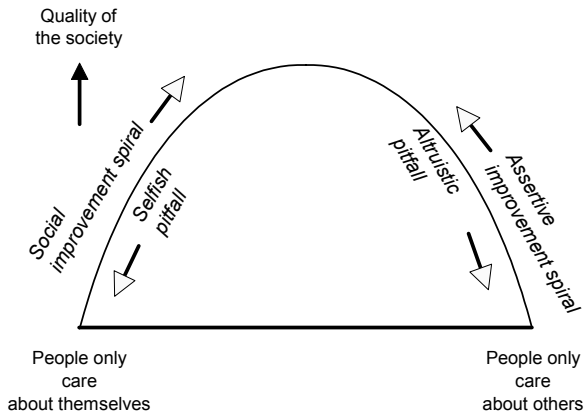
Personally, I would not want us to experience the end of modernity only passively, like lemmings; instead, I would love to actively seek out *the path of humanity* with you and follow it upwards. We can no longer allow large-scale societal developments go their own autonomous ways, with all the risks that would entail. I believe that showing Backbone, in whatever specific form, forms one of the crucial prerequisites for success.

9.6 Proficiency levels in societal innovation

People live their lives based on their own personal perspectivist experiential worlds. The fact is that by definition you can only experience things from your own personal experiential world, even when you have incorporated the experiential worlds of many others to the best of your ability. Your own personal experiential world is simply how identity is created, and the basis on which you value improvements (see also the radical actor thesis, section 5.1.3). I cannot change anything about that, nor do I want to.

But precisely now in our late-modern age, we are seeing more and more that, in terms of perspective, the small dimensions of our actor-specific experiential worlds (including those of our leaders) and the large dimensions of our integrated multi-actor societies have grown too far apart. This problematic situation makes it increasingly difficult to realize the maximum quality potentials in coherence and cooperation, or even come close to doing so.

In response to that, we are closing ourselves off, relatively speaking, and mostly optimizing our own direct interests, sometimes even defending them like rabid wolves. Our experiential worlds are too narrow, too short-sighted! I'll repeat the illustration of the societal balance model from Part I below. I believe I am perceiving that as the growth of late-modern societal practices continues to accelerate, the practices grind and squeal, and we are walking deeper and deeper into the selfishness trap. This creates a formidable obstacle to continued societal innovation along *the path of humanity*.



The balance model and societal shifts

We will have to deliberately activate the social improvement spiral and the assertive improvement spiral again, and that is exactly what plurimodern transformation aims to do. The plurimodern transformation will also be given form and content if we use methods

from multi-actor process management, the Innovation Cube, the Backbone, and the proficiency levels I will discuss below.

A Backbone appeals to a great many people as a general mental and operational framework. But I also know from my own experience that people often respond with disinterest and sometimes even become agitated at the suggestion that there can be different routes to continued societal development than the one they envisioned. After all, that requires that we reconsider our foundations, methods, and practices (the FMP model). We're not eager to reconsider something we have invested much of our lives in to build. That applies to people who say that they work on sustainability just as much as that it applies to people who work in the most unsustainable sectors, and I am no stranger to such reflexes myself. As a consequence, achieving plurimodern societal innovation and a solid Backbone is not easy.

Precisely for that reason, at the very end of this book, I propose using a tool that can help us get over our own preoccupations and together work vigorously towards societal innovation. I refer to what I have called *proficiency levels in societal innovation*.

Proficiency levels describe five levels of competence in societal improvement, which increasingly draw consequences from insights around societal innovation:

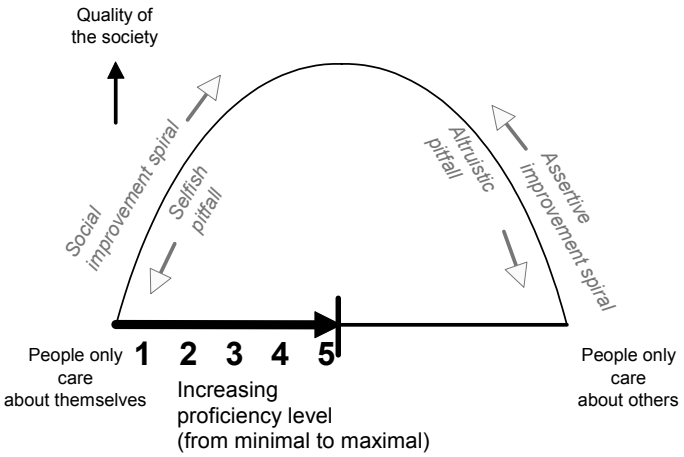
1 'Beginner'
2 'Advanced Beginner'
3 'Beginning Performer'
4 'Proficient Performer'
5 'Expert'

These levels aim to provide insight into the prerequisites for specific societal innovations and where additional prerequisites still need to be implemented. When we tackle a societal innovation, we also create insights regarding our own proficiency and professionalism based on these levels. Then everyone can see how we organize things, shed their own light on it, and make suggestions for improvement. A coalition that focuses on societal innovation should pursue at least proficiency level 4: Proficient Performer.

The experiential worlds of various stakeholders are often unrelated, sometimes even divergent, and are largely unknown to each other. And for many parties, the risks are much too great that their *own* situation will worsen for the benefit of societal improvements. From a societal point of view, we generally deal badly with losers, so it is better to avoid becoming one, if necessary even at the cost of societal competence. What is usually lacking is overview, coherence, and cooperation. There is a dramatic shortage of mutual sensitivity. It is hard to capitalize on the huge societal potentials. We are locking ourselves in.

That is why *proficiency levels* describe in essence to what extent attention and room for coherence and cooperation are embedded, along with mutual sensitivity in dealing with societal innovation processes. We owe it to ourselves to *purposefully* unlock the huge societal potential of *the path of humanity*; this is precisely why I have added the proficiency levels.

They indicate to what extent a societal innovation activity meets the prerequisites for a plurimodern transformation. They aim to establish the prerequisites needed to achieve and embed the optimal societal balance model more often (see figure below, modified).



Proficiency levels aim to reveal the degree of societal sensitivity, which encapsulates the basic conditions for societal innovation, and thereby more effectively assure the achievement of societal quality.

You improve once you address *more* parts of a Backbone in *higher* coherence. For instance, for the Backbone of the climate problem discussed earlier, this implies that there are a minimum of five focus areas for proficiency: Governance, Management, Arrangements, Transactions, and the Central nerve cord. Each of these focus areas has the same levels, from 'Beginner' to 'Advanced Beginner', 'Beginning Performer', 'Proficient Performer', and finally 'Expert'.

If we want to make these five focus areas assessable in concrete terms, and assign numbers to the levels from 1-5, then we have a maximum possible score of 25 points (five levels times five focus areas). Let us look at these five areas.

The ***Governance*** layer *ideally* should have clear and shared (societally shared!) societal perspectives in place, where politicians and governors encourage a powerful Backbone, encompassing all five areas, and should actually define in detail the required prerequisites (including an even but skewed playing field that promotes sustainability). The assessment for Governance, like all these areas, will then result in a score of 1 to 5.

The ***Societal coordination*** *layer* should have a clear view of the task at hand and the societal practices it affects (in the form of canvases),[558] It should be open to unexpected initiatives from society that make sense (good options certainly deserve additional support, but it should not be completely based on winner-picking), and the management function should be used to develop societally complete arrangements (see 'the little guy' with his five areas of emphasis and the methods for multi-actor process management). In this layer, programme management may often be in place, but the balance between recognizability and breaking away from societal practice is delicate here and needs to be monitored explicitly. The complete innovation lifecycle needs to be supported, from early ideas up to market launch (see figure of the funnel in the book). All six innovative value orientations (see the Innovation Cube) also need to be weighed carefully and receive coherent attention. The ratio between optimizing and exploring deserves particular focus here.

For the ***Arrangements*** layer, we should expand the idea of 'projects' and 'product-market combinations' to include 'developing societally complete coalitions'. (The definition of an arrangement is a viable coalition that produces a preferred result, and it is therefore societally complete, and sufficient to the task.) The most important characteristic of a societally complete coalition is that it is capable of self-supporting transaction. This guarantees that a deployed development will not run aground, but instead will continue until it reaches maturity to the point where it results in transactions at a sufficient scale. If it fails to do so, then the continuation of this arrangement needs to be discussed, and participants must choose to either continue developing (continue innovating, changing) it, or quit. Ideally, the arrangements layer should include arrangements in *all* stages of development (in conformity with the innovation lifecycle, see above in this section), which will cover *all* starting points for societal innovation (see the Societal coordination layer above, there is a clear link here with canvases), and together generate sufficient *Transactions* and provide sufficient prospects for scaling up.

For the ***Transactions*** layer, we should see sufficient tangible transactions (including supply-demand transactions) at *all* starting points of the integrated societal canvas; realistic and substantiated upscaling projections are available. Together, they need to be able to achieve the societal ambition set.

The fifth part, the **Central nerve cord**, should mainly support and guide the other four layers in conjunction. This is where the societal multi-actor nature of the innovation is shown. Monitoring and documenting activities in particular have a tendency to form independent and isolated (in the sense of separated) activities. We need to keep a close eye on that: the nerve cord needs to support the entire body. Although keeping the Central nerve cord healthy is explicitly *not* a task of the Societal coordination layer, this layer can provide secretarial services to support it. After all, a Central nerve cord that provides vital

[558] A 'canvas' is an inventory of starting points in terms of societal coalitions for measures. For the purpose of dealing with privately owned houses, the Climate Alliance Netherlands has already made such canvases in close collaboration with various municipalities. They are available on request from the author.

and proper performance is in the interest of, and a task for, all vertebrae. It is precisely for that reason that this function is carried out in close consultation, collaboration and conjunction by representatives of all the other four layers, taking into account their specific goals, roles, and interests.

The items can be characterized further as 'balanced' (several of the five parts contribute) or 'monomaniac' (some of the parts score high, others don't). Balanced is a desirable situation, and monomaniac is an undesirable situation, because the performance of one part depends on the support of the other. As a consequence, the whole is more than the sum of its individual parts. For that reason, you could define the ultimate proficiency level at the Grandmaster level for a coalition, for a team, as when the maximum score has been achieved on all layers. This situation is already very rare in sports, and it is even more exceptional in society. And yet this is the ultimate purpose of our long journey as mankind moving towards Team World. Even if we just come close, then the societal value we will have created will be huge.

There is much more to say and define about proficiency levels in societal innovation. The most important position of this assessment is that it explicitly and transparently highlights and discusses the set-up and quality of the societal innovation process being deployed. At the moment, this rarely happens, and we have much to gain by setting up societal innovation processes.[559]

This ends the discussion of the societal innovation methods, as well as Part III of this book. I hope many people will draw inspiration from it, and that they can work together using their own insights in our continued journey along *the path of humanity*.

[559] As this book went to the printers, proficiency levels in climate policy were being developed in more detail, based on the Backbone. The report, entitled 'Backbone for Climate Policy', is available from the author on request.

10

Wrap-up and prelude to the future

10.1 Looking back

We have made it all the way to the finish line of this book. A keen-eyed reader will have noticed that my foreword to this book was written several years ago, on Christmas Eve 2015; I've hardly had to change a word of it since then. By now, we've reached 2018. Several personal circumstances and a number of 'loose ends' in number theory ended up being significantly more difficult to resolve then I could have anticipated at the time.

I should have known that this essay would take time to write. The goal is ambitious: it encompasses simultaneous improvement at every scale of society, from small to large. "Can we improve our world?" That question is the core of the book. My answer was clear from the very beginning of the book: a wholehearted *yes*. You've been able to follow the process so far, to see first-hand how I have substantiated my answer and equipped it with an array of methodological tools. I have relied frequently and extensively on the work of others in the fields of philosophy, science, and actual practice.

When I completed my thesis on multi-actor processes, in the summer of 1997 (I was 35 when I completed my PhD, and conducted my research from the context of a normal day job), I knew that I had identified a huge mystery, possibly even touched upon its inner workings – I saw the solution shimmering before me now and then – but had hardly grasped its essence. That same mystery was already flitting through my thoughts at a younger age, but working on my thesis made it increasingly clear. It was about the relationship between societal development, multi-actor process management, and prime numbers. Their relationship can be revealed if you understand societal competence in terms of a unifying, underlying foundation: recursive perspective. It is possible to associate numbers with random societal practices and steps in societal development if you understand them as recursive networks of perspective. That applies to (nearly) everything we experience as people.

I knew that I would have to delve into that aspect more deeply. The work was not mandated by anyone other than myself, but some mandates can simply not be ignored. It was exciting; I looked forward to it. At the same time, I found it a daunting prospect, because it involved – as far as I could gauge – unexplored territory, and I knew that exploring this mystery, this relationship, and eventually writing this series and this book, would demand a great deal of work, and bring me into many fields of human endeavour and research I had never ventured into before, and would not necessarily excel at. I sometimes apologize for that in this book, when I once again nonchalantly enter into the hallowed halls of history or physics or sociology or mathematics without being a historian, physicist, sociologist, or mathematician (and this list is far from comprehensive). It should be noted that my apologies are in no way intended to express *regret*. On the contrary, it is my opinion that

everyone has every right to explore other disciplines and use what they find there for their own purposes. (It goes without saying that such use does entail an obligation to treat such disciplines with respect.) Rather, it is intended as a fair warning for seasoned disciplinary specialists: be aware that I am not an expert in these fields. That means that I may make mistakes, and could possibly do things that would never occur to you, which you may consider unheard of. But I am *using* them, these disciplines. I do have a *positive* opinion of how useful your disciplines are for *the path of humanity*. I am an admirer and proponent of using in-depth knowledge of specific disciplines; they make it possible to excel at specific aspects of societal competence. At the same time, however, I believe that an overly narrow focus on one specific discipline leads to societal fragmentation, and that overly well-defined disciplinary boundaries therefore would be more likely to obstruct deliberate ongoing improvement of our integral societal development than to help it on its way. Quoting Erwin Schrödinger again, as I did in my foreword to this book:

> *"I can see no other escape from this dilemma (lest our true aim be lost forever) than that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of some of them – and at the risk of making fools of ourselves. So much for my apology." (Erwin Schrödinger, foreword to "What is Life?" 1944.)*

In the twenty years since 1997, I have elaborated on large swaths of this issue in thought experiments, reports, and books, not as a scientist – precisely due to all the discipline-based preoccupations that accompany such a role – but as a reflective and eclectic pragmatist. The most important examples are Volumes I and IV in this series, Society in Perspective: *A Philosophy of Societal Practice* (which provides a solid foundation for recursive perspectivism) and *Multi-actor Process Management in Theory and Practice* (which presents multi-actor process management for practitioners).

Prior to writing this book, I have made various previous attempts to address the entire issue, the entire relationship between societal development, multi-actor process management, experiencing, and prime numbers, but all my forays before now were unsuccessful. I could claim now that it was due to a lack of time, and that was certainly true to some extent – it's a very large project to tackle alongside running a small business of my own – but that would be giving myself a very generous out. The truth is that it was simply a difficult undertaking, and that I lacked the knowledge and experience that it required. At a certain point, crucial helping hands were offered from unexpected corners (*fortuna favet animus paratus*), so I put aside my own reservations and set to work, tackling the integral relationship with renewed vigour. The result is this book. It uses the framework of recursive perspective to describe how our societies develop as recursive multi-actor processes, the role that prime numbers play in this context, and the most probable route to a better future: *the path of humanity*.

Nothing is quite as fickle as the course of societal development. It is difficult to dovetail a book with a title like *The Path of Humanity* into the scientific discourse, or indeed in any

discourse whatsoever (and I am curious to see how it will work out). Is there any point in writing a book like this, then? Doesn't that make me a fool in the Schrödingerian sense?[560] Isn't our late-modern society simply several sizes too big for us? Are we therefore simply at its mercy, unable to affect its course? Jacqueline Cramer said it well in her foreword:

> *"With my experience in politics, societal practice, and academia, I realized that there are many obstacles along our shared path, and that sometimes we have to take many winding roads. Whether we get there or not does not lie in one person's hands but is a collective process. Human development will always be somewhat haphazard."*

These are true words based on extensive experience and a wisdom that comes from life lessons. Even if there are some individuals who might actually be able to comprehend the whole of society (which is *provably* impossible; see my thesis for substantiation in the form of the cognitive threshold), the world does not benefit from isolated know-it-alls. There is a very fine line between genius and insanity here.

Even so, we can certainly do our best – as individuals, as groups and as humanity at large. We face the shared task of steadily improving our societies. *The path of humanity* testifies that we are at a crucial late-modern tipping point in our historic human development. It is not the first time that we have reached such a tipping point, but both the risks and the opportunities before us are greater than ever before. For exactly that reason, whatever has to be done from here should be done together, working as a team.

The path of humanity offers an entirely new perspective on our human development: it places it completely into recursive perspective and introduces balance principles, relativistic experience of value, quantum-theoretical obstacles, and a methodological framework for societal innovation. That leads to new insights, insights that can help us to engage with the future of our societies and guide it with a defter hand. Quoting from the foreword again:

> *"Henk has set out a clear long-term path of progress, unclouded by the issues of the day in our societal practice, by thinking deeply about societal development. His ideas and arguments shed an exceptional light on the fluctuations of human development up to the present day and represent a highly optimistic route to our future. It's encouraging to see that we've more or less been able to follow this path in human history thus far, with the attractive and less-attractive sides it entails. Henk offers ideas and methods that can help. The path of humanity can spark renewed thinking about the nature of our societal development, and what we can do together."*

This book offers prospects for setting a more deliberate course towards societal improvement, a course that we can constantly seek out if the path strays, following towards the future. Societal practices are, of course, just as complex and recalcitrant as they ever

[560] In recent years, I've occasionally seen the brilliant commentary offered by Gimli on his impossible task, and it made me grin every time. I felt a kinship with him: I too was like a dwarf setting out to accomplish an impossible task, and I too had started on my way despite the impossibility of the undertaking.

were. However, if *the path of humanity* has taught us anything so far, it is that we do not have to be limited to selfishness, and that we definitely can take collective action towards improvement – and professionalize our collective improvement efforts. As to the extent to which insights like the ones presented in this book will affect the course of the societal stream, only time will tell, but writing and publishing and distributing books like this are definitely a crucial first step. If you don't write it down, publish it, communicate it, then it almost certainly will not happen.

In any case, people will experience the transformation from our current late-modern age to the plurimodern society of Team World *no matter what*; I am completely convinced of that. Even if we play dice with perspective, the balance laws of the perspectivist dice still apply, and intentionality allows us to significantly accelerate the process of finding balance on the perspectivist dice. The only thing that can obstruct this transformation is a cosmic or human disaster that wipes out mankind altogether (in which case the perspectivist dice will disappear, and human experience will cease to exist).

Above all, I am an optimist. The steps we'll take to achieve that plurimodern society, and how long it will be before we get there, are not yet clear; time will tell. It's a matter of perspectives, improvement potentials, dice, the Riemann hypothesis, and societal balance. Coherence and cooperation will ultimately win out over isolation and competition, as we intuitively know; the historical course of *the path of humanity* clearly shows as much, and this book also provides entropic substantiation for that fact through recursive perspectivism. If the cosmos does not throw us a curve ball – the dinosaurs didn't see their end coming either – then our *human* future can therefore be projected as fantastic in the long term, from a strictly societal point of view.

Our human future is highly promising in the long term, as inevitably as the way that the outcomes of rolling dice converge towards balance. It is not guaranteed, but it is very probable, and becomes more and more probable over time. That may seem like an odd statement. Am I an utopian in disguise? It could be argued that I should take a better look at what's happening right now. There's 'plastic soup' drifting in our oceans; the increasing scale of how we stockpile arms will almost inevitably eventually lead to nuclear and/or conventional disaster; irresponsible leaders are taking power or being granted power by short-sighted voters; climate problems are becoming increasingly dire as we watch; there are growing risks involved in having to feed more and more people every year based on long, faulty food supply chains. And at nearly every human scale you can imagine, you will see beautiful human interactions side by side with atrocious abuses. Given all that, how can I still say that the future of humanity is very promising in the long term? Isn't that awfully utopian and optimistic?

But I am not practising blind utopianism, nor monomaniac optimism. The point here is the transformation process from our current late-modern societies to the plurimodern future of Team World: how do we define that process? Do we grab the wheel of societal innovation together and set a collective course, or do we run about ineffectively like chickens in a

farmyard? The crucial question is whether or not the *intervening* steps between modernity and plurimodernity will be accompanied by large-scale, anthropogenic disasters. On that point, we definitely do have some control over what happens, especially if we work together.

I have noted, as many others have, that we are on a collision course with major disaster in some ecological respects. I concur with the analysis that a persistent, one-sided financial and economic view of societability will push us over the edge. However, the very fact that I and more and more others are realizing that we are so out of balance offers fresh prospects for rediscovering the balance of *the path of humanity*. The societal balance model takes effect again sooner or later, turning the tide. And a growing consciousness that we can and will work together to guide our societies upwards along *the path of humanity* is precisely what this book aims to facilitate.

Recursive perspectivism opens up a long-term, optimistic vision for human development, offering the initial tools for developing a methodological repertoire for societal innovation. Simply put, we can state that our societies are a dynamic, coherent ensemble of overlapping, interweaving experiential worlds. Experiential worlds are experienced by actors, and are viewed within the context of recursive perspectivism as layered networks of perspective. For that reason, a key focus of societal innovation is comprehending, developing, and implementing multi-actor processes together, using recursive perspectivist approaches.

The methodological arsenal still has a long way to go, and is still not understood or deployed nearly often enough, *but it is transferable and it truly does make sense*. In the end, that is the stone that this book and the entire series hopes to toss into our shared societal river, redirecting its course to aim more accurately at a beautiful plurimodern future.

10.2 Consciously following the path together

The following words were written at the start of this book:

> *"This book recommends that we continue to study this path and start to follow it consciously, and it describes the first steps towards doing so. The subject of the book is as vast and far-reaching as the ideas presented in it. These ideas are certainly not isolated random thoughts. They have deep roots in the experiences of many people. Many ideas are in line with the insights of past and present thinkers and build firmly on them. At the same time, the basis of these ideas is still highly intuitive. They have the status of initially substantiated hypotheses, if they can be called that, since hypotheses must be experimentally falsifiable. This is hard to do on a societal scale. Although I provide rudimentary foundations for these ideas, the foundations need to be worked out in much greater detail. The ideas must be firmly confronted, they will arouse controversy, and much is certain to change."*

I still fully endorse these words now, at the end of this book. Over the course of the book, I believe I have been able to make a plausible case for the following. We are walking along a path together, whether or not we want to, and whether or not we realize this fact. On the whole, the path heads towards improvement, even though we generally aren't aware of that, especially in the darkest hours. This path is mapped out in recursive perspective. To assess its value accurately, we have to take a step back and see the bigger picture, like the painting by Jan Makkes that hangs in my living room: viewed up close, the brush strokes do not coalesce into a coherent picture, not even at a 10x10cm scale, but when you step back, the image of a landscape emerges majestically from the chaos.

You can describe *the path of humanity* in a historical context (Part I). You can place it in recursive perspective, and map out the optimal path along the diagonal in a three-dimensional space (Part II). And you can equip it with innovative methods, methods that can support further improvement in our societal practices. Coherent, coordinated implementation of innovation methods will make it possible for us to consciously rise along the diagonal and continue to improve (Part II). We will encounter deep valleys and soaring peaks along the way; the quantum-theoretical properties of the perspectivist space, which are expressed in the statistical concept of improvement potential, and form the foundations of intermittent change in societies, may well be the most surprising discovery of this book. Despite these dramatic fluctuations in altitude, one thing holds true: the perspectivist space inherently includes a promise that there will always be another, higher societal peak around the corner. If we continue to grow and seek out those elevations in coherence and cooperation, we will eventually find it. It's all a matter of balance.

I have tried to capture all this in writing in this book, in a more or less comprehensible way. Whether I have succeeded is for you to decide. In any case, it was an undertaking that took several years and was based on an extensive array of experiences, some of which even dated back to my early childhood. The writing process and accompanying thought process amazed me deeply on occasion. I knew ahead of time, ever since I wrote my thesis (see above in this concluding chapter), that the concept of perspective, and especially its recursive and systematic application as a building block of societal competence, would lead to new insights. I had in no way expected the huge shove forward that it would give me, the many sub-disciplines of human knowledge and interests I would encounter, nor the inadequacy and incompetence that I regularly detected in myself, my inability to find words to describe related concepts.

It may seem odd to write these words at the end of an extensive and occasionally complex book, but following *the path of humanity* really doesn't have to be all that complicated. I wrote before that I have reservations regarding people who blindly, dogmatically adhere to predefined principles. That category includes passionate practitioners, price-conscious consumers, power-driven politicians, rule-bound civil servants, profit-driven entrepreneurs, publication-driven scientists, armchair philosophers, and all other examples of fundamentalist thinking. I include myself in that category too; I may occasionally seem too dogmatic about the value of the key concepts in this book.

Fundamentalism: I see no value in it, and reject it entirely. It clings to you, tangling your steps as you walk, closing your eyes when you need to look at new things.

The answer I have offered in response to this self-affirming attitude is that we need to experience a plurimodern transformation together, aimed at constantly seeking and achieving the coherence and cooperation of Team World. That plurimodern transformation demands only that we take the nature of our society seriously, as an entity consisting of interacting, changing experiential worlds; it is increasingly a multi-actor practice. We can take it seriously by consciously making an effort to reach out to the people around us, and to work with them to develop better multi-actor practices. Recursive perspectivism even offers a rule of thumb for this: on average, we should devote 1/3 of our perspectivist capacity to ourselves, 1/3 to others, and 1/3 to the whole, regardless of what scale we're operating on.

Obviously, this simple principle can and should be supported by using multi-actor methods, multi-actor process management, the innovation cube, backbones, and other frameworks for societal innovation, as explained in this book and in previous volumes in this series. There are so many other sources that could also help us here. In my opinion, it goes without saying that, if we head in this direction, we should take an inspired, smart, professional approach. A clear methodological framework helps. Proficiency levels can offer an extra boost.

All these things are important to professional societal innovation in practice, but that is not the essence of the matter. On a fundamental level, it's about realizing that we need to catch up because we are out of balance. We are too focused on thinking about ourselves and our loved ones. Although we may have the best of intentions, we are very short-sighted, which causes us to wander off course, following massive societal practices, and that is causing more and more problems for us. The essence is that we need to stop extrapolating our own ideas and take a look at the much bigger picture, to gain a much better understanding of each other. Humankind as a whole needs to embrace a much more intense degree of mutual sensitivity. Working in coherence, cooperation, and reciprocity will benefit us enormously, as a society. The crucial step is therefore focusing more attention on each other, separately and collectively, even at scales that we have never attained before in our evolutionary history. We will tap into sources of societal potential that we can hardly imagine yet. They will support us in unfolding our shared societal improvement spiral, which will lead us into our shared future, more or less along *the path of humanity*. Once we share this insight, it would be better for us to develop it consciously, reflectively, and professionally, wherever we can, wherever it complements our intuitions. That is exactly where multi-actor methods and societal innovation methods come into play.

This essay advocates a more deliberate continuation of our societal development, in a far more explicit and intense coherence and cooperation that we have exhibited to date. Our society has much to gain if that happens, as this book shows. We could follow *the path of humanity* consciously from now on, working together in concert. For that to be feasible, we

will need to significantly improve our skills in the field of societal multi-actor innovation. That's a very tangible task – and we can start working on it today.

I would like to conclude this book with a single, simple proposal: Let's choose to follow *the path of humanity* consciously.

About the Author

Henk Diepenmaat (1962) lives in Zeist, is married to Hilda and has two adult sons. He started his career at the Netherlands Organization for Applied Scientific Research (TNO). After 10 years, he started Actors Procesmanagement BV, an independent practice in multi-actor process management: grasping and working purposefully in complex player fields. This has been his main activity for 20 years now. He advises and helps industry and government with strategy, innovation, and development of multi-actor programmes and projects. His goal is to identify promising approaches and apply insights that can generate value quickly. He also teaches and holds in-company workshops, lectures, and training sessions on multi-actor process management and innovation. All tailored to the participants' current work. He works with all economic sectors and focus areas that have complex player fields, including energy, climate, healthcare, education, innovation, mobility, construction, sustainability, and management and policy. His attention and interest are specifically focused on improvement processes for more inclusive and sustainable societal and business practices.

Henk studied Chemistry (Radboud University), Environmental Hygiene (Wageningen University), Knowledge Technology (CIBIT/HKU University of the Arts Utrecht), and Knowledge and Information Technology (Middlesex University, London). He wrote his doctoral thesis on the theory and practice of multi-actor models (University of Amsterdam, departments of Social Sciences and Spatial Sciences). Many of these activities took place alongside his regular work.

Henk often works parttime with organizations that share his motivations about innovation, societal improvement, and sustainability. For instance, he was a senior adviser, researcher, and programme manager for DRIFT (Dutch Research Institute for Transitions), Erasmus University Rotterdam, and an associate professor at Nyenrode University in Breukelen. At the moment of writing, he is professorial fellow at the International Centre for Integrated assessment and Sustainable development (ICIS) at Maastricht University.

Linkedin profile: Henk Diepenmaat

Curriculum Vitae and Acknowledgements

The Path of Humanity is an essay, a societal analysis, and a direction in which our society might develop. In addition, and in keeping with the theme of this book, it is an integrative result of the many experiences I have had with others. I cannot reference all these people here – even doing as much as I am here is a daunting prospect – yet I would like to take this opportunity to express my gratitude and appreciation to the many people involved. My heartfelt thanks!

Below, I will do this in roughly chronological order, in more detail, in parallel with events and episodes from my life. This is the course of my life, as seen from the perspective of this new book, and I have tried to be honest and forthright in putting it in writing. It will help sketch a global image of how a book like *The Path of Humanity* can come into being and of the pillars it is built upon. This has become a substantial text, but I myself always enjoy reading about the ordinary lives of other people. Perhaps this is true for you as well.

Early childhood
Well begun is half done. And my life definitely began well. I came into this world in a flourishing mining village in the south of Limburg, as the third of four children in a happy, warm family. Times were different then. In my early childhood, the greengrocer and milkman still came by our door with their horse and carriage; I can vividly recall standing next to the huffing and snorting nags – impressive as seen from my child's perspective – with their blinkers on (excellent metaphor), at first hiding a bit behind my mother. The region was doing well, as the mines brought prosperity. I remember the men from the neighbourhood who walked to the State Mine bus stops with their *pungel*[561] casually swung over their shoulders, waiting to be brought to the local mines (*de koel* – the pit). They returned with soot-lined eyes, since the mine dust would not easily come off their eyelids under the shower. There was a great sense of togetherness, but perhaps that is how children like to see the world. It was wonderful to be able to spend my early years in this lively environment; my thanks to all for this.

A warm family gives one a solid basis, a feeling of connection and reciprocity, and also a feeling of self-esteem and co-responsibility one never loses. I consider myself very lucky that I had the opportunity to be part of a family like that, to grow up in one. A big word of thanks to my father Jan, now old, my mother Annie, who passed away a very long time ago, my sister Ineke and brother Benno, and my 'little sister' Truusje. I cherish these memories, and even though we do not see each other often enough, our bond remains. That warm family is the foundation I am standing on.

[561] *Pungels* are blue-grey chequered towels tied crosswise, containing sandwiches and a water bottle.

I started nursery school, initially a convent school led by the Franciscan Sisters of Penitence and Christian Love. They were influential for the development of the quality of education in the region. The Roman Catholic life with its 'smells and bells' was showing cracks, since more and more 'ordinary' teachers came along. Below the surface, the traditional religious and socio-political barriers were breaking down rapidly. I remember putting soft soap under our slippers and stealthily sliding down the long convent halls. The slippers were round, red-chequered slip-covers with elastic, worn over our shoes to keep the school floor clean. I remember that the sisters were often strict; I can still feel my ears sting (enough to make anyone feel penitent).

Then I went to primary school. It was a wonderful time, with lots of friends and still that sense of togetherness. I was never good at penmanship, even though I tried, but the fact that I consistently got an insufficient based on 'effort' in writing – a small childhood trauma :-) – mostly made me doubt my teachers' judgement. It could not have been sound. This made my penitence, recently acquired at nursery school and always a precarious talent, start to decline. I was a voracious reader, and the reading cabinet of each subsequent year would be 'finished' within a small number of weeks. I read everything I could get my hands on. My mother would take me to the community library every week, sometimes even more often. I cannot remember much of it, but I seem to recall following my own curriculum. I can still see myself in the living room, an edition of *Reader's Digest* or a volume of my favourite cowboy tales hidden in my school atlas. Or deep in thought (and daydreams) in class, even though I was far from shy or introverted. I enjoyed myself, as long as the educational system left me alone to a certain extent. I passed my final tests in sixth form ('group 8' in today's Dutch educational terminology) with flying colours and went on to secondary school. I am grateful to my primary-school teachers for the freedom and space they gave me, or that I managed to create around me. It was a good time.

Secondary school and the first years of university

I started in the first year of secondary school, the bridge class where Dutch pupils are sorted into the various educational and vocational levels. Socially, it was again a wonderful time; all I can remember are lively conversations and good relationships, class after class. The educational side of things, the school grind, I withdrew myself from. At the end of this first year, the fact that I was mostly following my own curriculum started to take its toll. My primary-school strategy did not work as well in secondary school, and my flying colours were starting to fade. Although my grades in some subjects were on the low side at the end of that first year, my teachers must have championed my case for continuing to pre-university secondary education (VWO in Dutch parlance), since I obviously did not belong in higher general continued education level (HAVO). I think this was an important moment, and I am grateful to these teachers – unknown to me – for their autonomous insight and their courage. In the current dictatorship of grades, I imagine, the outcome would have been different. One would not want to allow one's students to undermine the school's performance!

I continued to the VWO track, once repeating a year and only barely passing the next year by the skin of my teeth. I was definitely working hard: I continued to read a lot, my wide and deep interest and enthusiasm undiminished, but my interests did not necessarily conform to what was going on at school. That which was a great time socially, I thought was terribly boring educationally. The educational side of school struck me as a monomaniacal and sometimes outright hostile machine. I never really understood the way that you learn languages in school, for instance – it definitely provides some inroads, but how can it be so counter to natural language acquisition? Occasionally, I would sit in class with an aching stomach, because it is one thing to just not participate, but an entirely different thing to be quizzed without proper preparation. The school's curriculum and I drifted apart further and further.

On the other hand, it was amusing to see how people (both staff and pupils) could mould themselves to a system without any critical thought, without any understanding of the nature of the system, without an eye for individuality and ongoing improvement. Without even seeing this system as a choice! I still think there is something wrong with that. If you watch the 1936 Chaplin film *Modern Times*, available on YouTube, you can see what modernity entails according to Chaplin (and myself) and why it is such a dismal failure as a blueprint for societal systems. Satire exaggerates reality, but when the satire is really good, reality will be victorious over the criticism shown. At the same time, the Chaplin films as a product show how the work of human beings can and must sparkle. Alternatively, look at the three axes of perspectivist space, as illustrated in *The Path of Humanity:* modern education is just a matter of imbalance, of suboptimization, where pluriformity is beaten out of people, losing out to unity and similarity. Well, of course, I was a teenager, and the other half was probably just me; I may have been overly sensitive to this. I did not take it all that seriously, but I did have to go through it, take the hurdle – that much I understood, and that much I did.

Now, at age 55, I understand much better than I did then that there was a deep incompatibility between my learning style, based on curiosity, connections, and improvement, and the pounding wheels of an inflexible, highly compartmentalized educational system. A system that – despite the theoretical presence of freedom of education – was also strongly monopolistic, with its most important goal to benefit and perpetuate itself. That educational system works reasonably well for a reasonable number of students and has the irresistible advantage to politicians and managers that it is reasonably tractable, reasonably controllable, reasonably governable, and reasonably cost-efficient. Its results are reasonably average (not a tautology!) and it closes its eyes to anything that is not average. Is that, then, what we are looking for in an educational system: reasonableness and averages? Education could also be beautifully sparkling and driving, or at least that is how I have also had the chance to experience it at times. Today, there is a scarcity of teachers, and this is partially the reason that the call for salary increases is strong. But why would you pay more than a mediocre price for a mediocre activity? At the same time, the differences in quality between individual teachers are stark, from inspiring and competent to sleep-inducing and incompetent. Good teachers should

definitely make good money. Why then would we not pay good teachers more than bad ones, to accommodate their perceived financial undervaluation? Personally, I think that taking the next step from a modern to a plurimodern educational system is desirable (in which money is only one element). *'We're upside down.' 'Yes, but only a few of us know it.'* (Paraphrased from Chaplin, *The Dictator*, 1940).

All in all, though, I look back on a very nice time in secondary school, mostly thanks to my many friends and definitely a number of understanding teachers. My thanks! It is wonderful to be able to determine time and time again that there are lovely people absolutely *everywhere*. Rigid systems I still avoid like the plague, whenever I can.

In the meantime, in the late sixties and early seventies, the once-flourishing mining economy had ground to a halt. Mines were closing left and right. The *communis opinio* was that the government was to blame. Deeper drivers were of course the international competition, the exploitation of ever deeper coal deposits, and the discovery of natural gas in the province of Groningen (the start of the Age of Slochteren, which is now nearing its end shock by shock as earthquakes rock the region). Despite a number of promises about alternative work opportunities, the mining region was completely laid flat. It was an economic and therefore a cultural shift that quickly became visible in the streetscapes and the social atmosphere, as though a shadow had fallen over the region. I was a regular visitor to the nearby provincial town. In the heyday of the mines, it used to be lively and prosperous, with bustling tea gardens and a healthy flow of money. After the mines closed, the train station was so littered with the used syringes of drug addicts that you literally had to step around them (and occasionally around the addicts themselves as well). I saw with my own eyes how the drive disappeared, how the people became much more lethargic than they used to be. It was still the same region, the same people, and only a few years later.

A culture and an economy can plummet into decline together, sparing nothing, while individuals stand powerless. I lived through this when the mines closed, and this first-hand life experience has been a strong shaping influence on me. Of course, I could not interpret all that happened around me in detail. And a monoculture such as mining is always vulnerable. Countries like England and Belgium experienced similar downturns. But it did fervently stir my sensitivity to and interest in a better understanding of societal practices and societal development. At an early age, I saw that what was happening around me built the argument for more diversity, coherence, and cooperation, at smaller scales but definitely also at larger ones (plurimodernity).

I worked side jobs and holiday jobs, and my interest was once again wide. My region was not only a mining region but also a fruit-growing region. I lived at the edge of the village, so I picked fruit for the farmers, mostly strawberries and cherries: tart cherries from short-trunked trees, and Hedelfinger cherries from tall, standard trees. The latter work was done on enormous ladders, wide at the bottom and narrow at the top. It was fun and exciting: if the ladder started tipping, you had to place your feet at the outside of the ladder and slide along the ladder to hopefully reach the ground before the ladder did. And the ladders

definitely tipped! Not often but still regularly, whenever you would reach too far because you ideally wanted to get all the cherries that were even remotely within reach; moving the ladder was quite a chore. You would develop a knack for it, and it usually all worked out, barring a few large friction burns on your hands. Those, you took for granted.[562]

Shoulder baskets were used to fill cases located in the centre of the orchard. That was always a beautiful sight, watching the fruit of the labour of many accumulate. Those tall trees have almost all disappeared by now. I have also had jobs in construction, in a dairy factory, in a bakery (conveyor-band loads of *vlaai*, the famous Limburg pies; I can still see them at night), in a supermarket, doing traffic count reports, as a barman and house painter, delivering newspapers, and I am sure I am forgetting several. The world is such a diverse place. Still, the production at the dairy and pie factories – the conveyor belts – never felt as satisfying as the stacks of full cases in the cherry orchard. The sense of camaraderie and connection and responsibility was so much less when working the belt; it was just the place you made your money.

The rule of thumb says that 20% of people are hanging off the back of the metaphorical carriage, slowing it down, 60% are riding the train, and 20% are driving it. These figures are rarely exact, the exact distribution is different in each case, but wherever I went I always found not just brakesmen (some) and passengers (many), but also special people, people who have attention for others, committed people willing to go the extra mile – thank you.

The finish line of my time in VWO was in sight, and I wanted to broaden my horizon. I increasingly knew what I wanted: to do something societally relevant. Finding something like that in the programmes on offer was difficult. Social sciences did not seem qualified, given my experiences after the mines closed. All in all, I did not have the faintest idea which study programme to choose. Together with a friend, Nic. Friederichs, I did an exciting chemistry experiment for my VWO graduation project: dissolving quarters in *aqua regia*, a powerful acid, and determining their nickel content with a beautiful red tomato-soup-like precipitate based on methylglyoxime. We did an excellent job at creating this solution, and that quarter was a part of the reason I decided to move to Nijmegen in 1981 to study Chemistry. At least it was a broad subject, as far as the physical sciences went, I rationalized the decision to myself. Had I done a different experiment, I might have chosen a different field of study. (Nic. turned out to be more set in his course.) At that crucial point in life, the modern premise prescribes that you only get one, perhaps two rolls with the dice, and as a reader of this book, you now know what that means. The roll was blessed, because in my first year of studying Chemistry, I met a young lady. Her name was Hilda Wolters. From that moment on, Hilda and I have done almost everything together. I will get back to that later.

[562]Low-hanging fruit that you suddenly have to start picking *ad hoc*, it has never been my thing – it signals indifference and legitimizes a lack of ambition.

My mother died, completely unexpectedly and in an instant. That was a hard confrontation. I had to face the reality that life may be beautiful, but that the cosmos is also capable of randomly dispensing abject misery and ugliness. I soon understood that it is up to us human beings to come together to cope with this fact.

My first years at university were a slog, study-wise. At its core, the university was a modern educational system. Socially, once again, the years were very pleasant. There were also loads of chemistry practicums, which I always enjoyed and which seemed effortless. As incompatible as I was with it, I kept slowly stumbling my way forward through the modern system; I had got used to it by then. At the time, I thought I was not learning very much, but that turned out not to be quite the case. Looking at the quantum-theoretical, relativistic, and probabilistic foundations of recursive perspectivism, I can only draw one conclusion: I must have had my eyes and ears open every now and then. My thanks, fellow Chemistry students and teachers, it was wonderful to be your travel companion for a time.

Later years at university

As my years at university went on, I kept increasing my control over the wheel. My freedom of choice expanded, as did my influence; the curriculum and my own development came closer together, allowing my feet to leave the ground once more. My grades shot up. I did not denounce my societal interest and became student assistant of Chemistry and Society. Between 1984 and 1987, I graduated in two subjects from two universities: Air Hygiene and Air Pollution in Wageningen and Analytical Chemistry in Nijmegen. Back then, Wageningen University was called Wageningen Agricultural Polytechnic (the LH) and the Radboud University was the Catholic University of Nijmegen (the KUN).

I went to Wageningen because I wanted to understand more about environmental issues. The planetary orientation towards environmental issues was at its zenith, as forests were dying because of acid rain (*Waldsterben)*. There was a growing realization that there are environmental limits to economic growth (as the Club of Rome had already set out in a controversial wake-up call in 1972). I was optimizing it a little, as it was not common for a chemistry student to go to another university, and several considered it not done. 'Usually' you would do a major and a minor within your own field of study, often doing your minor within the same department or, in highly exceptional cases, at another department of the same university. This was one of the things Hilda and I did together, as she, too, had her eye on a second major in Wageningen: Food Chemistry. We bought a little second-hand *deux chevaux* the colour of iron oxide to tear from Nijmegen to Wageningen and back, a *Special* (the most Spartan edition). Highly perilous, braving the highway in a tin snail, but it never broke down on us. I have loved driving convertibles ever since, something my sons know all about.

I started by taking a few basic courses in environmental hygiene. Even then, environmental issues seemed a societal multi-actor problem to me, even though I did not know how to formulate it as gracefully as I can now. I did not see much of that perspective in those courses. In Wageningen, people thought I had already completed my Analytical Chemistry

major and suggested I take a look at fluoride concentrations in the dairy industry. It was a misunderstanding I allowed to persist.

The key element turned out to be the deposition step. Fluorides precipitated from the atmosphere onto the grass. For that reason, I did deposition measurements in the Rijnmond region near Rotterdam, the Dutch polder landscape in the Lickebaert area, on the northern bank of the Nieuwe Waterweg. These deposition measurements were relevant because cows were susceptible to fluorosis: fluoride accumulates in grass, therefore in cows and eventually in milk. These fluorides originated from nearby fertilizer factories and other industrial processes.

I placed poles holding glass tubes (denuders) in the centre of fields, often right in the midst of the cows. You had to keep the cows far away from the poles because they would disrupt the airflow, theory predicted. Practice showed that they also ate your equipment. It was a beautiful and alienating image, the poles with glass tubes between the cows in the fields, against the backdrop of the industrial landscape of the Rijnmond area, with a small iron-oxide-coloured snail of a car off to the side. I wish I had a video of myself, making noise and gesticulating to chase the cows away from what was, in my perception back then, a very important experiment.

As an exception, I was allowed to try to do the subsequent fluoride analyses myself, since I was of course a real, bona fide Analytic Chemist. This was done with ion-selective electrodes based on lanthanum fluoride. Before I was allowed to touch their expensive stuff, the laboratory workers at what was then the Institute for Research into Plant Diseases (Instituut voor Plantenziektekundig Onderzoek; IPO) in Wageningen first put me to the test: I had to make a calibration range and analyze a few test samples. But every chemist from Nijmegen can do that with his hands tied behind his back: I did it with a straight line as a result, without breaking any glassware or abusing any equipment, and with the correct outcome. Those first few years of the Chemistry curriculum had of course been chock-full of practicums. I feigned being an Analytical Chemist to my heart's delight, and my act appeared to be credible. In the meantime, who I was mostly testing was myself.

The results were refreshing and consistent: on sunny days, the fluorides appeared to follow a reverse flux, disappearing from the grass up into the air. That provided an excellent explanation for the erratic jumps in fluoride concentrations in grassland and in the atmosphere, but it was also at odds with the prevailing opinion that fluorides were considered to precipitate onto grass. As logical as my measurement results seemed, it was difficult for me to find the nail that matched this new hammer.

My time in Wageningen broadened my scope on environmental issues tremendously. It became clear to me that not just environmental science as a discipline, but science as a whole as a collection of disciplines is much too narrow to grasp and address such an intrinsically societal phenomenon as sustainable development. You will have noticed this in the methodological approach that underpins this book. I was becoming clearer on where

my future path should take me. Both the people who allowed me to go from Nijmegen to Wageningen and the people in Wageningen have made a crucial contribution to this. For which my thanks!

By then, I understood that the opinions and intentions of the person looking into the test tube were at least as important as the 'factual content' of the test tube. By then, I was no longer a purely physical scientist. (Had I ever been one?)

I returned to Nijmegen and started my second major, Analytical Chemistry. We kept the tin snail just to be sure, and I still smile broadly whenever I hear one on the street. The department of Analytical Chemistry in Nijmegen focused (and still focuses) on Chemometrics: analyzing and processing chemical measurement data. The lab hummed with computers, and actual test tubes were rare. (Personally, I would never let a chemometrician touch wet chemical analysis instruments.)

I was intrigued by artificial intelligence and, together with fellow student Carlos Lucasius, specialized in further developing and programming an expert system shell, new terrain for me. A shell is a specialized development environment (a programming environment) for chemical expert systems; ours had the euphonious name CHLOE: *a Chemical Heuristics and Logic Oriented Empty shell.* It was empty, because you had to fill it with expertise: knowledge acquired through prolonged experience. Expert systems were designed to support chemists and others in their decision-making, for instance in choosing HPLC columns (a step in designing chromatographic analysis methods). The formula was: shell + expertise = expert system.

It was the time when artificial intelligence (AI) first arose, in the mid-eighties. ICT (Information and Communication Technology) was booming. The US and Japan were locked in competition for who would develop the first 'thinking computers', the so-called 'fifth-generation' economic war. The Russians and the Chinese had not yet entered the picture. The winner of this competition would rule the world, of this everyone was convinced, and literally everything would change. Currently, we are better at distinguishing what is of Man and what is of Computer, but back then, computers were slated to replace human beings: most AI experts looking at the world through their cathode ray tubes from their computer chip thrones, and many other experts would not even contemplate trying to explain their expertise, as this would lead to their obsolescence. I looked at all this with astonishment, as it seemed a very engineering-type view. Which can be very fine, but on this occasion, it had just been unleashed on the core of what makes us human. Still, it was a scintillating and exciting time. Only now, over thirty years later, have the high expectations of AI of that period been somewhat normalized and perhaps even partially met. And if change really is progress, it is adopted in two shakes of a lamb's tail, even if that progress comes in leaps. What then does it matter that things change? When I read in newspapers – in the year 2017, 32 years later – that we are on the eve of an AI revolution, I smile; not from a sense of misplaced superiority but from the knowledge that every generation needs its own exciting revolutions.

In late 1985, early 1986, Carlos and I adopted a *Symbolics 3600*, a cutting-edge AI computer from the United States (where else would cutting-edge technology come from?), also known as the *LISP Machine*. It was brand new, worth half a million guilders and the size of one of the refrigerators its land of origin is known for. Perhaps you are thinking, 'Cutting edge, whatever', but Symbolics was true AI and ICT royalty. The first and oldest Internet domain name had been registered on 15 March 1985, just a little earlier in that same year. It was symbolics.com. The *Symbolics 3600* had been a bad buy: for six months, it had been languishing under a cover in another department, ever since a professor there had left. It had not been easy to get it out of the US in the first place, since everyone in the States knew the Japanese were lurking everywhere. That much was clear. But Carlos and I were not Japanese, anyone could understand that.

A LISP Machine is specifically tailored to programming in LISP. LISP was developed in 1958, the oldest higher computer language except for Fortran (from 1957). You can use it for absolutely outrageous symbol manipulation, which is why good AI programmers adore it, and also for writing software that writes software (which was part of CHLOE). It is also excellent for *recursive* programming. I still have a fondness for it: all calculations and rendered figures in this book are programmed in LISP (with gratitude to Franz LISP Inc. and SBCL).

The LISP Machine did not show a single sign of life when I found it (Carlos joined a little later): no blinking cursor, no hum, and no beep. Manuals the size of phone books, stacked a metre and a half high, had their backs firmly and uninvitingly turned (as this was still the paper era). Our first task was finding an unplugged power cord – at least, we hoped that was the problem – in a tangle of cables under the raised panel floor of the computer centre. And yes, that turned out to be the problem; after many hours and lifted panels, we had found the unplugged cord while managing to keep all other computers running (our activities were watched suspiciously). After being plugged in, the LISP Machine proclaimed 'Hello world' on a large monitor. The screen had a phenomenal resolution and the LISP environment was fully WIMP based, truly amazing. For reference, other computers in 1985 had tiny terminals with fat green letters, line editors, and the resolution of a chess board. The WIMP interface concept (Window, Icon, Menu, Pointing device) was defined by Xerox PARC in the early eighties. Rumour has it that Steve Jobs (Apple) stole WIMP from Xerox at a later stage, and that Bill Gates (Microsoft) in turn stole it from Apple, but of course that is nothing but evil gossip. How Symbolics managed to get it this early on, I do not know. That 'pointing device', by the way, you know as 'mouse'.

You can liken our situation back then to two young men (Carlos and I) being allowed to teach ourselves to fly a fighter jet. Here it is, these are the manuals, all you have to do is to go look for the key. Totally irresponsible, of course, and a terribly steep learning curve for a pair of chemists, but what else are jet fighters for but steep climbs? We worked like demons, day and night, and had tonnes of fun. Thank you, Carlos; thank you, chemometricians; thank you, Alonzo Church; thank you, Symbolics, for a wonderful time!

This way I completed two extensive majors at two universities, and my time as a normal student came to an end in 1987. The final 3 years at university, I earned top marks. This happened because my supervisors did not manage or control me; I was self-directed and they supported me when I needed their support. I cannot thank them enough for this, as it allowed my entire attitude towards studying to shift from one often driven by bored and uninspiring *shoulds* to inspired exploration, research, and improvement. (A cynical psychobiologist might also say that my prefrontal cortex had finally developed.)

I was awarded my diploma with the *judicium* 'with pleasure'. My professor, professor Kateman of Analytical Chemistry, reminded me in a warm speech that this could have been much more if he had been allowed to disregard my first years. I have never before mentioned or stated this judicium, because it feels a bit like second prize. Hilda did obtain her diploma *cum laude*, and in less time, too. I do not always have to be in the limelight, but standing in my girlfriend's shadow was a little too much. So I never mentioned it. This, too, seems to have mellowed over the years. Perhaps this story can be an inspiration to my sons :-).

U

All in all, my school career can be succinctly summarized with a strapping U-curve. The flying colours of primary school, a long dip (a system-educational hibernation) in secondary school and the first years at university, followed by excellent results in my final years at university. Altogether, it was a very fertile period. I had a life partner, I had grown up and got educated, and I knew roughly what I wanted: to contribute in some way to developments on truly societal scales. I also knew what I had best avoid: modern bureaucratic systems. I had also learned that special, remarkable people can be found everywhere, concerned people who can make life even more worth living. I still find them everywhere, and I look for them whenever I can. With people like them, you can make both your own life and our entire society just a little – or a lot – more beautiful and more colourful every single time.

First employer, studying while working and PhD

I was ready for my next step: I went looking for my first real job. It was 1987, a time of crisis and high unemployment rates for chemists, so I thought: better start looking early. But information and knowledge technology were booming, and it remained unclear whether the US or Japan would win the 'War for Artificial Intelligence' (as usual, Europe was just rummaging along in the margins). The environment and sustainability were also hot topics: the report 'Our Common Future' by the Brundtland committee was published in that year, with what is still the most-cited definition of sustainability. Thanks to my accumulated knowledge of chemistry, the environment, and expert systems, I had the choice of several jobs. That seemed like excellent planning, but it was mostly just luck, me following my interests.

Six months before I graduated, I had already found a position: a job at the largest division of TNO, the Netherlands Organization for Applied Scientific Research. This division had the name Maatschappelijke Technologie (Societal Technology), a name with a wonderful ring and resonance and one that could serve as a mission statement. Within Societal Technology, there were several job openings for computer scientists and environmentalists. I chose a position as Knowledge Technologist in a department that served the entire division of around 750 employees, if I recall correctly, in three locations in the Netherlands (Apeldoorn, Zeist, and Delft). This, I figured, would prevent me from being disciplinarily pigeonholed. I enjoyed depth but did not have a one-track mind for one discipline only; I lacked all aspiration of becoming a specialist. Becoming a generalist did not attract me at all either: if possible even less, as it seemed much too shallow for me. What I wanted was to be *societally* active.

Back then, Knowledge Technologist was an entirely new job title. A knowledge technologist makes human expertise explicit through knowledge models and shapes it in ways that make this knowledge transferable and usable to others. Think of expert systems, documents, or courses and workshops. I was looking at the chemist, as it were, who was in turn looking at a test tube. As knowledge technologist, you are professionally engaged with the knowledge of *other people*, and this allows you to cast a very particular reflective gaze at the intentions, reasoning, considerations, and actions of individual actors. This is roughly how I now cast my gaze at a multitude of societal multi-actor practices.

At Societal Technology, I immediately met people who have since kept crossing my life's path, and with whom I still have deep bonds of friendship. For instance, Pieter van Langen, a contemporary doing his PhD at VU Amsterdam and working on it at TNO; I still ask him to proofread my books. For instance, Chris Bruijnes – we met at TNO's introductory course as two young dogs and immediately felt a click. He has been a good friend ever since, one I share my strong improvement drive with and with whom I – in part for that reason – have collaborated with regularly and intensely for 30 years. I also have to mention Joost Quakernaar, a striking and wise man at TNO even then, who naturally and selflessly took on the role of mentor for some of the 'youngsters' (you would always come out of his room with a head full of ideas and lessons, and sometimes a little dazed). He kept this up for many years after my time at TNO, even until today. He is a loyal reader and critic of my books-in-progress. Together with Rob Weterings, Joost and I hold a 'Brugwachter' meeting every year around Christmas, where we gather in the eponymous restaurant with food and drinks and discuss the state of the world in general and the necessary steps in sustainable development in particular, and of course anything else that comes up.

In 1987, TNO was a wonderful company, with long hallways of small rooms filled with subject-matter experts and specialists of all stripes, and larger halls with all kinds of laboratory equipment. It was a workplace where expertise was there for the taking, and this is where I got to know the tremendous value of an expert in full power. If anything is seriously wrong, in the short term you do not seek out the politician or the entrepreneur or the theoretician. You seek out the expert, who can deliver just the right tap with the right

Thor's hammer to repair something (you know the story of the hammer and the Bendix?). I also saw the dark side of this: an expert in the wrong place *destroys* value, quickly and effectively, by overstraining his experiential world. Experts with a strong identity mostly see their own Thor's hammer. That is, *if* they even see it. All too often, specialists are like the man with the hammer who sees the whole world only in terms of nails.[563] If you let them, their Thor's hammers can collectively do a lot of damage.

This is why we do not only have Thor's hammer, but also Heidegger's. What this hammer does is promote reflection, coherence, and overview. Heidegger's hammer only becomes visible once you notice, once you are open to the fact that Thor's hammers do not always work.

From a psychological assessment – part of the job application process at TNO – I learned that I had a rare profile. I was both theoretical/reflective and practical/activist. This was rare, but not that exceptional. What made my profile truly exceptional was my very high scores in both dimensions. The test had four dimensions, pictured like a cross. A fixed number of points were distributed across the axes of this cross, and the scores per dimension were connected with lines, usually resulting in an (occasionally lopsided) diamond shape. Apparently, I was not a diamond but a line, perfectly balanced. (The other two dimensions were about things like the need for hierarchy and a structured working environment; I will come back to that some other time.) Put in my own terms, I could wield both hammers with skill, both Thor's and Heidegger's.

I was still thirsty for knowledge, and in consultation with and with support from the working group leader, department head, managing board and Executive Board (what can I say, large organization), I made it happen that I could enrol in the brand-new 'second phase' Knowledge Technology education programme at HKU University of the Arts in Utrecht. (By way of what was then the Centre for Knowledge Technology, currently Cibit*academy*. I was part of its first year.) I later expanded this education to an MSc in Knowledge and Information Technology from Middlesex University (London). I was especially fascinated by the knowledge modelling side (cognitive models of human expertise) and the cognitive psychology and empirical side of knowledge acquisition and use. I learned a lot here, for which my thanks.

Both my studies and my experiences as knowledge technologist called me to humility about the transferability of knowledge, by the way. I started to pragmatically view knowledge as recursive perspectives (later expanding my concept of perspective to all types of experience). If you compare the number of perspectives to mass, you see that large masses of perspectives generate gravity (sucking smaller masses in) and inertia (they can be stirred to motion only with difficulty). Look at the behaviour of large cities or the stability of a

[563]Attributed to many, but definitely also to Maslow (1966), mostly known for his pyramid: '*I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail.*' This is no different for societal actors with a strong identity, by the way.

discipline. Thank you, Huygen from TNO's emission registration, for our discussions about the mass of knowledge in response to my nascent concept of perspective! These discussions may have been inimitable to others, but oh did they strike home.

If you are a young knowledge technologist just starting to work on experiential worlds, you may obtain some understanding of how wide, deep, and peerless specifically rooted expertise is. Acquiring, as an individual, an experiential world of at least some perspectivist size can require at least a substantial part of a human life, and elements of the experiential world of, for instance, 'an entrepreneur' may easily rest on many centuries of history of hundreds of millions of individuals. If you focus on societal practices, you need to know what you are working with, what you are pushing and pulling on!

Take Maarten Leupen of the Indoor Environment department of TNO. Back then, he was an internationally renowned Indoor Environment expert, who had built his expertise through 35 years of work. He hugely deepened my understanding of the ways people acquire and use knowledge, by discussing his expertise extensively with me as a knowledge technologist. At the start of our sessions, he was a little nervous: did he even know that much? But he was looking forward to the experiment and gave me full and unlimited insight into his considerations and reasoning. He could ride his bicycle past the front door of any house in Delft and know what the indoor environment was like in that house, which problems he might expect as a result, up to the presence of house mites and the risks for asthmatic children. To do this, he would field an impressive amount of totally disparate knowledge from many disciplines and a variety of experience-based guidelines, all instantaneous. Something he considered perfectly normal. He continually organized his experiences to benefit the problem at hand and constantly shared rules of thumb the existence of which he himself had not explicitly been aware of until then. Time after time, Maarten mentioned that his own view of matters was also developing and growing rapidly through our conversations. Our collaboration catalyzed and shaped not just *my* but also *his own* understanding. As for me, I thought it was wonderful to experience that you can, at least in outline, reconstruct, articulate, and discuss a thought process like that, and this way improve it together and transfer it. We were working reflectively on and with knowledge. He provided the content, I provided the structure, although it was of course very helpful that I had a background in chemistry and environmental hygiene. Maarten, thank you – it was impressive and big fun.

In the meantime, all the experiences I gathered were becoming more coherent. It was a coherence that transcends content and seeks structure. For this reason, others do not usually notice it. I continue to be surprised how strongly people need concrete content and find abstract structure scary. 'Practical', they call that, the largest misunderstanding ever. Whenever I hear someone plead for mostly staying practical,[564] my first thought is: he is not able to or does not want to do much. If you ask me, working the other way around is just as

[564]Note: *staying*.

good, from structure to content, for instance by applying generic models and patterns to specific situations. That is what knowledge technologists do all the time. Even better is combining content and structure in a flexible but balanced way. This is where we can find by far the most improving power, and this is what recursive perspectivism aims to do.

Around 1989, I wanted to start gathering and streamlining my insights and experiences, a motley collection by now, so I wrote a proposal to start a PhD, in addition to my work at TNO, about the coherent application of totally different experiential worlds and perspectives. Peter Engelmann, Walter van Kampen, and Anton van der Linden, department head and working group heads, considered this a little premature; how about I put first things first and complete my Knowledge Technology programmes. (Pfff, how *boring!*) In 1991, I obtained my second-phase diploma in Knowledge Technology, after which they championed my PhD plans with the desired result. (Of course, they were completely right.) I started my PhD research. In parallel, I obtained my MSc in Knowledge and Information Technology in 1993. (Being right is not the same thing as getting your way.) My thanks! Those first years at TNO felt like a warm bath to me.

Studying Chemistry in Nijmegen was the best idea I have ever had, and I can recommend it to anyone. This is how I met Hilda in 1981, after all, and we married in 1988. By now, she was leading a team of analysts at TNO's sister division aimed at food. She had been working on her PhD research in food chemistry for a while, in addition to her job, and completed it in late 1992. To this end, we collaborated in 1991 and 1992 on a study into the three-part interface between intelligent optimization, mathematical modelling, and the bioavailability of minerals and trace elements in food. It was Hilda who pointed my attention to the inverse proportionality (yes, the star concept in *The Path of Humanity*) that often occurs in bioavailability of minerals and trace elements in different compositions of food. She complained that linear multivariate statistics was no use to her in the real world, that TNO statisticians were not getting anywhere and could not find a single connection. For that reason, we derived a mathematical model based on interacting Langmuir isotherms (for the not-quite-chemists among you: these nonlinear curves are usually a good match for heterogenic equilibria) and had an expert system control the various optimization algorithms, to handle the pitfalls inherent in optimizations in multidimensional erratic nonlinear mountain landscapes. We used a combination of chromosomal crossing over optimization for a broad exploration of the landscape and simplex optimization for hill climbing (algorithms Theo Bosman and Addie Weenk had already developed earlier in LISP at TNO, under my guidance, although I do not want to exaggerate my role; my thanks, Theo and Addie). We optimized not only the numerical values of the equilibrium constants but also the *structure* of the mathematical model itself (something you can do with chromosomal crossing over). And *boom*, there were our connections. Perhaps you are familiar with optimization theory. If so, you will see the parallels with the optimizing and extrapolating (optimizing) innovation methods from the innovation cube from the book. With a locally optimizing algorithm, you reach the top of the hill you currently happen to find yourself on, and with an exploring algorithm, you can get to other areas in the search space that contain the high peaks.

Hilda and I did all of that on the side, at night and on the weekends, until we were dizzy with exhaustion. PhDs in addition to your job do not come for free – mostly, the term 'in addition to your job' is very accurate.

Observant minds will immediately have noticed that the frequency of words in James Joyce's *Ulysses* (and in any other book, see Zipf's law), the frequency of first digits in phone numbers (Benford's law), and the bioavailability of minerals and trace elements in food comply with the same laws of inverse proportionality. I myself only noticed that many years later, after Hilda bought me a popular scientific book about numbers by Alex Bellos as light holiday reading (regular holiday reads not being my thing). You, my reader, will be able to grasp this much more quickly than I could, because you have the benefit of reflection, articulation, and communication. For me, it was true what Louis Pasteur articulated so aptly: '*Chance favours the prepared mind*' (my thanks to René Kemp for this fitting quote). So many more trails from my past all meet up in the book *The Path of Humanity*. As I wrote before (in Volume I: *A Philosophy of Societal Practice*): Process = Identity.

After some discussion and shuffling, 1991 and 1992 saw the rise of a diverse triumvirate (m/f) around my intended PhD research: Professor Wim Harder, PhD, co-promotor, professor of Microbiology at Groningen University, and director of my institute at the time; Professor Bob Wielinga, PhD, promotor and professor of Human-Computer Studies at Amsterdam University at the time; and, last but not least, Professor Jacqueline Cramer, PhD, promotor and professor of Environmental Studies at Amsterdam University at the time. Wim was mostly interested as director of the institute, Bob was famous internationally for his insights into knowledge and expertise modelling (KADS: Knowledge Acquisition and Documentation Structuring) and Jacqueline was already politically active at the time, a leading figure in chain management and sustainability, something that in no way prevented her from shifting to a higher gear at a later time. The dominant multi-actor signature, my criticism of production and consumption chains, and the constructivist bass notes of my thesis are completely my doing, but rest in part on her insights. She still follows my work with interest and has written the preface to this essay. Wim and Bob have passed away by now, which only points out that I am not a young man anymore. For me, this was a dream team, supporting and coaching me from entirely different directions. My promotors are all part of that exceptional group of human beings who are worth it. I look back on our conversations with much enjoyment and appreciation. Partially posthumously but not with any less conviction: my thanks!

As a knowledge technologist and later as a product manager of multi-actor processes, I had a lot of space to make my work line up with my interests and my PhD research. I was researching the essence of society: how do the pluriform experiential worlds and perspectives of different actors come together into continuously improving societal practices? I looked into fields such as Emission Registration, Indoor Environment, estimation of the reactivity of atmospheric hydrocarbons, covenants to reduce volatile organic compounds (VOC), the design of bioreactors, qualitative optimization, strategic conferences (of construction and demolition waste and packaging waste). The result of my

PhD research was a thesis that can still be found on the Internet: *Trinity, Model-based support for Multi-actor Problem Solving* (University of Amsterdam, 1997, Henk Diepenmaat). The starting point of the thesis was realizing sustainability through structural change of societal multi-actor practices (the name 'transitions' only came in later). The thesis described a circular economy in construction and a transitional change of multi-actor practices towards sustainability – without naming the concepts of circular economy and sustainability transitions, by the way, because these names had not been coined yet. The thesis is built on an initial form or recursive perspectivism.

Disciplines, as experiential worlds shared with many of their participants, have a strong gravitational pull. And the cumulative gravity within TNO in the 90s was tremendous. For that reason, the name Societal Technology – to my sorrow – did not last long in the struggle between the powerhouses of disciplinary content. The collective potency of all these disciplines turned out to be difficult to valorize. To be honest, I still do not understand how specialists can think that the different Thor's hammers wrapped in a bow, different technical-scientific disciplines all stacked and stapled, can offer added value to society. If the different technical-scientific disciplines are to offer added societal value, a far-reaching and sophisticated embedding in and collaboration with other societal parties is required. However, the financial and programmatic boundary conditions for this only rarely line up. Societal innovation, as elaborated in this new book, is aimed at exactly this process (see the *penta helix*, multi-actor process management, the innovation cube, and the Backbone for a broader multi-actor view on societal innovation).

To my regret, the division of Societal Technology noisily crumbled into separate institutes. Colleagues in general supportive positions, directly around me and further away, were fired. Wherever I could, I helped them with self-reflection (Heidegger) and their résumés (Thor). My own situation, though, improved after each reorganization. Even so, I had had it with the reactive, punitive, and financially driven reorganizations; they damaged my colleagues, they were abhorrent to me, and they gave me a stomach ache. Was there really no better way to do this? I still ask myself this question, even though my disposition towards the managers piloting the ship back then has become milder. If there is no time and if reciprocity with the societal context as well as this societal context itself are in terrible shape, perhaps there is very little you can do as manager except execute harsh, short-term, and partially unjust reactive interventions.[565] It looks like a shipwreck with not enough lifeboats: some people will have to go overboard. But then do not pretend to be caring and professional. As a societal practice, on whatever scale at all, I can say with the wisdom I have now that it is best to try to prevent to get into the situation where you need that lifeboat. And not having enough lifeboats is never OK, not for a company, not for a region – look at my region of birth when the mines closed – not for Europe and not for our integral society. An ounce of prevention is better than a pound of forced and clumsy

[565]The image of tiny, tiny children, alone behind fences, dying of Ebola, haunts me. Try making the right decisions then.

intervention. We have to look ahead together, not be satisfied with staying afloat while people around us are drowning.

Eventually, I, too, was caught up by the gravity of discipline, so I joined content-based departments. They were wonderful departments if you consider the content fun and important, absolutely, but they were *not at all* what I was looking for. I wanted societal multi-actor breadth, not accumulated disciplinary sectarianism, no matter how beautiful those schisms of Thor fall into place societally. I obtained my thesis in 1997 on the topic that had always held my interest, multi-actor processes, but for me, it was high time to leave TNO and continue my path elsewhere.

I want to take this moment to express my appreciation and gratitude to the many colleagues, specialists, and experts of TNO I had the pleasure of working among and with. I was (and still am) in awe of your expertise. It is often difficult to apply this expertise to the benefit of societal, economic, and technological development (and government and industry do hold you to task for that). The linear knowledge model, from research to development to application, stopped sufficing a long time ago, and even a triple helix model of industry, science, and government is woefully inadequate for true *societal* innovation. These days, societal practices are much more dynamic than a linear knowledge model allows for, and every individual actor is part of a swirling multi-actor practice (see the *penta helix* to get an idea). And knowledge, even the kind inherent to the term 'knowledge economy', is simply too limited a notion; it is a *pars pro toto*, since what really matters are the experiential worlds. These include *all* relevant experiences and structures, together: sensory, cognitive, emotional, reflective, intuitive, material, technical, and what more you wish to distinguish. But what if we simply turn it around: how do countries fare if they do *not* have institutes like TNO? In a high-quality society, there is a place for organizations such as TNO, and its founding companies and governments saw that clearly after the Second World War. The huge concomitant disciplinary gravity well and the fixation on strongly cognitive notions of knowledge and academic notions of knowledge acquisition are things we just have to try to tame together.

In addition, I would like to take this opportunity to thank the people at TNO who supported me in furthering my education and in my PhD research, and who coached me informally as a young man. They were truly capable human beings with their hearts in the right place, which is invaluable. It raises the bar on your ambition forever after. This allowed me to develop myself at an accelerated pace until midway through my thirties. My experiences at TNO bubble up everywhere in *The Path of Humanity*. Sure, I was fed up with disciplinary obesity and damage control management. I also ended up having friction with the last boss I had at TNO (who partially reaped the whirlwind that was sown in me as wind a few years earlier, when my colleagues were fired). But perhaps it was also the *Zeitgeist;* I have mostly had a wonderful time there. With the wisdom of hindsight, I wish everyone a first employer like this! And as for TNO as an institute: your role is valuable, and you have my vote of support.

A start buffeted by storm

I was ready for yet another step. Hilda and I had by now moved to the edge of the forest near Zeist, and there is nothing as lovely as the smell of the forest in your house. Two highly educated young people, two great jobs, a committed couple. Together, we were storming the world that lay at our feet. Of course, we had some health issues, but our train kept rolling. We had two healthy children, Frank and Chris, adventurous boys that made us a young and happy family. It was a lot, all taken together – work, family, we were throwing energy around left and right – but what a wonderful time it was. Of course it felt heavy at times, and looking back I am amazed we managed to keep all these plates up in the air, but is that not the case for every young family? Strong and invulnerable, that is how we felt. A better basis for starting a small business is difficult to imagine. Who would possibly do anything to us, what could possibly hurt us? And why would anything ever take a turn for the worse?

That is why, in 1998 and at 36 years old, I started my one-man consultancy firm to support processes with many involved parties: Actors Procesmanagement BV. From here, the smallest possible company, I focused on promoting and improving the results of multi-actor playing fields, of companies-in-context all the way up to the largest societal multi-actor habitats (as in *The Path of Humanity*). This is how I remain loyal to the path that unfolded under me as I walked it, the insights that developed during my life.

I asked it earlier: Who would possibly do anything to our family, what could possibly hurt us? Intriguing questions that still vex me. We, human beings, calibrate our prosperity and adversity, our pain and pleasure (see J.S. Mill) against each other. This is how we keep formulating the Aristotelian norm of the golden mean, of the average, of the reasonable, out of the content of our experiences. This is also how we recognize the exceptions, in positive and negative sense, to these moments and in those episodes when life is lived most intensely.

There is something strange about that Aristotelian norm of the golden mean (Aristotle himself applied it to virtues, as can be seen in his ethics), and this strangeness has captivated me throughout my life. Life is more like a series of dice rolls than we suspect and perhaps wish. Even if things have gone right for a very long time, the chances of things going right for even longer continue to be just as large as the chances of things going wrong. But the chances of things *continuing to go right for longer and longer* become smaller and smaller. It is a magisterial paradox for anyone who looks at it for a little longer. The user of the dice seems to understand that every additional throw is free, independent of earlier throws, that this is why it is more difficult to roll a series of sixes than a random series and that that is why the mean tends towards 3.5. But in essence, dice are a giant philosophical riddle at a cosmic scale. Why does it not matter to a dice when you start counting in an existing series of throws? How can one thing be completely independent of the rest? How can previous history not matter? Perhaps you now think I do not understand dice, or that I did not pay attention in statistics class. Let me give those dice a solid philosophical kick. If a dice comes up six several times in a row, that is exceptional – we

keep expecting a different value. But what if it continues to do so, and consistently comes up six? That, too, is a possible previous history. Would we not start considering less and less that other values are also possible? What if the first time you see a dice, it keeps coming up six (an outcome that is definitely within the realm of possibility)? Would we not simply start expecting sixes? Would we not rather call this item a six-roller rather than a dice? And how would that be different from a pen that up until now has kept falling downward?

This is where we see the roots of experiential value and experiential effort, such central concepts in this book. Anticipation and confrontation play a wonderfully dynamic and multiscale game with each other, the deck is shuffled in our perspectivist consciousness, in the cask of our experiences, resulting in experiential worlds that extend from the past through the present to the future. This is why it is crucial that we, the winners, take good and painstaking care of the losers in societal development. Why it is necessary to include both old, wise folk and young people in matters of direction. Why it is essential to keep communicating through these various experiential worlds, hearing them and involving them. Why a broad, historical perspective is indispensable for societal visioning and policy. If you do not look back long enough, or broad enough, you miss crucial information. *The Path of Humanity*, encompassing the breadth of humanity from the Laetoli Footsteps (Tanzania, 3.6 million years ago) towards our common future is case in point.

But I digress. We felt strong; we, in our beautiful family, two young parents and two very young children, with the wind at our backs. We experienced and rolled sixes constantly. But we were weak and vulnerable, even if we did not know it, and the cosmos rubbed it in without mercy. It was September of 1998. Hilda had been pregnant for several months and had returned early from an international business trip. She was ill, got very ill, and finally deathly ill.

Life does not adhere to the boundaries between philosophy and practice. In the midst of the intimate emotions and hectic of that time, I took huge leaps in my philosophical understanding of what society is. Things that normally remain obscure and never even approach the surface, suddenly become crystal clear when the situation is extreme and these things become existentially important. My mind was sharp as a razor (at least that is how I felt).

I got to know the immense power of cooperation and togetherness. But I also saw the dark side, how medical specialists in a regional hospital each raised their individual Thor's hammers and ventured far outside their field of competence, often without knowing. How nurses and specialists were working past each other. They did this while lives were at stake, lives that were extremely precious to me. I took an impossible decision, together with a horribly weakened and ill Hilda (whose condition continued to plummet, far beyond what I thought possible) and a specialist who understood the reach of the hammers pounding all around us. He revealed himself as a true, complete human being. We kidnapped her, there is no other word I can use to describe it, on a Saturday morning, from a regional hospital to

an academic one, because she was only due for another examination on Monday and our trust had fallen below zero.

When we arrived at the academic hospital, it took no time at all, literally 20 minutes, for a diverse team of specialists and surgeons to gather at her bedside, right where they should be and standing in their full power, discussing her case together. What a relief, even though the situation remained grim. They asked us extensively about the course of the disease until now, and they took the reasons for her exceptional entrance seriously and even understood them. The situation was unique to them, too. They consulted further and included a different academic hospital. A new diagnosis was made, in part thanks to our information, and in consultation these experts took and enacted masterful decisions, very raw and yet very beautiful, with their backs pressed against the wall. It was make or break. Mother and child were on the verge of dying. I slept in a small room next to the academic hospital's Intensive Care Unit. All signals were red. Hilda first fought for both their lives and later for her own, first in a coma for many days and then for weeks after she woke up, and despite a slew of necessary surgeries, she escaped by the skin of her teeth. Our third baby did not make it.[566]

I watched it all and was occasionally hallucinatingly lucid. I understood how an unborn child may not have the ability to experience much of what being human is, but may already have full existence as a little human being in the minds of both his parents. I experienced how impossible it is to *share* this consciousness, this existence of an unborn life in the consciousness of his parents. This impossibility to share is something that hits you like a tonne of bricks in a situation this extreme. It cannot be solved if your wife is in a coma, on the brink of death, and *you alone* have to say goodbye to the stillborn baby you made *together*, placed in a little basket on a piece of cloth at his mother's feet. I had to say goodbye on her behalf, too. But for her, he was still alive, while for me he was dead. I cannot find the words to express the harrowing, resigned, all-encompassing unmooredness, the feeling of being torn in half, that you then experience. No man's land. The attachment, the familiarity, the coherence, the societal aptitude of the social world we know and understand did not function, it was all just gone.

This is the moment I truly realized why mind-matter dualism fails as worldview, how thinking and matter are only the edges, the limits of a perspectivist spectrum. How societal consciousness, societal practice, is built on the many layers between these extremes – from an individual born of two parents, a young family, an extended family and friends, to people elsewhere on this planet sharing expressing and sharing their commiseration. A society is much more than the sum of thinking individuals in a shared material world. Societal consciousness does not care about Newtonian time, Euclidian space, or boundaries between individuals. Ideally, there are many gradations of sharing the many different

[566] I shared part of this story before, in Part 1 of this series: *A Philosophy of Societal Practice*, in the chapter *Living on the edge of a knife*.

experiential worlds; this is what makes our society a successful multi-actor habitat and therefore a full-fledged liveable society. And as usual, a better, more beautiful societal practice is all about human beings trying their best, actually committing to each other, making the extra effort and coming together in part (sic!). If we can increase their share, compared to the brakesmen and the passengers, society will get more beautiful by itself. It is really that simple.

Hilda came to, a small miracle. Her eyes were initially hollow, empty. Her first question was about our baby. She cried for a long time. She had to try to get better, and so did we as a family, with little Chris only one year old and little Frank only three. How horribly had her world been turned upside down.

Mother Nature is unfathomably indifferent to us human beings, acting without a double agenda, out in the open, sometimes cruel but without the *intent* to be cruel. That was something we could understand and even accept. But a second blow followed, from her employer – she had become a case for HR. This second blow was also terrible, but it was different, since it was a human's doing. It was furtive, underhanded, hidden, intentional. Hilda would not be returning to work. I will never forget the look in her eyes changing – I was looking straight at her – when she realized the games that had been played to get her illness past the two-year mark, since after that it would be legal to fire her. All her enthusiasm, all her effort, all her commitment up to that moment, all completely irrelevant. The dismissal letter fell onto the mat on the first possible day, without any notice. Isn't it great when people say hi? I myself was terribly shocked, and I was only experiencing the deepest misery from the shallow end.

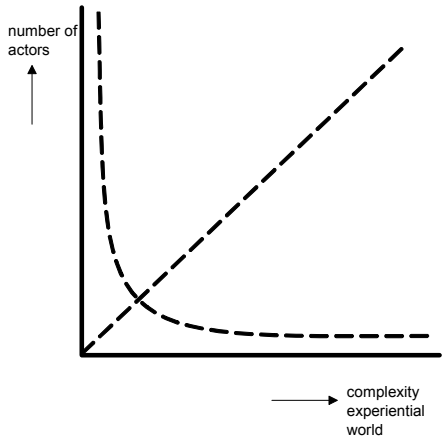
But she got up again and straightened her back. Because we might not win all the time and we are definitely not invulnerable, but we do have the capacity to be strong in crucial moments. Today, my opinion about HR's *decision* has become milder. Hilda was undeniably very ill, something that has turned out to be structural. An organization, with employees and employers, an HR department, and what happened to Hilda: that is the agreement we made in our modern time (or at least what we allow to happen), that is how we do things, individuals are collateral damage in the competitive race for the continued existence of organizations and ongoing economic health. Of course, that is not pretty, these are excesses that are part and parcel of modernity, but you do not blame a crocodile for drowning a fawn. The *way* this all happened, the deception, the double standard, the underhandedness, that still disgusts me. If you are a crocodile, at least have the balls to show it.

In the end, you can still do your best within the options you have, to be mutually committed and put in the extra work. That is what so many people, relatives and others, around us did do, in so many ways. Even distant relatives and people who did not know us that well. Some held prayer meetings, even across the globe. Thank you, your support helped us in our upward climb; it was so beautiful I am still overwhelmed.

Of her former HR department, but in essence of modern organizations in general, I ask: if you do not put in the extra work, if you do not honour individual reciprocity, what makes *you* worth our trouble? Of course I was, and still am, utterly partisan in what happened. But it still makes me shudder, even writing this down almost 20 years later. Such one-sidedness, such disinterest, such banality… yuck.

These experiences were as valuable as they were confronting. I had changed; I now understood things I thought I already understood at a deeper level than ever before. I would have been glad to miss out on these lessons, but now I had had them I had better use them, since they fit into my path wonderfully. My perspectivist view also helped me understand better how deep societal multi-actor habitats are rooted, and how stubbornly they resist if you try to change them. It is possible to reconfigure them, but it requires very specific conditions. All in all, these were purifying experiences.

Onwards as an independent consultant



Oh yes, that company I founded. It really needed some attention. The one big advantage of having a steady job, the steady salary, I did not have anymore. My initial ideas for fast growth, well, I put them all to the side, since they were no longer relevant. I knew I was at some point going to follow the threads from my thesis, threads I had first sketched in their initial form in 1989 (see the above figure from 1989 to get an idea), using all the new insights I had gained. I was dreading that a little, because I know it was going to be difficult. First, I had better generate some revenue, since living at the edge of the forest near Zeist was very pleasant.

It was 1998, far before the term 'ZZP'er' for 'self-employed person with no personnel' became popular, a negative term coined by modernists and one I do not feel much affinity with. An airplane does not have an upper jaw nor a root system, and we do not mention

that either. The Closed World Assumption[567] does have some pragmatic advantages. I thought it was prudent to find collaborators, being a one-man shop, especially considering the societal nature of my own theories. I had many conversations about realizing sustainable societal systems with people from the former ministry of VROM (Housing, Spatial Planning, and the Environment, in particular the management of Strategy and Governance), where the fourth Dutch National Environmental Policy Plan (NMP4) was being prepared under minister Jan Pronk, with the ringing title 'A World and a Will'. It was a dynamic time; the Ministry understood very well that the ancient command and control approach, compulsion through law, would not be able to solve the persistent environmental problems of the time or help society become sustainable. In this NMP4, published in 2001, it introduced transitions and system-innovative thinking to the arena of policy. Transitions are structural changes of societal practices. You can easily interpret them in terms of recursive perspectivism as changes from one societal multi-actor configuration to another (although actually getting there is a different thing altogether).

Frans Vollenbroek of VROM connected me to Harry te Riele, another self-employed person and co-author of the then-controversial report 'Transitions: Can Three People Change the World?' Personally, I do not think three people can do so, but Frans knew Harry's work and my own thesis and multi-actor work, and he knew this collaboration would be fruitful. Harry's clear, influential report gave the term 'transitions' a huge push in recognition and meaning, and my own thesis was about societal transitions *avant le mot.* Actors Procesmanagement BV received a call for a quote for an exploration of the boundary between strategy and practice, to understand the phase after the end of the controversial Sustainable Technological Development (DTO) programme and set out how a transition practice could work.

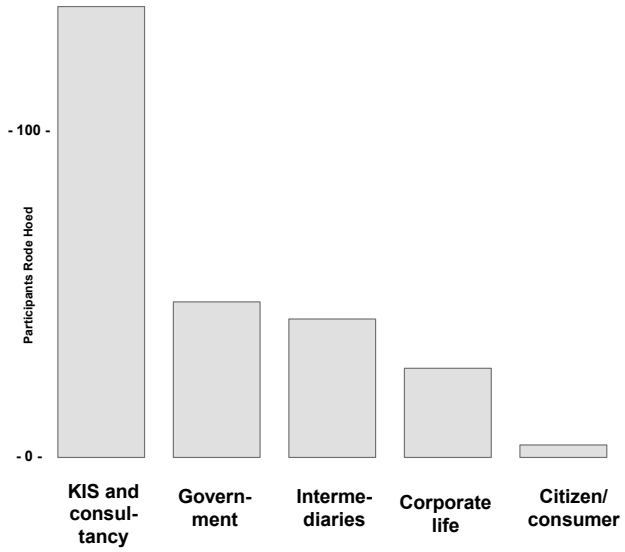
I wrote my quote together with Harry. An interdepartmental working group judged the submissions and was assigned the supervision of the project, and our duo of self-employed consultants won out over a variety of highly recognized institutes. The interests of the different ministries were often diametrically opposed, and if we had made a mess of things, they would have had some explaining to do to justify their choice. In other words, the working group had to have balls, and it did. Chapeau!

Harry and I talked to many people in central positions, avoided the institutional grey as much as we could, and held deep discussions in Harry's office in The Hague and my garden at the edge of the forest near Zeist. Hilda's friends wondered what on earth we were doing, sitting in our garden on two teak rocking chairs and sharing a bottle of Chablis (a question Hilda was unable to answer, since she, too, had been wondering). But why should consulting be boring, why should the standard approaches be sacred?

[567]Closed World Assumption: the world is closed. In particular: things that are not included in a data file or knowledge base do not apply. In general: things you did not say, you also did not mean. Perspectivistic-philosophical: things you do not experience, pragmatically speaking do not exist.

We mainly considered the sustainability activities at the time to be too marginal; both their ambition and their conditions needed a lot of improvement before a flourishing transition practice could arise. We published a report with the euphonious and biologically incorrect title 'Above the Clover Flower the Daisies: a Societal Network for Innovations Toward Sustainability' in the early summer of 2001. In this report, we posited that sustainable innovation can only take place in 'societally complete coalitions' ('the little guy' as description of the *penta helix* is from this report) and that innovation coalitions in the practice layer (the daisies) need to get solid, structural support, coverage, and facilitation from strategic boards with real power (the clover). As we phrased it back then: of course you need to respect a level playing field, but you should still have the courage to put the entire field at an angle, tilted towards societal sustainability. 'Even but predictably skewed', that is how desired and deliberately controlled transitions gain momentum. Something you need to do carefully and predictably, while caring for the losers. All of this was diametrically opposed to the way sustainable innovation was organized then: in many temporary programmes, with incomplete projects revolving around knowledge parties, advisers, and others with no skin in the game.

The title had not been plucked out of thin air, by the way. If you spar with Harry, one thing is certain: your titles will not be run-of-the-mill. I often placed the actors in a coalition in a structure around the theme (the heart; I am not an airy-fairy person, but it definitely looked a little like a flower). And the daisy was the logo of the Dutch National Environmental Policy Plans. When I presented 'Above the Clover Flower the Daisies' at the Rode Hoed debate centre in Amsterdam, I was wearing a daisy necktie loaned to me especially for the occasion by Paul de Jongh (former Deputy Director-General of the Environment at the Ministry of VROM, responsible for the Dutch National Environmental Policy Plans and later also the National Strategy for Sustainable Development, NSDO). Harry and I were not just whingeing, by the way: beforehand, we quizzed everyone present into which of the five groups of societal actors of the 'little guy' they fell and confronted the audience with the result. It was clear that our approaches were very societally *incomplete*, even though sustainability had been the talk of the town for years. Knowledge infrastructure (KIS) and consultancy dominated the hall (see figure; the presentation can be obtained from Harry or me). That was the status quo in 2001. Industry and (organized) citizen/consumers, even though they are the minimum necessary core of a society, were barely present. Makes it hard to tell us we were wrong, doesn't it?



The report 'Above the Clover, the Daisies Flower' was widely distributed and read. Renowned councils referred to it in advisory messages about NMP4, such as the Council for Public Health, Spatial Planning, and Environment (the famous 'Environment and Economy' uncoupling report) and the response by the Social and Economic Council (the SER). Shocked into paralysis, people forgot to publish it in the Environmental Strategy series. ('Above the Clover Flower the Daisies' is still only available as Actors edition.)

The report was ahead of its time: most sustainability initiatives still lack a solid clover, which is in part why most sustainability projects are still failed and isolated daisies, failing because they lack crucial leaves and isolated because they are prone to countless instances of reinventing the same wheels, often square. Attempts at sustainable innovation still mostly take place in short-term programmes and projects with clearly biased resource management that governments can easily influence (and shut down) and are driven by KIS and consultancy. A structurally tilted playing field, not aimed at rewarding technological winners but on achieving its aims (for instance through a long-term incentive for CO_2 reduction or a structural tax on CO_2 emission) is still rare. That would allow us to unleash, aim, and catalyze the tremendous innovation power of *the path of humanity*. But the tide *is* turning! The results of the Conference of the Parties in Paris (COP 2015) were unthinkable back then. Offshore wind farms do indeed improve the situation. Companies are becoming positively restless because of our slow governments, which only seem to stir in response to the media and voter favour, and are increasingly self-organizing around sustainability. Perhaps we need to write a reprise, with the wisdom of today.

It is seen as a victory that wind farms nowadays can be built without subsidies. Of course, that is a lovely thing within its tiny context. But it is also a misapprehension of how *un*sustainability arises, and of what kinds of interventions are required takes to tilt from a

less sustainable to a more sustainable society. Our society is thundering towards greater unsustainability, in part because people in a variety of positions and roles (miners of raw materials, producers, consumers (buying, using and casting off items), waste processors, governments, knowledge parties, and intermediaries) choose those options that are best for *them* (often the most profitable options). Many costs are not being internalized because the misery is passed on to others, the collective or the future (the core of unsustainability). That is the reason why all of us need to have the courage to create even but skewed playing fields, so innovation will ensure that these costs are internalized and that the passing on stops. You simply cannot leave the creation of sustainability in the short term up to the forces of the free market. Or are we, if fracking of shale gas unexpectedly becomes much cheaper, simply going to close the wind farms again?

At the time, I was also involved in other intractable sustainability issues. Together with George Brouwer, Bernhard van de Ven, and others, I focused on transition in the Rijnmond harbour and industrial complex (commissioned by the Ministry of Economic Affairs and under the auspices of ROM-Rijnmond, see the 2002 report 'Towards a Sustainable Rijnmond: Experimentation Space for Transition'.) A group of several people and I, later complemented with Jan-Paul van Soest as masterful editor, also co-wrote an integral sustainability vision about the harbour and industrial complex (called 'To C or Not To C' in its original 2003 version). Diametrically opposed to the unspoken Rotterdam rules, there was much talk and little action. The sites of the mostly global players in the Rijnmond area lacked a strong clover and there was no sign of an even but skewed playing field, so the attitude towards sustainability there was very circumspect. For that reason, there were very few daisies, something I could understand. Therefore, I held fast to the idea that pilot projects would only work if you could consistently change the conditions within which companies had to operate (hence the focus on 'experimentation space for transition'). People of Rotterdam, thank you for these experiences. They helped me gain clarity about the conditions under which transitions *would* pick up speed and how far removed we are from these conditions. Why would only companies have to run the gauntlet, all by themselves? Can we not simply stop pointing fingers at each other as *penta helix* parties? Perhaps today the agreements made at the 2015 COP in Paris can help push the playing field to the even but skewed position, resulting in the clover we so sorely need and giving a necessary boost to the fight against climate problems. It is high time, because the emission of greenhouse gases continues unabated; look up the Keeling curve on the Internet.

Much of my work was aimed at traditional sustainability, but I was not that picky. I have never held much stock in 'triple P' (People, Planet, Profit) lists. I also focused on process management in and around primary education and enjoyed addressing the hiccups around large infrastructural projects. One time, I even dipped a toe into the hornet's nest around a large European nuclear reactor. In my opinion, any time you are trying to understand the interrelationships of different experiential worlds and are opening experiential worlds up to each other, you are working on sustainable development.

I put myself forward as strategic adviser around consumer communication and sustainability while the aforementioned Chris Bruijnes became the director of Milieu Centraal and developed it from the simple consumer telephone helpdesk of environmental protection agency Milieudefensie into a professional national multi-channel consumer education agency for sustainability. Milieu Centraal is still fighting the good fight, as one of the first parties in the Netherlands offering tailored consumer advice on a large scale. This activity is supported by expert systems, although there are few people who know the direct link between Milieu Centraal and the unplugged power cord in Nijmegen.

In 2002, I also started the SlimLicht! (smart light) foundation with Chris Bruijnes and Peter van Luttervelt. Our motto: if people cannot even screw in an energy-saving lightbulb, screw their talk about sustainability. We replaced a tremendous number of light bulbs with energy-saving ones through schools, churches, sports associations, municipality governments, and so on. (LEDs were not in the picture yet.) We did more than just the regular song and dance of education and communication: we actually *sold* the lightbulbs, buying them directly from companies like Philips and selling them to individuals, usually around five bulbs per family. At one point, we even depleted the national lightbulb supply lines because we offloaded 60,000 at once. For a second, it looked like I would have to tap into my pension funds to pay the Philips bill (there are some downsides to success). In 2006, our final tally was 200,000 lightbulbs actually screwed into lamp sockets, with our employees working their tails off. In 2007, Greenpeace showed off flimsy consumer promises to screw in 1,000,000 light bulbs. A number padded, by the way, with the 200,000 we had already taken care of. We did not mind, it was something that helped the cause. But I have grown sceptical about sustainability initiatives without a clear strategic framework (clover) and transparent arrangements and transactional components (daisies). Later on, Chris and I also tackled making the Dutch housing stock more sustainable (under the label *Meer Met Minder* – More with Less). We knew this would be difficult, and this tackle actually slammed us to the floor. There was still no clover, so there were hardly any daisies. Regularly, Chris and I put our shoulders to tough challenges, often successful and sometimes not, and we were even the cause of a television show at one point. Personally, I think we have not shown all we have to offer; there is still room for a timpani finale.

I learned that parties, in the face of doubt and disinterest, choose self-interest time and time again. This holds for governments, businesses, and consumers, and even intermediaries and universities are not exempt. From their individual points of view, of course, that is not strange at all – it is inherent in *having* interests, and a smart thing to do. That is why the challenge is marrying self-interest with others' interests. You do that by communally showing the wisdom of tilting the playing field, and by being professional in multi-actor process management for societal innovation. Because every actor has the capacity to see improvement and the desire to make it a reality. If things are stuck, the required committed parties will perceive that there is no improvement possible. And that is what you need to work on: either that perception is wrong (sometimes, although sustainability missionaries beat that drum to the point of annoyance) or it is correct (more often than people think), or a mixture of both. In the first case, persuasion might help. In

the latter two cases, it is necessary to change the societal contexts and develop new societal multi-actor arrangements so it is in the interest of the participating parties to commit themselves. In short, you have to do societal innovation (of which persuasion is only a relatively minor part). Multi-actor process management, the innovation cube, and the Backbone (see book) are frameworks to accomplish this.

One foot in academia

There were still some loose threads to my PhD thesis (euphemistically spoken). To address those, I felt I had to seek out a more academic context. From 2005 to 2010, I took the position of programme manager and senior researcher at DRIFT, the Dutch Research Institute for Transitions, part of the Erasmus University in Rotterdam. The institute had just been founded by pioneer Jan Rotmans (another early writer about transitions). Marjan Minnesma was appointed financial director soon after. Jan was recovering from a severe bicycle accident, but he did not think that should hold back the establishment of a sorely needed institute. DRIFT was instrumental in elaborating and popularizing the concepts of transitions and transition management. Its current director, Derk Loorbach, was also working on his PhD thesis back then (on transition management), and currently leads the place with enthusiasm. Marjan would later do controversial work as Director of Urgenda with the internationally renowned Urgenda court case against the Dutch national government. Which, according to Urgenda, was not taking its duty of care towards its citizens seriously when it came to climate problems, something the judge agreed with. She won this high-profile case, a daring feat that to be honest, did not surprise me in the least. I also bumped into Harry te Riele again at DRIFT, as well as Jord Neuteboom (see below) and René Kemp, now working at Maastricht University, with whom I had many more wonderful conversations, this time about this new book.

DRIFT was not drifting along, it was *driven*. It had two inspired captains (Jan and Marjan), whose friction brought shine, and a ferocious crew of smart, motivated people who could not (not did not *want* to but were not *able* to) choose between science and activism. It was a wonderful, bouncy, and exhilarating ride, especially for people like me with just one foot in the boat. I remember tall ships, overnight stays in yurts (Kyrgyz tents), and long nights around large bonfires on desert islands. I was 'master of wine', since people suspected me of being able to deliver quality. For one, I was more liberal than average (not that difficult at DRIFT, but everyone knows liberals drink a better class of wine), and for two, some people thought I hailed from a mysterious, penumbral barbecue scene that thrived in the forests near Zeist and was replete with white wine. Anything I recommended must be good.

I have been very happy to contribute my efforts to DRIFT, also as pioneer and programme manager of the 'pizza programme'. In this programme, we (researchers, consultants, and PhD students) helped six extensive innovation programmes as best as we could to plot and hold a course towards sustainability. It was not easy; in keeping with Dutch tradition, these innovation programmes lacked all serious amounts of clover when it came to sustainability. The projects were around civil engineering (Delft Cluster), mobility (TranSuMo), water management (Leven Met Water), building and construction (PSI Bouw), agri-food

(TransForum), and geo-informatics, each with high-profile projects such as the Spitsmijden peak traffic avoidance project.

But of course, I had joined academia to be able to take the next step in my thesis and beyond. Joining the DRIFT way of thinking was not the best way to go about it, since multi-actor thinking was not all that central then (something that changed at a later stage, perhaps in part because of me). DRIFT-Erasmus University Rotterdam (mostly Jan Rotmans and Marjan Minnema) was one of the drivers, together with the University of Amsterdam (John Grin) and Eindhoven University of Technology (Johan Schot), of the Knowledge Network System Innovations and Transitions (KSI), a large network of researchers at various universities and a few free-rein practitioners (among whom Harry, Jord, and me). The KSI research programme ran from 2005 to 2010. In one of the KSI research projects, with people like former colleague and early transition thinker Rob Weterings, I found a modicum of space to at least start the sequel to my thesis: expressing my still-developing insights, part sparkling and partly derived from the sad and shocking private experiences I just recounted, in a book. I thought: with so much to say, I might as well turn it into a series. I envisioned not only a philosophy volume (Volume I, what do we experience as true?) but also an ethics volume (Volume II, what do we experience as good?), a pragmatism volume (Volume III, how is it even possible to improve?), and a workbook for practitioners (Volume IV, how then do you go about improvement in a multi-actor habitat?). The result was the series Society in Perspective.

Volume I, *A Philosophy of Societal Practice*, was published in Dutch in 2009 (Parthenon Publishing); an English translation is in preparation. I mostly wrote it at night and during weekends, well exceeding the limits of what is reasonable in terms of effort and health, because I could simply not ignore the task I had set myself. Rob Weterings, thank you – it was not easy to think through the details of the philosophy of perspectivism in the after hours of more-than-overflowing work days, but the crucial support from our project made it possible for me to do it anyway.

Volume IV, *Multi-actor Process Management in Theory and Practice*, the book for practitioners, was published in Dutch in 2011 (also by Parthenon); an English translation is in preparation. It was sponsored by the TranSuMo and TransForum innovations programmes, and an earlier preamble was sponsored by the interdepartmental program Education for Sustainable Development. Since then, I have handed out the Volume IV workbook more than 1000 times at workshops, training sessions, and lectures about multi-actor process management, and in schools: at the advanced management programme at Nyenrode Business University, at executive and in-company education, to particular strategic groups, and to 'regular' students (studying anything from MBAs to sustainability, in places like Nyenrode and Maastricht University).

The Path of Humanity now sits in front of you as Volume V, rightfully bearing the series name Society in Perspective. For volumes II (Ethics) and III (Pragmatics) I still need to find time and sponsors, so if you happen to know anyone…

I left DRIFT in 2009 and 2010, a slow process of drifting away. I had to continue with what was starting to become my life's work: the Society in Perspective series, with my thesis as its first instalment. People of KSI and DRIFT, and all with whom I have collaborated in those years in the widest possible variety of coalitions: thank you for an effervescent and inspiring time. Even though I had already started thinking about system innovations and transitions, although they were not called that back then, these years have given my ideas about recursive perspectivism and *the path of humanity* a decisive push. In the meantime, I had gained so much experience with and confidence in multi-actor thinking and working that I could apply it in literally any complex societal situation. After all, a societal practice is only a number of actors in cooperation (or not, I usually hurry to add). That is exactly why the multi-actor perspective perfectly fits the desire and necessity to improve our societal practices even further towards a sustainable future, towards the future plurimodern phase of Team World. I am handing more and more of this over to others.

Around 2009 I ran into Anke van Hal again, an old acquaintance, who had meanwhile become Professor of Sustainable Construction at Nyenrode Business University and Delft University of Technology. Among other things, she tirelessly champions the interests of companies and housing customers in the construction sector. Her 'Fusion of Interest' and my multi-actor process management showed a promising similarity. For that reason, I joined her group at Nyenrode Business University for a few years, serving as Associate Professor of Multi-actor Process Management.

Nyenrode is a very formal university, where students wear smart suits and high heels daily. This is counterbalanced by a beautiful old building. I taught my lectures on oak floors many centimetres thick and many centuries old. Highly rated education, transparent improvement processes, a glorious environment: something other universities would do well to emulate.

Together with Anke and Joost van Ettekoven, I wrote the book *Mastering Three, a Threefold Method Towards a Vital Building Practice* (Nyenrode, 2012). The book and the far-reaching construction study it was based on were sponsored by Royal BAM construction group. Our progress was followed with interest and intense discussions by Rob van Wingerden (BAM CEO and Executive Board member) and Tom van Beek (former BAM director of Corporate Social Responsibility). We acknowledged three complementary approaches to sustainability, totally different in character, and described the challenge of applying all three where needed and in balance (hence *Mastering Three*: you need to master all three methods coherently). Mastering all three is not an easy task: the three innovation methods require a variety of skill sets and organizational cultures. To me, *Mastering Three* was a logical next step after my thesis, since innovation is the process of moving searchingly in a perspectivist space, but it was nevertheless wonderful to be able to take this step together with some very competent people from the construction sector. Structure needs content (and the other way around). Anke, Joost, Rob, Tom, and many others from academia and practice: thank you, we made some real progress together!

For an outsider, all the domains, focus areas, and groups of people involved may seem like an incoherent mess. In fact, there are many more I am not even mentioning in this *curriculum vitae*, since my company was going full steam ahead (sorry, people whom I cannot mention here). To me, however, they were all multi-actor habitats. I attacked these very different underlying problems[568] from the – to me – very coherent multi-actor concepts and saw many connections and generalizations. With the wisdom of hindsight, I can see these were all building blocks and experimental plots for the through-lines in the essay *The Path of Humanity*. After all, the world is a laboratory.

Anke asked me whether I would enjoy co-authoring an academic paper about *Mastering Three*. Funding was a bit of a problem (since it was, after all, a university). In the end, the accent would have to be on the dynamic balance between different innovation methods, since that balancing act was an intriguing aspect of *Mastering Three*. We would also have to add substantiation (management literature is chock-full of intuitive balance metaphors that lack any solid basis). Anke was right in seeing all of that. That balance was something I had somewhat avoided writing about in *Mastering Three*. It was very intuitive and recognizable, and people consistently responded strongly and positively to it. I had caught glimpses of it as early as 1989 (see diagonal in earlier illustration). But to me, with my physical sciences background, an unsubstantiated balance was nothing more than pseudo-scientific hocus-pocus. (In the back of my head, I can hear quantum physicist Wolfgang Pauli remark '*This is not right, it is not even wrong!*') Anyway, this is where I once again ran into the loose threads of my thesis I still had to address (since thinking about societability is never done).

I knew it would be difficult to fathom and substantiate the societal balance, but I also knew that understanding this balance would unlock a *substantiated path* towards societal improvement, something I considered worth my while. Anke did not know she was actually asking me to write *this* book, the one in front of you right now: *The Path of Humanity*. I was sincerely dreading it, since I knew that thinking this through and writing it down would tax me to the limits of my competence, and it remained to be seen whether *I myself* would be able to keep my balance during such a challenge, since my position as independent adviser was already precarious.

I had been drawn to academia (Erasmus University/DRIFT and Nyenrode Business University) because I thought an academic environment would help me follow the indicators in my thesis and further mature my thinking around recursive perspectives. In part it did, since it is still possible to find an intellectual climate in academia (even though it is no longer a given there either), and without the many contacts with scientists I would not have been able to elaborate on and formulate many of the ideas in this book.

[568] Why are human beings so driven by problems? Societal innovation offers just as many options for opportunity-driven approaches, and better options, too! We have to reconcile the exploring, optimizing part of innovation with the optimizing part that likes to stay within the lines.

But I also, paradoxically, found out that universities these days hardly allow one to think and write freely and unimpededly. Perhaps that had always been the case with new topics. Recursive perspectivism stands on the thoughts and writings of many others. It is built upon a frankly eclectic collection of experiences, consisting in part of philosophical and academic experiences and in part of sparkling and poignant life and practical experiences. And I do consider recursive perspectivism – as unifying and structural foundation of integral experiencing – a truly novel step forward, even though it also continues ancient lines of thought such as the *harmonia mundi* that go all the way back to Pythagoras. Of course, I am not comparing myself to great individuals such as Pythagoras, Galileo, Kepler, Spinoza, Boltzmann, Hume, Kant, Darwin, Planck, Einstein, and Bohr, but they, too, have had to fight for their new space to think, with little direct support and often bitter opposition from the establishment of the time. If you want to think up 'something new', it is better if you stay close to what people already expect: it is not even a paradox, it is a plain contradiction that often functions like a choke coil and, even in science, contributes to a certain populism and lock-in. You better search for that looked-for successful innovation in the light of the street lamp, because it illuminates a road that people already know and that funding organizations can judge.

In addition, universities want you to follow prescribed methods and academic rules. Of course, there is nothing wrong with that, as long as wisdom continues to reign supreme. Even with all these rules, many scientific disciplines have output that is difficult to reproduce, something that is diametrically opposed to academic principles. In addition, people in research groups often do a lot of citing back and forth, while the worldwide citation index of scientific publications often leaves something to be desired. As discipline or field of study as societal sector, there is nothing wrong with acknowledging your heroes, but that is what professional awards are for. The condition of 'publish or perish' obviously does not bring out the best in science. In other areas of our society, scientific articles are cited even less. You can probably tell that I am not so sure about the academic publication regime.

We cannot close our eyes to the fact that it may take decades before academic knowledge trickles down and finds a place. For that reason, there will always be an important role for disciplinary and fundamental science. But my own view of science includes its position as a dynamic and catalyzing part of the integral societal game of improvement, especially at more complex scales. And it is exactly there that science is dropping balls left and right, having turned its fragmented back to our integral society. Actually, a strictly disciplinary and traditional scientific method does not fit exploratory societal improvement by leaps and bounds. Rather, it is eclecticism[569] that is an especially powerful approach: it mirrors how a society forms, using what fits it. Scientists do not like eclecticism, it tends to be a slur

[569]Eclecticism is the fully pragmatic approach to selecting sources: everything that might help you realize your goal can be used. It is opposed to a disciplinary approach: carefully staying within the accepted framework of your discipline, or at most looking for specific overlap with another discipline.

in academia. But as long as there is *methodological* coherence, I find eclecticism valuable and beautiful, without the presumptuousness, myopia, and lack of doubt that characterize the bastions of discipline, which allows eclecticism to explore and connect. I note with pleasure that my work has strongly eclectic aspects, but also hope that others, too, will see its strong methodological coherence.

Perhaps I am being too critical, giving you the impression that I have no use for science. The opposite is true, so let me remove that misconception once and for all. I recognize and appreciate the tremendous value of academic traditions and the phenomenal power of conscious experimentation and the reproducible search for falsifiable new knowledge. This is not merely an obligatory remark, but straight from the heart. Centuries ago, Adam Smith already articulated the added value of science beautifully: *'Science is the great antidote to the poison of enthusiasm and superstition.'* But I believe that our science, too, like many other societal practices, is in need of a leap towards plurimodernity. I sometimes find it difficult to understand why intelligent people like scientists allow themselves to be constricted by a modern scientific system, a corset bursting at the seams. They should know better.

I am telling you loud and clear that, *without* the help of plurimodernizing science, we will probably only take the next step towards the beautiful societal arrangement of Team World through abject misery. That is how it has always gone. This is why I am always called towards part-time positions within universities, and why I enjoy working hard towards their goals and changing future. Because *the path of humanity* is one you should preferably walk together, exploring and testing, conscious and reflective.

But I digress again. All in all, I did not much feel for writing a traditional scientific article about *Mastering Three*, all the more because we already had a lovely booklet in two languages (it was Book of the Week at Milieufocus in 2013). In addition, the task I saw before me – understanding the societal balance to help improve our societies – did not suit the traditional academic approach and the time frame and space of an article. I thought back to my elementary school time, when I was mostly following my own curriculum. Perhaps it was time to do that once more, using the full scope of what my time at DRIFT and Nyenrode had taught me. Because I had made many great connections there and had had good discussions and experiences. I have a bit of a love-hate relationship with academia as an institute, like with all modern institutes, but at the bottom line I have the warmest possible feelings for what academia could and should mean for society, and I know that it is where you find very special people.

For that reason, people of DRIFT, KSI, and Nyenrode, although I will never be a stereotypical scientist, I enjoy working on science part of my time, and I thank you for a time that was as educational as it was fascinating!

Dragging the ghosts into the spotlight

I noticed I was ready for the step towards what was going to become *The Path of Humanity*. I said farewell to Nyenrode and did the first run-ups to start writing the book you are now

holding. A book that would be difficult to categorize. Societal balance would be a key concept. This balance would be substantiated by recursive perspective. And it would have to elucidate how societal development works and what the sense and nonsense of cooperation is, so we can better understand societal innovation and steer our societal development. Nothing less.

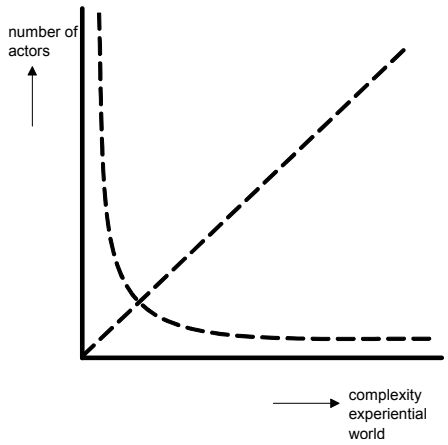
The only place I could have any hope of making that happen was not at a university but in my own little garden office in Zeist, with the arch gates open and the scent of the forest in my nose, with a wide variety of music playing and occasionally blasting from my unsurpassed old speakers, and with a reflective Bernese Mountain Dog at my feet, looking up at me encouragingly whenever progress was difficult. (Polle has had to take this latter job from Sam by now, but most Bernese possess a natural talent for abstract reflection, see also elsewhere in this book.)

But I still had no idea how to go about it exactly; I knew it would be my strongest cognitive challenge so far, with a very uncertain outcome. And my one-man company had to keep going as well. Would I be able to do it all? Was it even smart to try?

Societal competence has a lot to do with coherence and cooperation. It seems that coherence and cooperation must be worthwhile. For a lot of people, this is an intuitive assumption. The accent here is more on cooperation than on coherence. Cooperation, more cooperation, and even more cooperation, that is the mantra for thinking about societal development in the 21st century. We teach it to our children and believe in it ourselves. It is not really something you can be against.

Still, it has always given me an ambiguous feeling. Something rankles, a lot. The call for ever more cooperation also sounds like noble wishful thinking that is at severe cross purposes with societal practice. A societal practice that is bursting with conflict and competition. All too often, it is simply advantageous to mostly think of yourself. And if you win in a conflict or competition, does that not often result in a little something extra? In addition, everybody knows very well that having *too many* parties on board is disastrous for value creation and progress. Keep adding parties and general paralysis or a cacophony will be the result. Both usually lead to the same net effect: solid decline. These opposite notions are at least as intuitive as the notion that more cooperation is needed. Populists use them to their advantage, but cooperation adepts never even mention them (adepts filter and model experiences towards preconceived visions). How do you deal with that? Should you actively exclude or even blacklist actors? Is that why we send refugees from the Middle East and Africa back whenever we possibly can, while victims of a fire in the city are lovingly taken in? Why we, in the Netherlands, economically demonize Greeks while we economically cherish Germans? Because they are already on board? Blind faith in ever more cooperation seems to me, for all the reasons mentioned above, difficult to substantiate empirically, since it quickly perishes in combat with recalcitrant societal practice.

Is occasional cooperation, 'to a certain extent', the solution? This is where the societal balance is found, at this optimum, this mysterious watershed between too little and too much coherence and cooperation. Clearly, a societal practice in development seeks the balancing point that fits it (something you would be justified to call, echoing Adam Smith, an 'invisible hand', even though it is extremely undesirable to allow it to remain invisible). A societal practice in balance is coherent. But which point of coherence is right for which societal practice? How do you make this societal balance visible? How can you work with it? These were the questions that haunted me. At night, I was tormented with visions of societal improvement landscapes, with deep gaps and high and low peaks – I recognized my optimization work with Hilda.



I had a few handholds. I had recursive perspectivism, and the actor space concept that rested on it (my thesis). I had already seen glimpses of t*he path of humanity* in a primitive two-dimensional actor space in the late eighties (see the diagonal in the figure from 1989, repeated here). Furthermore, I anticipated a role for prime numbers in the explanation for the leaps and capriciousness in societal development, a leading role that you can only first see when you move from content thinking (substance thinking) to combined content-and-structure thinking of recursive perspectivism, as unifying philosophical foundation for everything human beings can experience.

It seemed (see illustration) that – when the number of perspectives stays the same, see the inverse proportionality in the figure – points on or near the diagonal in the actor space are preferred over points far from the diagonal (and near the axes). The diagonal works as a balance axis. In three dimensions, it holds: pluriformity, similarity, and unity seek each other out: picture it like imaginary three-faced dice – the more you roll them, the more the ratio between the throws equalizes. And this is how you end up with more or less diagonal positions. The empirical suggestions that something like this happens in societal arrangements as well, on average, are truly staggering, at least if you learn to look at societability in terms of perspectivist experiential worlds. If you send school children on survival camp, they will not all independently employ identical methods to survive. Neither

will they each execute one unique part of a very specific and inviolable united approach.[570] No; they will organize in smaller groups to build shelter, to find food, to dig and build latrines, for socializing, and so on. They will organize in such a way that they will, on average, be closer to the diagonal balance. This is a self-organizing societal principle.

This is how content and structure of perspectives play an impressive game with each other, and a certain balanced cooperation seems to be preferred. So how does this work? Is there a certain structural path up along that diagonal in actor space? Why on earth would that be the case? And what does that path look like? And if cooperation has that many advantages, why do we not all run off like hares in the direction of increased cooperation, picking its sweet fruits along the way? Why is it that we continuously find so much competition and conflict and misery in our societies, on every conceivable scale? Why does our development follow such a bumpy road, and why do societies suffer such deep setbacks every now and then?

Societal development paths may seem to be going up, in the long term and seen through our eyelashes, but they progress chaotically, friably, jerkily, falling and then rising in leaps (occasionally) and leaplets (often); just look at *the path of humanity* or the development of share prices, which rest on similar perspectivist principles. And, to make a bridge to the theory of evolution, the usual (although unlikely) suspect for an explanation of patterns like this: we *never* see intermediate species between elephants and giraffes (giraphants or elaffes). The world, society, is not something we experience as continuous. Rather, it is discrete, organized in uneven steps of categories and species, and it moves in jolts. And that is why consciousnesses love repeating patterns at all scales.

This is where prime numbers come in. Perspectivist experiencing is based on prime numbers. When I worked on my thesis, I found out that the perspectivist notion of society opens up an entirely new quantum-theoretical view that directly explains these jerky changes and patterns. With a fixed number of perspectives, only specific perspectivist product configurations are possible – other arrangements simply do not exist. (Initially I thought this was an intriguing but strange thought; I felt retroactively related to Planck.) A perspectivist consciousness simply has to deal with that. If you think about it a little longer, the effect of prime numbers on possible perspectivist configurations has truly stupendous structural implications for what and how we can experience and develop. I kept mum about it back then, since these thoughts were too revolutionary and controversial, and blurry to boot – they were more like feverish fragments of thought than clear concepts. Furthermore, there was a hard-nosed empiricist among the opponents at my thesis defence, someone who did not want to hear anything about knowledge theory and who was already offended enough by my thesis alone. These new thoughts would have been altogether too much for him. I let the scientific choke coil do its job for a little while – science itself is simply a

[570] See Monty Python, Life of Brian: '*You're all unique, you're all different*'. Monty Python here illustrates the societal balance.

societal practice, of course, and my thoughts were only half-baked. But I knew my time would come, one day I would crack this extremely tough nut, or at least start the process.

Simply looking at the actor structure (qua perspectivist structure) only a limited number of perspectivist configurations are available if there are a certain number of perspectives. This causes leaps and jolts, instilling structural patterns and structural paths in our experience that have the tendency to get filled and followed. This is, in essence, a quantum-theoretical phenomenon. I understood that right away, since I had had a solid chemistry education in Nijmegen. You can only formulate, understand, and see the quantum-theoretical perspectivist patterns once you start looking at the societal multi-actor habitat (or experiences in general) from a recursive perspectivist point of view. This was exactly what my thesis had opened the door to. But what is going on with those prime numbers and what is the deal with those patterns?

Boy, these were some ghosts I had dragged up! My head was spinning even faster. I weighed these questions, measured their heat, and found them leaden and glowing hot. I put them away yet another time. I looked at a bowl of oranges on the kitchen table – empirically, you expect a bell curve if you weigh them one by one. But I thought I was seeing the start of an *explanation* as to why their weight would follow a bell curve – a normal or Gaussian distribution (even though in my imagination the bell curve was discrete and binomial in nature). I now know that the omnipresence of bell curves and inverse proportionalities (in practice often approached with logarithmic connections) follows from the quantum-theoretical effects of a recursive perspectivist consciousness, but back then everything was just rattling around in my brain. Pfff, so many thoughts, how is it even possible to share them with others? And why could I not simply let these questions rest? I had a company to run!

I would have liked nothing better than to set these questions aside, even though they intrigued me beyond measure. But I was not simply asking myself these questions out of a strictly philosophical or theoretical or mathematical interest, even though they were definitely philosophical, theoretical, and mathematical in nature. From the very first, my interest in these questions was heavily supported by my continuing commitment to sustainability and sustainable development, to societal improvement. I am far from an alarmist, I am much too stoic for that and too much convinced of what people are capable of doing when necessity or opportunity knocks. But I do think that we as human beings severely underestimate the prevalence, the treacherousness and the unpredictability of societal shocks. It is something that Nassim Nicholas Taleb writes about in his books, for instance, and recursive perspectivism offers a quantum-theoretical substantiation of it. (The tail ends of a discrete inverse proportionality of a huge number of perspectives know only few blocks, but they *do* exist!) Economic crises like we know them these days have, historically speaking, only been ripples. Would the 1945 Trümmerfrauen have been able to imagine what was coming? The people who died in the firestorms of the Rotterdam bombardments on 14 May 1940, would they have had an inkling on 9 May? Not to mention Hiroshima and Nagasaki? We would do well to acknowledge this and align our societal

arrangement and development with this fact. Although the chances something like this will occur are extremely low, that is not even remotely the same as it being impossible.

The name 'sustainability issues' is, if you ask me, the label we use in this late-modern era for a growing societal imbalance that, if *we* do not take adequate action, *will* be corrected with a jolt. In all likelihood, this will not be a gentle process. And knowing what that adequate action is and how we can execute it is not something that we, as a species, show any skill worth mentioning in. The things we, as human beings, have been able to demonstrate in the field of sustainable development are not all that impressive to me (euphemistically speaking). Anything we do is usually reactive, putting plasters on wounds and holding down the societal fort. If there is a hole in the ozone layer to be mended, you call out those parties that cause it: they are small and without much of a vote, so an urgent and fairly manageable job like that has a good chance of being successful. But true societal sustainability issues, like climate problems or global disadvantage policy, or our linear treatment of our biosphere by depletion of resources, consumption and dispersion of waste (plastic soup and micro-pollution), those are different stories. Problems like those are so intertwined with our integral societal arrangements, with our actor structures.

When I was very young, I pleaded with my father and mother until they gave me a bowl of goldfish for my birthday. I was finally given permission, if I looked after them well and by myself. *Yes, of course I would!* I can still see the bowl slowly turn green, until my mother – metaphorically – grabbed me by the scruff of my neck. The things we are doing with our own goldfish bowl, our earth, are really not OK. My mother passed away a long time ago and would not have been able to grab humanity by the scruff of its neck anyway. Neither do I expect Gaia, the Greek goddess of the earth, to reach out and grab humanity by the scruff of its neck to keep our earth habitable. That task belongs to us all.

And that is still reactive, problem-driven. I am not even mentioning the proactive improvements for which Section III of this book, Societal Innovation, offers guidelines. Recursive perspectivism and its mountainous landscape sheds a first light on a truly enormous societal improvement potential, showing high peaks in our future. To reach them, all we have to do is join hands and find coherence.

I saw rolling dice. I saw quantum leaps. I saw the road to improvement become clearer. I increasingly started to understand the relevance of recursive perspectivism for societal development. I started to understand that *the path of humanity* has followed a preferential path in actor space throughout history. That John Lackland signed the Magna Carta in England, replacing royal supremacy with something more inclusive of clergy and nobility, many call a unique constitutional step. But its structure was written in the perspectivist stars. John was simply following *the path of humanity*, and if not for him there would have been another in a slightly different time and place. Of course we deviate, of course we lose balance (sometimes a little and sometimes a lot), but something will always turn the tide once again, and we will continue to seek out the preferred patterns, just like the dice do. I was starting to see the key to targeted societal development more and more clearly.

As rigid as experiential worlds can seem when looked at in the moment, as fluid they are in the long term. And their searchlights can occasionally shine right past each other (if they are even on). This even happens when it is unnecessary and undesirable. We can simply continue to bring our experiential worlds into more coherence and cooperation, as long as we want to try, as long as we want to make the effort. I could not get these thoughts out of my head. There was no way I would *not* have written this book. Down with the choke coil!

My motivation, then, is both theoretical *and* practical, something TNO had seen well and at an early stage in 1987. Through a number of contacts and steps I developed (roughly from the realizations as formulated above) the concept of societal balance based on the foundation of recursive perspectivism into the book *The Path of Humanity*.

I took my first step with Jan Klinkenberg, someone I knew as director of TranSuMo (TRANsition towards a SUstainable MObility, an innovation programme aimed at mobility and transport). I first tried to explain the balance between the three innovation approaches of *Mastering Three* without using the concept of perspective. That did not work; I concluded that, if you want to grasp the core of societal balance, you have to go into perspectivist depths. That was one battle lost. But what a wisdom I gained through this warmup exercise! Jan, thank you for this small yet crucial piece of aid. Our societal models for transport and conveyance did become clear on our first try and received a place of honour in this book.

For a second step, Jord Neuteboom and Arin van Zee were with me. They work as transition specialists in healthcare and other economic sectors (their company is called Viatore: foot traveller). I knew Jord through DRIFT, where he was my public transport coach for a while. I have very little tolerance for public transport, and unfortunately, his help was of no avail. Most of our often-deep conversations about societal improvement took place in the sumptuously leather-upholstered seats of beautiful old cars. In our discussions, we reached the conclusion that a combination of multi-actor process management and an elaborate societal innovation theory should be part of the basic toolkit of anyone involved in transitions and the improvement of societal practices. Jord once asked me whether I would be willing to teach a short series of practice-oriented workshops to process managers of a large health insurance firm, VGZ. I said yes, providing me with a hoop to jump through, a reason to jump through it and a deadline. That is a very powerful combination. At breakneck pace – I could feel the sparks fly – I expanded Mastering Three to the three axes and six innovation methods it should have had on perspectivist grounds. This resulted in the innovation cube, included in this book. Together with Jord and Arin, I immediately applied it to the healthcare practice, adding multi-actor process management (something I was an old hand at). I taught these masterclasses to groups of process managers at VGZ and other institutes; they were my unwitting test subjects as I exposed them to brand-new concepts. Their enthusiasm was palpable. Jord and Arin of Viatore, Leonie Voragen (Strategic Innovation Manager at VGZ), and Peer Gruijters (former team manager of Business Project Management at VGZ), thank you for this wonderful collaboration. It was a

crucial developmental step, from my thesis through *Mastering Three* to the innovation cube, straight into practice. Healthcare can benefit so much from societal innovation.

A third step I took together with Johann Kaemingk. In the Zeist circles, Hilda and I had met Johann and his wife Annemarie around the year 2000. One of their daughters was in the same nursery school class as my eldest son, and they continued to come up through the ranks together. With some others, we formed a lovely dinner club of friends that still enjoys pushing culinary limits in memorable ways. Before you get the wrong idea: the culinary limits we liked pushing were those of the members themselves by taking turns cooking, usually competently and occasionally exceptionally well. The dinner club itself also deserves a word of thanks, for their friendship and wonderful conversations: thank you!

Johann and I share a strong interest in the ins and outs and the changeability of complex societal practices. In the short time between entree and dessert, we managed to discuss everything in the world and even a little more. Of course, I shared my thoughts and ideas with him. Johann added his vision of society to the mix, broad, deep, and in part financial. Since about five years ago, we started seeking each other out regularly. We would have heated discussions around the themes of *The Path of Humanity* and many other topics. Johann's view on global developments is often refreshingly different and deeply considered. Multi-actor thinking, my specialty, is second nature to him. His sharp observations and broad knowledge of what is going on in the transactional world have left clear marks on this book. It is interesting to have noncommittal discussions about sustainability, but it is only when you take positions, formulate them and enter into contracts (whether formal or informal, social or economic), that the cooperative and coherent nature of humanity shows. That is something I was already convinced of, but Johann added some large explanation points that have found their way into this book in a variety of ways (see the transactional layer of the Backbone, among other things). Thank you!

This is how I found the energy and space to develop and write *The Path of Humanity*, the step that had already lain dormant in my thesis. I think it is a wonderful thing that, in addition to research programmes, in recent years it has mostly been large companies like BAM (construction) and VGZ (health insurance) and the many other companies that I have provided executive training to and that are involved in innovation programmes that have allowed the development of this philosophical and practical vision of societal innovation to take place.

It was also time to take another step in my cooperation with academia. In these past years, I discussed the development of this book multiple times with René Kemp, professor at ICIS, the International Centre for Integrated assessment and Sustainable development at Maastricht University, for which my thanks. There, too, I taught multi-actor process management. It is exactly on this interface between societal problems and opportunities on the one hand and societal innovation on the other hand that we will have to take many steps these coming years, and if it is up to me, these steps will lead us directly to a more

sustainable world. This is what ICIS studies, and I think that my collaboration with ICIS in my role of Professorial Fellow will lead to a lot of fertile cross-pollination. I am looking forward to our continued collaboration.

In the meantime, I thought, talked to people, and wrote, all while running my company. On and on, for many years. I was driven by exciting thoughts, which then took a lot of energy and time to consider fully and state clearly. My commitment to and cooperation with concrete societal and commercial improvement processes continues undiminished. For instance, climate problems and the Dutch innovation policy. Members of these activities and others involved: my thanks!

Attentive readers will have noticed that my preface was originally written in December 2015, and I have not changed a word since. It is now 2017. I had to tie up some loose ends to this book (you cannot accuse the Riemann hypothesis of being simple) and some private circumstances needed my attention. The result is this new book, now finished. It will be reissued by Freek van der Steen of Parthenon Publishing House in Almere, a publisher with a heart for good books. Freek, thank you once more for your support! Writing is so much better when you know something wonderful will come of it.

I am, once more, looking ahead. I do not know what the future will bring. To those who have followed my work with interest over the years, I promise you have not seen the last of me yet. I will continue to maintain and renew the many threads I have woven with people. And I will enter into new relations as well. But among all this uncertainty, one thing is certain. We will all follow *the path of humanity* together, consciously or unconsciously (and with large ups and downs). And doing it consciously is much better.

Epilogue

And now I am sitting here, in my office at the edge of the forest near Zeist. Volume V of the series Society in Perspective is in front of me. The full title of Volume V is:

> *The Path of Humanity:*
> *Societal Innovation for the World of Tomorrow.*

There are many people I have worked with on the development of societal practices, spoken about it with, thought about it with, and written about it with. And still, I am leaving so many experiences and people out of this curriculum vitae. This book has arisen from the smallest possible business and has become a description, a perspectivist explanation of and a compass for our greatest human activity. The book describes *the path of humanity* in a historical context, uncovering it and explaining it in terms of recursive perspective. Providing the path with a first pragmatic methodological repertoire for societal innovation, to allow us to follow it more consciously into the future. This book is also a clarion call that I hope will find resonance: a call to come together not only reactively (problem driven) but also pro-actively (opportunity seeking) to mine our truly enormous societal opportunities even further.

This little office in my garden turned out to be the right choice: it is a place where I can go at irregular hours – from early in the morning until deep into the night – to think and work, without annoying (almost) anyone with my music, and where I could always rely on the unconditional support of my Bernese friends, first Sam and now Polle. It has been a wild ride, these past years. And I would not recommend it to anyone. Hilda gave me her full support, but also looked at it all with worry and mixed feelings. She knew that writing this book was something existential for me, but there were so many other things these past years that wanted and needed more attention than they got. Hilda, thank you, you make life beautiful in so many ways.

Einstein is said to have said that *'the secret to creativity is knowing how to hide your sources'*. This is most likely apocryphal,[571] but that does not diminish the extraordinary meaning of this quote, since it is an incontrovertible truth. With this curriculum vitae, I have shown you my own sources, in part. This book is a very logical outcome of my life's path up until now, as you can now understand in its outline.[572] The conclusion is: it took a lifetime to write this book.

It was good to write down this curriculum vitae up to the present day. I could feel the coal scuttle scrape through the coals once more and I re-lived the scent of the Brunssum coal furnaces in winter. I felt the Hedelfinger cherries in Bingelrade pop between my teeth once more. I saw Hilda for the first time once more, in Het Haantje and Diogenes in Nijmegen. I saw my sons Frank and Chris grow up in Zeist once more, into the young adults they are now. But it was not just pleasant. I also felt the responsibility once more of the decision to kidnap a mother and our unborn on the brink of death from a regional to an academic hospital, because we did not trust what was happening. I was consciously incompetent, and the pressure was terrible. And then the wrenching, to us human beings incomprehensible social emptiness I became aware of in the Intensive Care Unit, sitting next to our stillborn baby, placed at his mother's feet on a piece of cloth in a little tub while she was fighting for her life. This made me understand so much better how intimately connected and intertwined experiential worlds and life paths are, how this is what shapes us and leads to societability and eventually to our shared world, both tangible and experiential. These experiences were purifying, and no academic studies can even come close to the insights I gained then.

The music is floating from my little speakers while I write this; I can almost reach out and touch the violins and voices. Pergolesi, 'Stabat Mater', something that fits the completion of a book and of writing my curriculum vitae so far. But I can switch to other genres with ease. I am an eclectic with methodological bass notes, and I cannot be otherwise. No cages for me, whether disciplinary or social or otherwise; I collect and construct my experiential world together with many others and I feel good doing it.

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[571] C.E.M. Joad wrote in 1923 *'The height of originality is skill in concealing origins.'*

[572] To predict an identity, you have to know the process. The other way around, you can deduce a process from an identity. Part I of Society in Perspective describes this as the law of Process = Identity.

As I am writing this, Polle is giving me a long look full of wisdom and reflection. He, too, thinks the book is done (or perhaps he is just hungry). I hear Hilda in the garden. Frank has taken my convertible car out for a few days. Chris rides by on his bicycle, going to his holiday job working with the elderly in a nursing home (and when Frank comes back, Chris is taking the convertible). It is beautiful here, at the edge of the forest near Zeist. The trees are rustling and I hear a lawnmower. Happiness is found in everyday things.

There is so much that can go wrong in a lifetime. The world was capricious and sometimes cruel to our family. But it could have been so much worse, and we have mostly had wonderful experiences together. In general, I consider myself a lucky man. After all, there are many things we have a hand in going well, by paying attention to each other, by listening to each other, by being mindful of reciprocity, by going the extra mile for each other. By putting in the effort to shape a beautiful family. Thank you, Hilda; thank you, Frank; thank you, Chris. Life is good with you, not because everything is always a success but because we always try to make it a success, and that is why things often do succeed. What more should I say. It is a summary of this book in miniature. I do not quite know where *I* end and *we* begin. These boundaries will continue to shift and change the more you, Frank and Chris, will find your own paths. But since I still carry a warm family in a flourishing mining village deep within me, I hope the same will be true for you.

For us, as a species, this is also true: there is *so much more* we have a hand in going *so much better* – again, not a tautology – by simply paying more attention to each other, by setting aside our myopia and being a little more interested in each other. The improvement potential cannot help but come to the surface, and we will make it happen. For we are improvers; that is the human condition. We are inveterate improvers. And there is so much potential for improvement in our society, a potential that I aimed to lay bare through this book and that we can bring about together. It takes humanity to build society. This is the truth of this late-modern age, and from this idea, I wrote this book. We are on this path together, inevitably. If we can follow *the path of humanity* more consciously, if we keep finding the balance together, that will help make our societal practices better. That is what I saw at an early stage, that is what I considered deeply and elaborated on with the help of many others, and that is what I am trying to convey through this book. It is my stone in the river of society, to change its course and improve it. I know that many others are already moving in this direction, from their own insights and intuitions. Let us continue our journey with more attention for each other and help our society become even more beautiful. Because there is a lot of potential there, and we have the capacity. *The path of humanity* will show us the way.

Henk Diepenmaat
July 2017

A word of thanks
I would like to thank the team of translators who in close collaboration meticulously translated and edited the entire book: Piper Hollier, Anne Hodgkinson, Joy Phillips, Maartje Gorte, Michael Blommaert, and especially Jan Jaap Knobbout for editing the final version. In addition, I would like to thank Freek van der Steen of Parthenon Publishing House, who once again took care of a very professional publishing track.

Henk Diepenmaat
August 2018

Appendix

(Prime)factorisations, improvement potentials, and symmetry

F = number of factors according to asymmetric formula

C = number of factors corrected for symmetries

Δ = F – C, in the case of an A (asymmetric), there are no symmetries in the prime factors, and this difference is 0

N	prime factors	improvement-potential	F	C	•	factors
1	(1)	1	1	1	A	(1)
2	(2)	1.5	2	2	A	(1 2)
3	(3)	1.833	2	2	A	(1 3)
4	(2 2)	2.25	4	3	1	(1 2 4)
5	(5)	2.283	2	2	A	(1 5)
6	(2 3)	2.75	4	4	A	(1 2 3 6)
7	(7)	2.592	2	2	A	(1 7)
8	(2 2 2)	3.375	8	4	4	(1 2 4 8)
9	(3 3)	3.361	4	3	1	(1 3 9)
10	(2 5)	3.425	4	4	A	(1 2 5 10)
11	(11)	3.019	2	2	A	(1 11)
12	(2 2 3)	4.125	8	6	2	(1 2 3 4 6 12)
13	(13)	3.180	2	2	A	(1 13)
14	(2 7)	3.889	4	4	A	(1 2 7 14)
15	(3 5)	4.186	4	4	A	(1 3 5 15)
16	(2 2 2 2)	5.062	16	5	11	(1 2 4 8 16)
17	(17)	3.439	2	2	A	(1 17)
18	(2 3 3)	5.041	8	6	2	(1 2 3 6 9 18)
19	(19)	3.547	2	2	A	(1 19)
20	(2 2 5)	5.137	8	6	2	(1 2 4 5 10 20)
21	(3 7)	4.753	4	4	A	(1 3 7 21)
22	(2 11)	4.529	4	4	A	(1 2 11 22)
23	(23)	3.734	2	2	A	(1 23)
24	(2 2 2 3)	6.187	16	8	8	(1 2 3 4 6 8 12 24)
25	(5 5)	5.213	4	3	1	(1 5 25)
26	(2 13)	4.770	4	4	A	(1 2 13 26)
27	(3 3 3)	6.162	8	4	4	(1 3 9 27)
28	(2 2 7)	5.833	8	6	2	(1 2 4 7 14 28)
29	(29)	3.961	2	2	A	(1 29)
30	(2 3 5)	6.279	8	8	A	(1 2 3 5 6 10 15 30)
31	(31)	4.027	2	2	A	(1 31)
32	(2 2 2 2 2)	7.593	32	6	26	(1 2 4 8 16 32)
33	(3 11)	5.536	4	4	A	(1 3 11 33)
34	(2 17)	5.159	4	4	A	(1 2 17 34)
35	(5 7)	5.920	4	4	A	(1 5 7 35)
36	(2 2 3 3)	7.562	16	9	7	(1 2 3 4 6 9 12 18 36)
37	(37)	4.201	2	2	A	(1 37)
38	(2 19)	5.321	4	4	A	(1 2 19 38)
39	(3 13)	5.830	4	4	A	(1 3 13 39)
40	(2 2 2 5)	7.706	16	8	8	(1 2 4 5 8 10 20 40)
41	(41)	4.302	2	2	A	(1 41)
42	(2 3 7)	7.130	8	8	A	(1 2 3 6 7 14 21 42)
43	(43)	4.349	2	2	A	(1 43)
44	(2 2 11)	6.794	8	6	2	(1 2 4 11 22 44)
45	(3 3 5)	7.674	8	6	2	(1 3 5 9 15 45)
46	(2 23)	5.601	4	4	A	(1 2 23 46)
47	(47)	4.437	2	2	A	(1 47)
48	(2 2 2 2 3)	9.281	32	10	22	(1 2 3 4 6 8 12 16 24 48)
49	(7 7)	6.722	4	3	1	(1 7 49)
50	(2 5 5)	7.820	8	6	2	(1 2 5 10 25 50)
51	(3 17)	6.305	4	4	A	(1 3 17 51)
52	(2 2 13)	7.155	8	6	2	(1 2 4 13 26 52)
53	(53)	4.556	2	2	A	(1 53)
54	(2 3 3 3)	9.243	16	8	8	(1 2 3 6 9 18 27 54)
55	(5 11)	6.895	4	4	A	(1 5 11 55)
56	(2 2 2 7)	8.750	16	8	8	(1 2 4 7 8 14 28 56)
57	(3 19)	6.504	4	4	A	(1 3 19 57)
58	(2 29)	5.942	4	4	A	(1 2 29 58)
59	(59)	4.663	2	2	A	(1 59)
60	(2 2 3 5)	9.418	16	12	4	(1 2 3 4 5 6 10 12 15 20 30 60)
61	(61)	4.696	2	2	A	(1 61)
62	(2 31)	6.040	4	4	A	(1 2 31 62)
63	(3 3 7)	8.714	8	6	2	(1 3 7 9 21 63)
64	(2 2 2 2 2 2)	11.39	64	7	57	(1 2 4 8 16 32 64)
65	(5 13)	7.261	4	4	A	(1 5 13 65)
66	(2 3 11)	8.304	8	8	A	(1 2 3 6 11 22 33 66)

67	(67)	4.789	2	2	A	(1 67)
68	(2 2 17)	7.738	8	6	2	(1 2 4 17 34 68)
69	(3 23)	6.846	4	4	A	(1 3 23 69)
70	(2 5 7)	8.880	8	8	A	(1 2 5 7 10 14 35 70)
71	(71)	4.846	2	2	A	(1 71)
72	(2 2 2 3 3)	11.34	32	12	20	(1 2 3 4 6 8 9 12 18 24 36 72)
73	(73)	4.874	2	2	A	(1 73)
74	(2 37)	6.302	4	4	A	(1 2 37 74)
75	(3 5 5)	9.558	8	6	2	(1 3 5 15 25 75)
76	(2 2 19)	7.982	8	6	2	(1 2 4 19 38 76)
77	(7 11)	7.830	4	4	A	(1 7 11 77)
78	(2 3 13)	8.745	8	8	A	(1 2 3 6 13 26 39 78)
79	(79)	4.952	2	2	A	(1 79)
80	(2 2 2 2 5)	11.55	32	10	22	(1 2 4 5 8 10 16 20 40 80)
81	(3 3 3 3)	11.29	16	5	11	(1 3 9 27 81)
82	(2 41)	6.454	4	4	A	(1 2 41 82)
83	(83)	5.002	2	2	A	(1 83)
84	(2 2 3 7)	10.69	16	12	4	(1 2 3 4 6 7 12 14 21 28 42 84)
85	(5 17)	7.853	4	4	A	(1 5 17 85)
86	(2 43)	6.524	4	4	A	(1 2 43 86)
87	(3 29)	7.263	4	4	A	(1 3 29 87)
88	(2 2 2 11)	10.19	16	8	8	(1 2 4 8 11 22 44 88)
89	(89)	5.071	2	2	A	(1 89)
90	(2 3 3 5)	11.51	16	12	4	(1 2 3 5 6 9 10 15 18 30 45 90)
91	(7 13)	8.245	4	4	A	(1 7 13 91)
92	(2 2 23)	8.402	8	6	2	(1 2 4 23 46 92)
93	(3 31)	7.383	4	4	A	(1 3 31 93)
94	(2 47)	6.656	4	4	A	(1 2 47 94)
95	(5 19)	8.100	4	4	A	(1 5 19 95)
96	(2 2 2 2 2 3)	13.92	64	12	52	(1 2 3 4 6 8 12 16 24 32 48 96)
97	(97)	5.157	2	2	A	(1 97)
98	(2 7 7)	10.08	8	6	2	(1 2 7 14 49 98)
99	(3 3 11)	10.15	8	6	2	(1 3 9 11 33 99)
100	(2 2 5 5)	11.73	16	9	7	(1 2 4 5 10 20 25 50 100)
101	(101)	5.197	2	2	A	(1 101)
102	(2 3 17)	9.458	8	8	A	(1 2 3 6 17 34 51 102)
103	(103)	5.216	2	2	A	(1 103)
104	(2 2 2 13)	10.73	16	8	8	(1 2 4 8 13 26 52 104)
105	(3 5 7)	10.85	8	8	A	(1 3 5 7 15 21 35 105)
106	(2 53)	6.835	4	4	A	(1 2 53 106)
107	(107)	5.254	2	2	A	(1 107)
108	(2 2 3 3 3)	13.86	32	12	20	(1 2 3 4 6 9 12 18 27 36 54 108)
109	(109)	5.273	2	2	A	(1 109)
110	(2 5 11)	10.34	8	8	A	(1 2 5 10 11 22 55 110)
111	(3 37)	7.702	4	4	A	(1 3 37 111)
112	(2 2 2 2 7)	13.12	32	10	22	(1 2 4 7 8 14 16 28 56 112)
113	(113)	5.309	2	2	A	(1 113)
114	(2 3 19)	9.756	8	8	A	(1 2 3 6 19 38 57 114)
115	(5 23)	8.526	4	4	A	(1 5 23 115)
116	(2 2 29)	8.913	8	6	2	(1 2 4 29 58 116)
117	(3 3 13)	10.68	8	6	2	(1 3 9 13 39 117)
118	(2 59)	6.994	4	4	A	(1 2 59 118)
119	(7 17)	8.918	4	4	A	(1 7 17 119)
120	(2 2 2 3 5)	14.12	32	16	16	(1 2 3 4 5 6 8 10 12 15 20 24 30 40 60 120)
121	(11 11)	9.119	4	3	1	(1 11 121)
122	(2 61)	7.044	4	4	A	(1 2 61 122)
123	(3 41)	7.888	4	4	A	(1 3 41 123)
124	(2 2 31)	9.061	8	6	2	(1 2 4 31 62 124)
125	(5 5 5)	11.90	8	4	4	(1 5 25 125)
126	(2 3 3 7)	13.07	16	12	4	(1 2 3 6 7 9 14 18 21 42 63 126)
127	(127)	5.425	2	2	A	(1 127)
128	(2 2 2 2 2 2 2)	17.08	128	8	120	(1 2 4 8 16 32 64 128)
129	(3 43)	7.974	4	4	A	(1 3 43 129)
130	(2 5 13)	10.89	8	8	A	(1 2 5 10 13 26 65 130)
131	(131)	5.456	2	2	A	(1 131)
132	(2 2 3 11)	12.45	16	12	4	(1 2 3 4 6 11 12 22 33 44 66 132)
133	(7 19)	9.198	4	4	A	(1 7 19 133)
134	(2 67)	7.184	4	4	A	(1 2 67 134)
135	(3 3 3 5)	14.06	16	8	8	(1 3 5 9 15 27 45 135)
136	(2 2 2 17)	11.60	16	8	8	(1 2 4 8 17 34 68 136)
137	(137)	5.500	2	2	A	(1 137)
138	(2 3 23)	10.26	8	8	A	(1 2 3 6 23 46 69 138)
139	(139)	5.515	2	2	A	(1 139)
140	(2 2 5 7)	13.32	16	12	4	(1 2 4 5 7 10 14 20 28 35 70 140)
141	(3 47)	8.136	4	4	A	(1 3 47 141)
142	(2 71)	7.270	4	4	A	(1 2 71 142)
143	(11 13)	9.603	4	4	A	(1 11 13 143)
144	(2 2 2 2 3 3)	17.01	64	15	49	(1 2 3 4 6 8 9 12 16 18 24 36 48 72 144)

Index

A

a broad dialogue 55
a posteriori 380, 714
a priori 62, 112, 124, 127, 294, 299, 321, 572, 577, 661, 709, 816, 920, 930
absolute lie 522
absolute objectivity
  as a limiting case 289
absolute subjectivity
  as a limiting case 289
acceleration mechanisms
  mutual dependence 139
accountability for this book 43
accuracy of the determination 658
Acemoglu, Daron 402, 517
Achilles and the tortoise 521
Achilles and the turtle 660
Achilles heel 379
Achlum 855
actor
  and entity 349
  and identity 349
  and improvement perspective 78
  as a host of an experiential world 298
  as a host of improvement perspective .. 77
  as an agent of improvement perspective 77
  collective actor 109
  composite actor 82
  composite actor 425
  definition of 74
  description 108
  emergent 80
  emerging and vanishing 81
  how to change 354
  hybrid of objectivity and subjectivity ... 74
  in the course of time 351
  intentional actor 80
  learning actor 523
  multi-actor 425
  radical actor 937, 938
  the situated actor 352
  two worlds, two domains 74
  what can you ask of him? 357
actor configurations
  enumerable amount for h 442
  optimal 505
  possible, and prime numbers 444
  ultimate 442
actor space 442
actors
  as a pragmatic pivot point 908
  as seekers of balance 370
  value and effort 450
actor-specific logics 421
adaptive mechanism 120
adaptive order 54
Advanced Management Programme 67
agnostic 35

agricultural and livestock-rearing
communities 219
AI (artificial intelligence)..... 991
Ajax.....452
Algan, Yann.....170
alpha thinking 53
altruism
and egoism 166
altruism trap..... 171, 191
altruistic..... 164
ambition of this book..... 375
analogies
between society and dice.....523
analytical continuation.....705
anarchist 54
anarchistic 53
anchor number.....773, 776
introduction of.....772
anchor points..... 63, 467
Andeweg, Karin 267
Andrew Odlyzko 773
anecdotal.....53
annihilation 120
produces identity (balance).....725
annihilation effect
of heads and tails 725
annihilation in physics 725, 768
and Einstein energy = mass 768
Annihilation in physics, parallel to
perspectivism 725
annihilative averaging 768
annihilaton effect
with dice 725
anthropology 109, 385
antibiotic.....64
anticipate and confront.....311
anticipation 370
anticipation and confrontation 336
antidualism..... 61
anti-intellectual.....99
anti-intellectual attitude 99
anti-intellectual tendencies..... 91
antinomies (Kant) 156
antitheoretical.....99
antitheoretical attitude 99
apes 385
approximation formula
Euler, harmonic series 824
arch-conservatives 89
Arendt, Hannah 506
Ariely, Dan 188, 445
invisibility bad for morality 200
societal norms..... 432
Aristoteles.....662
Aristotle 94, 165, 289, 922
arithmetic angle..... 653
Armitage, David
The History Manifesto 90
arrangement
description 970
arrangements.....959, 964
and canvas..... 963
and intentional logic 962
societal.....962
Arrangements management..... 963
Arrow, Kenneth 171
artificial intelligence..... 991
artificial intelligence (AI) 991
assertive improvement spiral 191, 967
assumption of purposefulness.....508
asymmetry
full.....828
ultimate 828
asymptotes.....135, 145
asymptotic 768
atheist 35
Atkins, P.W. 563
attachment points.....442
but not really 442
attention for each other pays off 68

Augustine of Hippo 31
autarkic phase 107
Avogadro's number 182
avoiding misery
and seizing opportunities 75
awakening 72
Axelrod, Robert
The Evolution of Cooperation 387
axis of rotational symmetry 512

B

Babel, tower of 131
baby 320, 321, 329, 564
comes into the world 321
baby and bathwater 858
backbone 882
bad is better than none 966
description 951, 952
important concept 952
introduction 115
prerequisite for success 966
required for progress 966
show 946, 966
summarized discussion 965
takes layers seriously 951
why it is a good idea 952
backbone climate 956
backbone for climate
central nerve cord 965
backcasting 905
Bailey 782
balance 48, 109, 166
and expectation hypothesis 558
and maximum entropy 522
and repetition 558
and three societal foundations 139
and tritropy 439
as a weapon 365
between rationality and irrationality ... 68
delivers the most improving power 133
flexible and adaptive 371
object and subject 72
perspectivist balance 110
restoring 365
seeking and finding 439
specific definition 561
splitting hairs about 446
tension and consciousness 72
unity of 71
balance axis 145
diagonal object–subject 73
object and subject 73
balance hypothesis 558
balance interpretation
of sustainable development 898
balance metaphors
lacking solid basis 1014
balance model 171
chemical 559
information theory 559
of societal quality 175
or Societal Balance Model 175
societal 559, 967
balance principles 110
balance shifting
consequences 445
balance systems 818
balance, restoring
at higher and lower levels 505
balancing point
between objectivity and subjectivity 72
tritropic 441
Balmer series 842
basketball players 450
Beauvoir, Simone de 51
behavioural norms
see norms 433

being practical
as a stopgap 98
bell curve 525
Bell Labs 879
benchmarks 868
Benford datasets, examples 591
Benford, Frank 125
Benford's law . 105, 111, 112, 121, 125, 443, 568, 569, 570, 571, 572, 591, 613, 714, 848, 998
and inverse proportionality 592
and inverse proportionality 606
discrete explanation 608
explanation 819
finds its origin in 592
introduction 125
simulations 601
Benford's law, pseudo-derivation 595
Bergson, Henri 922
Bergsonian
derived from Bergson, Henri 922
Berlin Wall 889
Bernoulli experiment 717, 724, 770
Bernoulli, Jacob 5, 559, 686, 724
Bertolini, Luca 265
best of two worlds
many primes, low symmetry 690
beta disciplines 63
beta thinking 53
better behaved
Mertens than Bernoulli 729
Beukers, Frits 740
bicycle tyre 906
big O notation 718
Big Science 419
Big Science colleges, University of
Amsterdam 216
binomial coefficients 683
binomial curve
and Gaussian curve 653
not a real Gaussian curve 653
binomial Gaussian curve 745
biological-evolutionary 875
black body 142
blockages
the largest in ourselves 68
board of nails 680
Bohr, Niels 315, 510, 513, 836, 864
Boltzmann
hypothesis of 558
intense criticism of 563
perfume 692
Boltzmann principle
diametrically reversing 692
Boltzmann, Ludwig 179, 181, 510, 541, 546, 563, 585, 648, 708
and perfume 179
Boltzmann's hypothesis 175
Boltzmann's principle 513
boomerang 448
Boomsma, Suzanne 265
boomtowns, example
and provincial towns 587
Bornum, P.W. 338
Borwein 782
Bos, Stef 499
Bose 805
Bose–Einstein condensates 805
bottom-up 953
bounded rationality 418, 421
Not bounded at all 421
Boven het klaver 354
box, inside the 918
box, outside the 918
Brahe, Tycho 289
brain research 80, 311
brains 80
and object–subject tension 80
Brentano, Franz 293, 315
bricklayer 142
broad dialogue 55

broad view of things 68
Brouwer, Luitzen 845
Bruegel, Pieter the Elder 131
  tower of Babel 131
Bruijnes, Chris 918
Brundtland Report 894
Brundtland, Gro Harlem 894
Brüntrup, Godehard 304
burden of proof
  for recursive perspectivism 568
bus driver 119
business universities 67
  concerns about 67

C

Caesar, Julius 362
Cahuc, Pierre 170
calculated guess 513
camel 116
campfire 857
canvas 962, 970
  and arrangements 963
  description 970
  societal 961
canvases 964
  societal 962
capacity optimization
  in detail 940
Capacity optimization 912
capuchin monkeys 385
card counters 528
cards, drawing of 654
carousel 960
carousel metaphor 960
Cartesian coordinate system 442, 503
Cartesian dualism 315
Castells, Manuel 377
casuistic 53
category 1, 2, 3 numbers 735
causal relationship
  between coherence and quality 237
causality
  as perspectivist repetition 310
  or correlation 170
  time and space 310
causality hypothesis 170
cause and effect 336
cave, Plato 287
central limit theorem 604, 652, 657
  illustration with Galton's board 681
CEO of the oil company 356
chain configurations
  socially undesirable 430
  when acceptable 430
chains
  when appropriate 428
  disadvantages of 427
  and chain configurations 430
  and imbalance 858
  as a danger to society 891
Challenger (space shuttle) 366
chance 141
Chance favours the prepared mind 998
change and situation 332
Checkland, Peter 284
chicken coop 81
child
  missing in the woods 866
child care 229
children
  and counting 713
  and numbers 713
  and sharing fairly 386
  not selfish 386
children's ball pit 527
  creating order through play? 649
chimpanzees 385
chocolate experiment 345

Christensen, Clayton
The Innovator's Dilemma 939
Churchill, Winston 34, 306
circular economy 231
circular reasoning 932
object and subject 61
circular society 231, 232
circularity as a spiral 231
citizen/consumer 853
is poorly organized 856
lost hold 856
citizen/consumer/voter 857
city-states 221
Clancey, William J. 342
Clausewitz, von
On War 413
clay feet 946
clay-footed giant 855
Cleopatra 362
and her barely unique nose 364
Cleopatra's nose 364
climate problems 115, 875
climatological drought 505
Mayans 505
clovers 852
Club of Rome 888
codified mediocrity 867
coefficients
not necessary for balance 446
coffee growers 66
coffee list 116, 902
coffee traders 66
cognitive bias 64
cognitive biases 63, 76
minimalizing object–subject tension ... 63
cognitive consonance
as determinant of our society 371
cognitive dissonance 64
cognitive dissonance theory 59, 75, 78
two routes 59
cognitive psychology 510
cognitive threshold 383, 483, 908
coherence and cooperation . 39, 396, 415, 507
coin 177
tossing and entropy 178
coin tosses
alternative interpretation of sequences 724
one series two interpretations 769
collective action 343
collective action, dilemma of 453
collective actor 109
collision course 979
combination strategies in innovation 914
commenda 222
commodity price cycles 154, 434
common sense 287, 377
communism 376, 444, 446, 662
communist regimes 506
comparative psychologist 385
competition 39, 434
in moderation 393
competition spiral 400
competitive processes 166
complete sextuple innovation strategy .. 920
complex arithmetic 705
complex numbers 705
composite actor 425
composite perspectives
and effort 452
and value 451
concept of numbers
and children 713
concepts as perspective 327
concern for each other 166
condensation
whip of Indiana Jones 815
condensation process 805
configurational entropy 176
configurations 444, 512

extreme team configurations 408
possible and impossible 143
conflict 39
conflict and competition 234
confront and anticipate 311
confrontation 369, 370
consciousness
as experiencing perspectives 310
as object–subject tension 57, 59
as team spirit, spectral 313
common, shared 82
directed attention 59
fringes of 369
learning 523
one-dimensional 472
seeks value 360
societal 50
value makes it intentional 360
conservatism 99, 141
ineffective in the long term 141
conservative 35, 54, 123
rational is too conservative 73
conservative pseudosolution 99
to societal dissonance 98
consonance mechanisms 371
constant k-interval 678
continuity illusion 525, 556, 597, 608, 610
continuous field interpretation 131
contour integral 449
Contraria sunt complementa 315
convergence of structure and content ... 651, 678
convert
category 3 into 1 774
cooperation
entropic preference 184
not a miracle cure 1017
cooperation spiral 400
cooperative foundation 855
Copenhagen interpretation 815
Copernican reversal 302, 312, 319
from mind–body to recursive perspectivism 302
in three steps 315
of this book 308
Copernican somersault 128
Copernicus, Nicolaus .. 128, 226, 301, 305, 315
correlation
or causality 170
correlations 168
correspondence hypotheses 451
perspective–effort 451
perspective–value 451
value–effort 451
cosmic disaster 978
cosmos
whims of 141
costs of failing 429
Coulomb's law 569
Council for the Environment and Infrastructure 852
Cramer, Jacqueline 7, 9, 94
crazy and brilliant
the thin line 65
creaky stairs
problem or not 75
creation of value 75
creationist 35
creative destruction 391
creditworthiness 167
crisis is not a method! 358
critical strip 705
Cro-Magnon 218, 394, 395, 396, 431
Cropper, William 181
crucial question
reversing the 818
Cruijff, Johan 405
Cuban Missile Crisis 399, 436
cube symmetry 700

cubes....505
cubic symmetry....498, 500, 910
cucumber....385
cultural phenomena
  obstinacy of....467
cultures
  of value orientations....934
cultures, innovation cultures
  mixing demands care....934
cycles and waves
  and recursive perspectivism....928
cynic....123
cynics....402

D

dairy factory....430
daisies....852
dancing figure (little guy)....852
dancing procession of Echternach....928
daredevil....591
Darwin, Charles....5, 359, 360
das Ding an sich....128, 305, 364
Datooga....218, 396, 431, 434
Dawkins, Richard....5, 35, 391, 393
  The Blind Watchmaker....35
debate....*See* political debate
  criticism of....238
  limitations....857
defensive reflexes....873
degeneration in perspective....513
delocalization....514, 653
  of particles....741
dematerialization....682
democracy
  constructively weak....857
  correctively strong....858
  in perspective....516
democratic destruction....858
Denjoy
  not enough for a proof....770
Denjoy criteria....768
Denjoy, Arnaud
  interpretation
    Riemann hypothesis....767
  interpretation Riemann hypothesis....717, 719, 731, 770
Derbyshire, John....703
derivaten....222
Descartes, René....309, 315, 316
  res cogitans....134
  res extensa....134
deterioration perspectives....451, 561
deterministic....129
developmental psychologist....713
Dewey, John....61
diagonal
  balance axis object–subject....73
  why does it show up....929
diagonal points are neutral....471
dialogue....89
diamond
  sparkling of....405
dice....111, 210
  and knowing....529
  and purity....526
  as philosophical riddle....1001
  comparison with development....210
  giving it a philosophical kick....1001
  perspectivist....978
  random or non-random?....521
  reversed....930
  simulations with....210
Diepenmaat, Chris....493
Diepenmaat, Frank....263
Diepenmaat, Hilda....6
differences
  between Bernoulli and Mertens . 726, 770
diffusion

and statistical thermodynamics 926
diffusion of innovation
in the perspectivist domain 925
Dijkstra, Edsger W. 427
dilemma of collective action 453
dimension
switching of 508
diminishing returns 148, 469
law of 148
diminishing returns, law of 929
Ding an sich, das 503
Dinge an sich 503
Dirichlet, (Johann) Peter G.L. 758
disciplinary boundaries
advantages and disadvantages 976
disciplinary specialist 54
discrete inverse proportionalities
as basis for patterns 569
discrete inverse proportionality 495
discrete inversely proportional
proportional relationship 572
disenchantment, Max Weber 379
disruptive developments 939
Dixit, Avinash K. 391
doctor's office
and doctor 74
dominos 55
donkey sanctuary 931
double hypothesis
statistical 930
double peak 678
double standard 97
double strategies
double innovation strategies 913
double symmetry 692
dove 399
Dresher, Melvin 387
dual track
content and structure 37
dual world view
becomes problematic 319
dualism
hunter–gatherers 291
poor fit to late modernity 312
poorer fit to Team World 312
dualisms
limitations of 89
dualist wave–particle character of light .741
dualists 61
inveterate 58
dualities in perspective 336
Duns Scotus 293, 931
haecceitas 94, 931
Durkheim, Émile 47
anomie 47
mechanical and organic 47
Dutch Research Institute for Transitions
.....922

E

e
average effort 452
average effort per perspective 454
Eadem mutata resurgo 686
earth revolves around the sun 58
Ebola and plague 236
eclectic 53, 87
eclecticism
and methodology 1015
as opposed to disciplinary 1015
description 1015
is a force 1015
is a strength 53
economic patterns
are explained in the context of
perspectivism 928
economic sectors, explorations of 260
economie

transactional market norms 432
economy
description 434
like a cuckoo chick 434
transactional interacties 432
transactional interactions 187
transactional market norms 187
education
quality of 870
Edwards, Howard 701, 717, 719, 767, 768, 770
Riemann's Zeta function 767
effort
absolute and experiential 922
as a relativistic concept 452
average effort e 452
average per perspective 511
description 452
needs value 470
objective and experienced 470
pseudo-objective 489
effort sequence 449
egoism
and altruism 166
versus individualism 174
Einstein, Albert ... 70, 287, 289, 295, 302, 320, 361, 510, 513, 521, 703, 805
and dice 394
$E=mc^2$ 569
photoelectric effect 741
relativism 58
simple as possible 361
Elkington, J 888
emerge (turn up) 572
emergente actor 74
energy orbitals
of an atom 114
energy packets 706
engineer
in the societal china cupboard 954
enlarging the pie
misses the point 416
Eno, Brian 392
Enron affair 200
entities 122
entity
no entity without identity 187
no identity without entity 188
entrepreneurial social responsibility 67
entropic configurations 177
entropy 176, 537, 541, 559, 585, 768, 809
a quick look at 439
configurational 182
exact interpretation 178
information 182
not logarithmic but discrete 182
rough description 176
societal 182
statistical 522
tritropy as a threefold concept 439
entropy curve 180
Entzauberung der Welt 379
epistemology
description 365
epsilon
arbitrarily small number 768
equal pay for equal work 470
equivalence relationships
effort and value 514
energy and matter 514
process and identity 514
Eratosthenes
sieve of 709, 847
ergodic hypothesis 563, 930
escalation 400
essay 96
established societal practice
as a result of cleverness 101
Ettekoven, Joost van 263, 859
Etzkowitz, Henry 854
EU

European Union....507
Eubulides of Miletus
heap paradox).... 461
Euclides.... 781
Euclidian proof
infinitely many prime numbers 740
xxx.... 738
Euler, Leonhard.... 573, 600, 824
approximation formula harmonic series
.....685
Euler–Mascheroni constant 685
even but predictably skewed 1007
even but skewed
promotes sustainability.....1009
even but skewed playing field 958
encourages sustainability 958, 960
promotes sustainability..... 969, 1009
evolution and 'being'.....360
evolutionist.....35
expectation hypothesis
of outcome and process.....558
of situation and process 558
experiences
arising and disappearing again.....369
fluctuate around the average 922
pleasant and unpleasant 161
experiencing
description 295
in three dimensions..... 508
experiential value .. 75, 108, 465, 581, 707, 819
calculation of.....496
description of..... 121
development of 480
habituation..... 480
introduction 120
is relativistic 476
experiential world 511
emergent 188
first description 282
is your identity 967
experiential worlds 96, 380, 908
are networks of perspective.....298
individual 284
recursive networks of perspective..... 297
recursivity of.....286
societal.....287
spectrum of.....287
experiential worlds 109
experiential worlds-society 377
experimental psychology.....468
expert system shell..... 991
expert systems..... 510, 991
expertise
as a by-product.....87
as part of a practice 87
development of.....87
exploitation 915
exploration 915
extrapolation 235
extreme (team)configurations.....407

F

fact becomes opinion.....289
factor gap
introduction.....778
factor gaps 783
facts..... 61
fail and succeed.....866
failed state 96, 166, 402, 900
falling upwards 238
family 417
family, balance example 194
farmer 450
fascism 376, 444, 446, 662
fascist regimes 506
Fechner, Gustav Theodor
Weber's law 468
Weber–Fechner law.....468

feet of clay 855
Ferdinand, Franz 364
Festinger 59, 63, 64, 71, 75, 78, 98
Feyerabend, Paul 93, 226, 284, 420, 421
  Against Method 420
Fichte, Johann Gotlieb 890
field-theoretical approach 130
fifth generation
  and thinking computers 991
fin de siècle feeling 244
fingerprints 455
fire
  colours in 142
first perspectivist balance 442
fish stall, Zeist 360
flat bicycle tyre 906
Fleming, Alexander 64
flexible working times 229
Flood, Merril 387
Flores, Fernando 349
flow adjustment 905
Fludd, Robert 5
Flynn, James
  Flynn effect, IQ 243
FMP
  foundations, methods, practice 350
  the identity model 355
folding back to more dimensions 513, 707
food safety
  and second perspectivist balance 507
food supply chain 429
foot race 72
formal logic 932
formation of cartels 434
foundations 350
foundations, methods and practices 968
Fourier, (Jean-Baptiste) Joseph 758
f_p formula 634, 656, 687, 726,
  as upper bound for factors 690
  tossing a coin 726
fractal 294, 340
Franz Ferdinand 364
free riders
  Olson, Mancur 450, 453
free will 129
freelancers 229
French Revolution 192
frequency 126
frequency of words 572
Friedman, Milton 198
fruit of this book 570
Fukuyama, Francis 31, 391
  versus Samuel Huntington 255
funcitons, central
  Mertens function 715
functions, central
  Möbius function 715
  zeta function 715
fundamenta theorem of arithmetic 776
fundamental theorem of arithmetic 113, 499, 695, 710
fundamentalism 54
  rejection of 290
  the price is too high 662
fundamentalist 54
fundamentalists 744
furniture maker
  in the workshop 74

G

Galilei, Galileo 58, 61, 302, 420, 836
  Earth around Sun 70
Galton, Francis 681
Galton's board 681
game of leapfrog
  of structure and content 679
game theory 109, 385
gamma

Euler–Mascheroni constant 600, 824
gamma disciplines 63
gamma thinking 53
Gandhi, Mahatma 412
gaps
between actors 70
garden nuisance 868
gases
mixing 176
Gauss Carl Friedrich 836
Gauss curve
description 525
Gauss, Carl Friedrich 113, 361
bell curve 525, 543
Gauss curve 525, 526
normal distribution 525, 568
Riemann's mentor 717
general gas equation 568
generalist 703
generalization-specification 455
geocentric theory 301
Gershwin, George 43
get up 72
getting a degree, example 466
Gibbons, Michael 419
Gimli 977
goal-achieving 918
goalie 526
goal-seeking 918
God does not play dice
Albert Einstein 521
Gödel, Kurt 715
Goldacre, Ben
Battling Bad Science 91
grain kernels
heap paradox 461
Grandmaster
as ultimate proficiency level 971
grape 386
Griesinger, Don 173
Grin, John 235
Groep, Jan-Willem van de 392
growth spurt 251
Guldi, Jo
The History Manifesto 90
gummi bears 386

H

Habermas, Jürgen 284
habituation 469
Hadamard, Jacques 781, 788
Hadza 213, 217, 395, 396, 420, 431, 434, 578
hypernomadic 395
Hadzabe 93
haecceitas
"dit" 94
Duns Scotus 94
Haidt, Jonathan 216
Hal, Anke van 263, 859
hamburger 469
hammer
Heidegger's 995
Thor's 995
hammer principle
Abraham Maslow 995
Hammurabi, Code of 256
Harder, Wim 94
Hardin, Garrett 450
tragedy of the commons 450
Hardy 782
harmonia mundi
Pythagoras 1015
harmonia, Greek 415
harmonic arrangements 113
harmonic assumption 146, 582
and improvement potential 582
harmonic progression 146, 149
harmonic relationship

in a mathematical sense 113
harmonic row 817
harmonic series . 139, 468, 475, 479, 480, 488, 508, 570, 597
approximated with logarithms 573
Harmonic series
diverges (d'Oresme) 704
Harmonious 415
hawk 399
Hayek 506
Hayek, Friedrich 198, 376, 413, 435
The Road to Serfdom 412
Hazabe 838
health care
modernity acts as a brake 871
health-care system
modernist knee-jerk reactions 873
heap paradox (mountain paradox) 445
Hegel, Georg Wilhelm Friedrich 31, 890
thesis antithesis synthesis 890
Hegelian pattern 890
Heidegger, Martin 74, 293, 306, 318, 349, 931
'to world' as a verb 325
lectern comes to life 325
Heidegger's hammer 74, 299, 995
Heisenberg, Werner
uncertainty principle 521
Heizenberg, Werner 658
heliocentric theory 301
helix
penta helix 854
triple helix 854
Heraclitus 336, 661, 662
panta rhei 661
heterogeneous social norms 432
Heuvell, W. van den 293
higher mountains 68
Hilbert, David 845
Hill, Ted
scale invariance 592
Hitchcock 346
Hitler, Adolf 364
hocus-pocus 111
Hofstadter, Douglas
Gödel, Escher, Bach 97
Holterberg 130, 591, 863
homogeneous social norms 432
homologous middle space 318
hospices 872
hot spots
in perspectivist landscape 844
house of cards
USSR, EU 507
Housing, Spatial Planning and the Environment, Ministry of (VROM) 852
human condition 70, 101, 503
humans as improvers 97
improvement 70
human development
characteristics 402
human development 106
human experience process 113
humans
as pragmatic improvers 503
Hume, David 113, 305, 309, 381, 567
and causality 309
hunger winter 507
and food supply chain 429
hunter-gatherers 217
as a team 431
are not primitive 436
hunting and making weapons 447
specialization as weaponmaker and hunter 448
Huntington, Samuel 391
clash of civilizations 255
Husserl, Edmund 293
hydrogen 837
hydrogen atom 513
hypotheses 32, 516, 979

balance hypothesis....558
expectation hypothesis....558
of situation and process....558
perspective–effort correspondence....451
perspective–value correspondence....451
perspectivist value hypothesis....361
societal correspondence....185
statistical double hypothesis....930
value– effort correspondence....451
hypothesis of this book....114

I

ice cream cone....119, 120, 132
balance point....132
ice cream parlour....661
idealism, philosophical....128
identity
development of....351
N+1....185
no entity without identity....187
no identity without entity....188
the third identity....186
Identity = Process....535
identity model....355, 420
identity model in view....355
IKEA
example of dissonance....59
imaginary....705
improbable
and impossible....542
improvement
as human condition....36
at larger scales....124
reduces object–subject tension....98
we will no matter what....978
Improvement Cube....115, 882
also known as Innovation Cube....906
improvement dilemma
repetition....97
improvement dilemma....56, 97
improvement dilemma
in author's own experience....97
improvement landscape
macro-interpretation....130
micro-interpretation....130
improvement logics....101
improvement management....376
improvement path
overall....980
improvement perspective....55, 561
actor-specific....75
as a pragmatic building block....57
as a societal building block....85
as building block....48
composite....148
definition of....77
description of....85
estimating value of....360
worse and better....77
improvement potential....108, 113, 120, 465, 581, 585, 707, 819
and harmonic series....582
and perspectivist configurations....570
and structure and content....652
as value per effort....511
calculation in multiple dimensions....825
description of....121
formula....823
higher levels of....843
introduction....120
principle of....680
improvement potential, principle of
recursivity....590
find a balance....590
find a high dimensionality....590
improvement potentials....837
are quantized....826

summed 148
improvement spiral
social 191
assertive 191
improvement urge
driver of *the path of humanity* 35
inclusion 225, 913
inclusive institutions 402
inclusive political institutions 184
inclusive societies 517
incommensurable pair, example
specialist and generalist 703
incommensurable pairs 658, 662
incommensurable, examples
effort and experiential value 662
energy and time 660
mind and matter 662
object and subject 662
p, s, and u 662
position and impulse 660
pressure and volume 662
the three spatial dimensions 662
time and space 662
incrementalist 131
disarmed once again 590
is a conservative in camouflage 591
misses the mark 131
Indiana Jones
whip of 815
individualism
versus egoism 174
individualistic act 174
indoor environments 87
infinitesimals
mixed feelings 687
information entropy 177
information theory 106
Inherited Trust and Growth 170
innovation
according to recursive perspectivism 862
an odd term semantically 862
diffusion of 924
double strategies 912
integral strategies 912
is that possible on a large scale 862
modernity acts as a brake 871
mono-strategies 911
resistance to 467
societal innovation strategies 912
triple strategies 912
Innovation Cube 115, 882
also known as Improvement Cube 906
innovation funnel 918
innovation methods
follow value orientations 882
innovation paths 866
innovation practices, integral 860
innovation strategy
integral sextuple 920
societal innovation strategy 920
innovative methods 980
innovative value orientations 906
introduction 115
innovator 35
inside the box 918
integrated human being 88
is hidden 88
intentional activity 340
intentional actor 80
intentional human beings 124
intentional logic 360, 465
based on experience 469
composite 343
description 344
requires will and means 344
intentional logics 901
typology of 895
interdisciplinary bridges
are multi-actor perspectives 922
interest

self-interest or interest of others 163
interleaving 695, 747
as mutual intrusion 747
as overlapping stair steps 748
degree of 733
description 695
takes place exactly mirrored 748
interleaving effect 731
intermediate position 284
International Monetary Fund 154
intervention approaches 905
intuitions 89
inverse proportionality 113, 135
continuous 113
continuous interpretation 135
discrete 113
inversely proportional 126
inversely proportional relationship
not continuous but discrete 143
invisible hand 198, 199, 574
and visible hand 201
much better when visible 201
original source 199
preferably made visible 201
invisible hand, the
description 198
is blind to sustainability 199
visible is better 198
irrationality
and innovation 70
as a positive force 64
as a pragmatic notion 62
definition of 60
isoline 443
isosurface
mat 443

J

Jacobi, Carl 757
James, William 61, 293, 303
Jarl Waldemar Lindeberg 657
Jon and Vangelis 301
Jönsson, Claus 814
Joustra, Douwe Jan 231
Joyce, James 572
Ulysses 113
Juglar cycles 154
juglar waves 927
jump of value 922
Juran, Joseph 568

K

Kahnemann, Daniel 63, 64
intuitive and rational 63
Thinking, Fast and Slow 63
kangaroos 577
kangaroos, example 311
Kant, Immanuel ..112, 127, 287, 305, 503, 572, 575, 817, 836, 890
antinomies 156
Critique of Pure Reason 127
das Ding an sich 128, 364
noumena 318
Kemp, René 130, 235, 265
Kennard, Fredrick 720
Kennedy, John F. 70
Kepler, Johannes 5, 289, 302
Kierkegaard, Søren 77
Kierkegaard, Søren 60
kitchen table
in Achlum 855
kitchen tables 857
and intense life 854
too much distance 857

kitchin waves 927
klaver 354
Klinkenberg, Jan 265, 266
knots in the rope 841
knowledge analyst 87
  description 112
knowledge development
  partly unstructured 87
knowledge is bias 577, 875
knowledge technology 510
Kondratieff cycle 154, 927
Kondratiev waves 729
Kuhn, Thomas 284, 294, 298
  and scientific paradigms 298
kuznet waves 927
Kuznets cycles 154

L

Laetoli footsteps 11, 30
Laffer Curve 175
Lakatos, Imre 294
Landau 782
landscape
  draping in perspective 822
late-modern age
  imbalance 507
late-modern phase 233
Latour, Bruno 284
law of diminishing returns 148
law of increasing and decreasing returns 146
law of returns 146
layers 115
  in societal practices 114
League of Nations 35
leap of faith 513, 865
leaps
  and steps 65
  have knowledge of 864
learning 576
learning and forgetting 486
learning process 523
Led Zeppelin 350
Lego 55, 81
Lehman Brothers 858
Leibniz, Gottfried Wilhelm 596, 609, 619, 665, 776
  something rather than nothing 609
less is more
  Mies van der Rohe, Ludwig 585
level playing field 958
  even but skewed is necessary 958, 969
  is not very level 958
  is not very level at all 969
  uphill battle 958
Leydesdorff, Loet 854
liberalism 444, 446
life cycles
  examples 927
lifeboat, example 586
likely paths 129
Lilienfeld, Julius 879
limit theorem, central 604
limiting cases 294
limiting cases, two 285
limits 287
Limits to Growth 888
Limoges, Camille 419
Lindblom, Charles Edward
  en incrementalisme 239
Lindeberg's theorem 657
linear economy 232
lion
  killing with knife and spear 396
LISP Machine 992
little guy 353, 1007
little guy (dancing figure) 852
living

experiencing perspectives 576
Livingston, Jim 173
Lloyd, William Forster 450
tragedy of the commons 450
locality 653
localization 653
lock
we lock each other up 384
lock-in 130, 400
of the Thracian girl 149
quantum-theoretical explanation 130
rests on perspectivist landscape 889
logarithm 180
logarithm books, wear 125, 591
approximate the harmonic series 573
mixed feelings 687
rather go back to the source 687
logic
syllogistic (Aristotle) 165
Loorbach, Derk 130, 235
Lorentz transformation 479
Lorenz, Edward
butterfly effect 362
Lorenz's butterfly 364
losers 124, 202, 238, 251, 968
as implication of winners 866
do they actually fail? 866
loss aversion 467
not a subjective fault of the mind 469
low-hanging fruit 988
lower Riemann sum 596
quantum-theoretical 606
Lyman series 842
Lyotard, Jean-François 239

M

macroconfigurations 178
macrolandscape 123
macrolevel 502
macroroute
and microroute 122
macroscale
continuity 122
Mager, Sander 267
Magna Carta 225
main thesis of this book 656
Mallory, George 66
management 445
overshoot 445
Mandelbrot, Benoît 340
many little steps don't add up to big ones 148
margrieten 354
markets
are seldom in balance 434
Marx, Karl 31
Marxist class struggle 899
Masai 396
Maslow, Abraham
hammer principle 995
hierarchy of needs 892
pyramid of human needs 995
Mastering Three 860, 935
mat
attachment points 442
but not really 442
isosurface 442
material
needs mental 72
material world 61
mathematician
how to convince 730
mathworld.wolfram.com 782
matter and spirit 336
Maturana, Humberto 349
mayonnaise 935
mixing value orientations 915
oil, vinegar, and eggs 915

McMichael, Anthony J. 236
Meadows, Dennis 888
measurement error 287, 526, 571, 580
memory bias 63
mental
  needs material 72
mental world 61
Merli, Pier Giorgio 814
Mertens conjecture 733, 772
Mertens function 715, 770
  better behaved than Bernoulli 747
  definition 716
  displays volatile wave pattern 729
Mertens, Franz 716
Mesopotamia 221
methodological foundations 55
methodological framework 86
  figure 95
  for societal improvement 94
  introduction 55
  layers 95
  needed for practice of improvement 95
  needed for practice of improvement 95
  practice, science, and philosophy 88
methodological solution
  to societal dissonance 101
methodology
  as practice + theory + philosophy 101
methods 351, 901
methods, arsenal of 901
microconfigurations 178
microlevel 502
microroute
  and macroroute 122
microscale 123
  discrete steps 122
Mies van der Rohe, Ludwig 585
Mill, John Stuart 12, 13, 75, 113, 372, 814
  On Liberty 12, 75
  pain and pleasure 366
mind and matter
  how they emerge 322
mind–body dualism
  as a marginal phenomenon 303
mind–body problem 63, 315
mind–matter problem 58, 63, 91
minimum coupling and maximum cohesion, see: Separation of Concerns
Ministry of Housing, Spatial Planning and the Environment (VROM) 851
Minnesma, Marjan 235
mirror neurons 433
missing links 122
mistakes 976
mixing two gases 176
Möbius function 715
  definition 715
Möbius, Augustus Ferdinand 715
model
  actor and improvement perspective 78
  adjust objectivity 79
  adjust subjectivity 79
  and referent 363
  confusing with referent 363
  learn to appreciate IKEA 79
  painting window frames 79
Model T Ford 445
model theory
  in recursive perspective 363
modern human 30
modern logical constructs 256
modern nation states 224
modern pattern, summary 232
modern phase 107, 223
modern quality framework
  as a brake 869
  as a brake on plurimodernity 869
modern straitjackets 871
modern systems
  are autistic 229

criticism of 229
defend themselves 873
mutual tensions 229
modernist juggernaut 855
modernist strain 250, 872
modernist systems
defensive reflexes 873
modernists 89
modernity 223
also has its perks 950
as a turning-point phase 260
characterization, definition 225
description 249
swan song of 238
mono-cultures
are a bad match 934
monopolies 434
monopositions
derivatives of dualism 308
mono-strategy in innovation 911
monotonic improvement 30
Montaigne, Michel Eyquem de 405
Monty Python
and societal balance 1019
You're all unique 1019
Moore's law 879
moral behaviour
is it innate? 386
mosasauri 931
most important key 116
Most Noble Order of the Garter 88
Mount St. Peter 65
mountain paradox (heap paradox) 445
mountain ridge 124
mountain ridge in perspectivist landscape 148
mountainous landscape
peaks and gaps 106
moving target 915
multi-actor
composite actor 425
preferred habitat 448
shows plurimodernity 442
multi-actor improvement perspective 902
multi-actor modelling language 81
multi-actor models 116, 902
multi-actor perspectives
as interdisciplinary bridges 922
multi-actor practice 348
multi-actor process management 299, 510, 961
multimodernity 228, 238, 249, 897
description 889
multiplication 913
multiplication/upscaling
in detail 943

N

N+1 identity 185
Nagel, Thomas 316
bat 282, 298
Nagell 782
naive dualistic premise 128
Nalebuff, Barry J. 391
National Environmental Policy Plan, fourth edition (NMP4) 852
natural logarithm
and entropy 180
mixed feelings 687
natural sciences 318
and empiricism 318
nature and nurture 321
nearly always different 662
nearly always the same 662
negative value orientations 920, 933
neoliberal 166
neoliberalism 662

Neolithic Revolution 219
Netherlands Bureau for Economic Policy Analysis (CPB) 870
network society 377
networks of perspective 381
neurons 143
Neuteboom, Jord 265
Newcomb, Simon 591
  and Benford's law 125
Newton, Isaac 112, 287, 302, 577, 596, 699, 741
  Principia 418
  second law of 569
Newtonian time 137
NMP4 852
noise barrier
  as a multimodern interim solution ... 889
Non sunt multiplicanda
  William of Ockham 722
nonlocality 653
non-monotonic 537
norms
  and team configurations 433
  heterogene social norms 432
  homogene social norms 432
  transactional market norms 432
not even wrong
  Pauli, Wolfgang 567
Nowotny, Helga 419
nuggets of knowledge 577
number sense 702
  and recursive perspectivism 848
number theory 121, 652
  and recursive perspectivism 701
  description 570
number, concept of
  in perspective 666
numbers
  are not *a priori* 713
  category 1, 2, 3 735

O

object and subject
  leapfrog 58
objective 57, 311, 316
  as a relative (!) notion 59
  description 62
objectivism 286
  extreme natural sciences 922
objectivity
  as a basis for subjectivity 61
  is relative 577
  needs subjectivity 71
objectivity illusion 135, 483, 525, 556
object–subject dissonance 60, 63
object–subject phenomena 57
object–subject question 90
object–subject tension 57, 130
  as a pragmatic notion 59
  emerging and disappearing 85
  is actor-specific 75
  two roads 80
Ockels, Wubbo 322
Ockham, William of
  non sunt multiplicanda 722
Ockham's razor 361, 722, 920, 932
oil and vinegar
  mayonnaise 46, 915, 935
oligopolies 434
Olson, Mancur
  dilemma of collective action 453
  free riders 453
one basic building block for improvement 55
one-dimensional consciousness 472
  aware of position and direction 474
ontological nature 365
open economy 858
opinion becomes fact 289

opinions 61
opportunities
  and misery 75
opportunity driven 115
opportunity-driven
  and problem-driven 884
optimism 31
optimism, monomaniac 978
optimistic vision 979
optimists 161
optimizing 882
optimizing innovation 882
optimizing value orientations 914
Oresme, Nicole d' 480
Oresme, Nicole d' 704
ostrich egg, cooking an 218
Our common future 894
outcome and process 558
outcomes and routes to them 541
outside the box 918
overshoot
  past balance point 448

P

PAIR analysis 116, 902
panta rhei arrow 665
paradox 336
  heap (mountain) 445
  magisterial 1001
  sorites (heap) 461
  sorites (mountain, heap) 461
  value paradox 927
paradoxical difference
  between children's ball pit and dice ... 529
Pareto principle
  as pattern law 568
Pareto, Vilfredo 568
Parmenides 822
  poem *On Nature* 661
Pascal, Blaise 362, 699
  probability theory 679
  triangle of 460
  Triangle of 113, 570
Pascal, Blaise 179
Pascal's triangle 460, 652, 679, 745
  and process=identity 682
  combinatorial, binomial, and odds-targeted 771
  describes binomial coefficients 723
  describes combinations 723
  describes statistical odds 723
  foundation of Mertens and Bernoulli . 771
  peculiarities 684
Pascal's Triangle 113, 179, 570
Paschen series 842
pastoralism 219
patroonwetten
  explanation 569
pattern law
  largest is The path itself 823
  Moore's law 879
pattern laws 105, 112, 113, 127, 836
  and discrete inverse proportionality .. 569
  description 568
  due to perspectivist consciousness 571
  examples 568
  explanation 848
  introduction 105
  recursive perspectivist foundation 128
  the central principle 569
  understanding 569
Pauli exclusion principle 512
Pauli principle
  societal 512
Pauli, Wolfgang 5, 10, 281, 304, 567, 658
  not even wrong 10
peaceful co-existence
  a bar set low 895

peak, single and double 678
Peirce, Charles 293
penicillin 64
penta helix 354, 359, 854, 1007
free rein for the 857
people managers 915
People Planet Profit
summarizing critique 894
people skills 915
perception, sensory 569
perfume bottle 179
perfume vapours 563
Pergolesi 405
person-in-the-world 350
perspective
and value, relationship 360
as a carrier of value 296
as a precursor of mind and matter 323
as an experiential phenomenon 293
autonomous 339
average effort 361
average value 361
belongs to an actor 296
consists of organized actors 298
description 338
improvement and deterioration
perspective 296
innovative perspective 923
intentional 340
internal threefold structure 296
material 76
mental 76
mental and material 76
objective or subjective 76
origin and elaboration 293
rational or irrational 76
recursive character of 297
routine perspective 923
three parts 75
trade in, improve, learn 486
what can you do with it 384
perspective–effort correspondence
hypothesis 451
perspectives
adapting 511
as a homologous starting point 317
as improvement toolkit 381
condition of 120
halves do not exist 142
managing 511
small numbers 143
staggering quantities 143
perspective–value correspondence
hypothesis 451
perspectivist actor 343
perspectivist analyses
examples 666
perspectivist analysis 113, 569
description 569
many different aspects 652
six parts of 667
perspectivist balance 108, 365
as root of the path of humanity 372
first balance 442
people seek this 371
second balance 447
third balance 453
perspectivist balance concept
in quantitative termen 442
perspectivist configurations 113, 836
and improvement potentials 570
three dimensions, three extremes 437
perspectivist consciousness 127, 130
as an adaptive improvement system .. 576
as reversed dice 930
creates the pattern laws 571
efficiency 113
is restricted, limited 483
seeks a harmonic arrangement 113

perspectivist consciousness is at the helm 821
perspectivist dimensions
all different 207
all the same 207
merge more or less together 207
perspectivist dimensions
together one whole 207
perspectivist dimensions 426
perspectivist harmony 146
perspectivist improvement landscape 105
a priori structure of 114
unveiling 105
perspectivist landscape 123, 127, 375
how it directs us 129
inherent characteristics 121
peaks in 122
perspectivist landscapes
and pattern laws 121
perspectivist quantum theory 836
perspectivist relativism
bridges gap between objectivity and subjectivity 489
perspectivist space 442, 708
abstraction and specification 501
as a state space 512
different separate points 446
is a discrete space 511
points 444
perspectivist structural landscape 119
phenomena 315
as that which is experienced 315
phenomenological
philosophical schools 61
phenomenologist 72
rejects dualism 72
phenomenology 315
philologist 113
philosopher 95
philosophical hybrid 702
philosophical rethinking 376
naming of 377
philosophy
as art for art's sake 90
description 90
philosophy, pure 94
physiognomic studies 362
Piaget, Jean 27, 577, 713, 817
development of expertise 87
piecework pay 449
pilgrim, example 466
Pinkham, Roger 592
pioneering innovation 882
pioneering value orientations 882, 914
pipe dream 99
plague quarantines 872
Planck, Max 70, 142, 577, 578, 706
colours in fire 142
constant of 837
Planck's constant 837
planner
Taylor, Frederick 505
Plato 106, 119, 123, 662, 822
plurimodern
description 107
plurimodern benchmark 872
plurimodern innovation and pilots 876
plurimodern phase 107
plurimodern society 202
plurimodern transformation 896, 954, 967
and positive competition 393
as a compass 517
as a visible hand 201
how to implement 967
requires connecting citizenship 860
the key to Team World 248
plurimodernity 203
description 245, 424
description in perspective 506
essence of 504

is spectral....257
versus postmodernity....249
polarization 517
policy brief 870
political debate
as a competitive event 415
as a dogmatic event 415
political leanings 35
political movements
and perspectivist imbalance 444
communism 444
fascism....444
liberalism....444
political spectrum
as preconceived choices 422
politics.... 412
my incomprehension of 415
permeated with competition 415
politicians unfit for.... 412
Polle 931
polyhedra, regular 522
Popper, Karl 294, 310, 352, 568
popularizing books
very needed 703
populism 141
populist 27, 95, 101
pork cycles.... 729, 927
positive value orientations 920
positivism
rejection of 383
possible positions....578
Postel, Anne Marij 263
postmodern lack of commitment 284
postmodern phase....249
Potential
description 63
powers 652, 665
practical
practical ability....56
practical scale invariance..... 443, 455, 612
practice
for its own sake 94
practice 351
practitioner....95
pragmatic
philosophical school 61
pragmatist 72
reflective and eclectic 976
rejects dualism....72
pre-epistemological 564
description 365
pre-epistemological nature 365
preferred positions 586
premises, incorrect 816
premodernity 249
preoccupations
substantive and structural....157
pre-ontological 309, 564
description 365
prime factorization
symmetric 687
prime factorizations 113
description 581
trivial and non-trivial 582
prime factors 581
Prime Number Theorem 719, 774
description 781, 788
image 781
prime numbers....113, 121, 444, 569, 652
and deepest pits....588
and secrets 848
and societal innovation....707
and the perspectivist space....707
and tossing a coin 721
are not analytical 709
are synthetic, constructivist 709
arise ex aequo....714
constructivist definition 710, 776
constructivist interpretation 804
definition.... 501

emergence of....711
explain pattern laws....569
little mathematical interaction with .. 712
mix of low numbers is best 691
play leading role in patterns 570
products of....501
structure experiences 702
vacancies are emergent....709
prime numbers diminish 781
prime sieves....709
primitive
criticism of the term 217
primorial numbers
are square-free 736
description 753
Mertens based on category 3.... 777
primorial products 736
provide best stepping stones 753
why beneficial 815
primorial sequence 739
primorial steps 736
in short.... 780
transport from cat.3 to cat. 1 738
principles of acceleration, three.... 138
Prisoner's dilemma 387
heart of the problem 388
Prisoner's Dilemma.... 183
Prisoner's dilemma, series of....387
probabilistic....122, 129
probability orbitals.... 653
probability theory....679
problem driven 115
problem-driven
and opportunity-driven.... 884
problems 51
process approaches 905
backcasting.... 905
flow adjustment 905
hidden work 905
intervention approaches 905
participatory work....905
scenario approaches....905
stepwise improvement....905
trick exploiting....905
trouble-shooting....905
working in isolation 905
Process optimization 912
in detail.... 939
process=identity
in Pascal's triangle....682
procession of Echternach.... 244
Procrustesbed.... 436
Product innovation
in detail....942
Product/service innovation....913
production and consumption processes 891
production–consumption chains 507
proficiency
five focus areas....969
proficiency levels....883
1 Beginner....968
2 Advanced beginner....968
3 Beginning performer....968
4 Proficient performer 968
5 Expert....968
aim 968
and arrangements 970
and governance....969
and management....970
and the Backbone 969
and the central nerve cord 970
and transactions....970
balanced 971
description 968
five levels of competence....968
Grandmaster is ultimate level 971
in societal innovation....968
monomaniac 971
Proficiency levels....115
introduction....115

proof disruptors 733, 738, 773, 810
diminish 803
prophets of doom 161
prosperity 890
prosperity and well-being
huge reservoirs 506
pruning 82
pseudo prime configuration ... 825, 827, 848
explanation 825
pseudo prime factorization 827
pseudo-linear value sequence 449
pseudo-objectivity
as a fringe phenomenon 471
pseudo-subjectivity
as a fringe phenomenon 471
psychologist
and cognitive biases 76
psychophysics 468
Ptolemy 289, 301
Public Health, Spatial Planning, and Environment
Council for 1008
publication regime
academic 1015
puppy example 328
pure science 419
purposeful
lots of value for little effort 817
purposefulness 525
Pyrric victory 399

Q

quadratic prime factorizations
share has asymptote 773
Quakernaat, Joost 177
quality society 139
quanta 142, 513, 595, 600
quantize in all dimensions 600
quantum chemistry 187
quantum effects in perspective 512
quantum entanglement 757, 766
quantum leap description 510
quantum mechanics 114, 142
quantum theory 120, 121, 142
quantum-theoretical 130
quantum-theoretical interpretation
of the improvement landscape 141
quincunx 681
Quine, W.V.O. 187, 349

R

rabbits 853
radical 288
radical actor thesis 74, 300, 303, 314, 901
description 343
radical perspective thesis 74
radical replacement 54
radioactive decay of atoms 513
random walk 727
graph 718
rank 126
rank of words 572
ratchet effect 138
rationality
as a pragmatic notion 62
creates its own prison 65
definition of 60
rationality creates its own prisons 69
ravines 122
Read, Leonard
'I, Pencil' 198
realism 98, 123
as pessimism 31
reality
as extreme probability 650
rearrangement of layers 252

Recursief Perspectivisme
risk of 568
recursive 81, 294
external 906
internal 906
recursive atoms 510
recursive character 382
recursive dimensions 509
recursive networks 360
recursive perspectivism 55, 85
above all pragmatic 379
as a pragmatic skill 379
as a quantum-theoretical gateway 515
as a value-seeking interpretation 379
as unification methodology 10, 571, 743
bridge with Riemann hypothesis 701
burden of proof 568
continuous interpretation 105
cycles and waves 928
intermediate philosophical position 921
is adaptive 365
is instructive 365
is it valid? 571
is not a faithful model 379
is not traditional science 379
is pre-epistemological 365
is pre-ontological 365
mathematics of 706
pattern laws are based on 129
philosophical positioning 108
quantum-theory interpretation 105
short and long term 932
structure and content 111
the 'why' of 378
unifies all experiences 744
Recursive perspectivism
advantage of 309
and social-societal structures 345
and team collaboration 345
between materialism and mentalism 128
is anti-dualistic 294
leads to a multi-actor image of society 298
legitimacy 293
more sociable than dualism 309
offers space 319
origin of 378
philosophical roots 300
pre-epistemological and pre-ontological 309
presupposes nothing about everything 308
recursive perspectivism and pattern laws 568
recursive perspectivism says nearly nothing about nearly everything 111
recursivity
of experiential worlds 296
of perspectives 296
of societal practices 296
red in tooth and claw 391
referent
and model 363
reflective pragmatist 27, 62, 76, 93, 101, 568
and science 88
reflective pragmatist 141
regimes
as supported practices 861
regression 251
relation
between Bernoulli and Mertens 771
relational analysis 116
relationship between structure and content
the crucial question 655
relationship of knowledge
between knower and object 306
criticism of 306
relativism 285
rejection of the extreme 290
relativistic effects

in three dimensions 490
relativistic theory 502
relativistic theory of value and effort 470
relativistic undercurrent
invisible in the short term 501
reigns supreme in the long term 501
relativity
of objectivity 577
relevance of actors 907
relevance of perspectives 907
religious 35
Rembrandt 34, 215, 383
reorganizations 948
repetition 525
and balance 558
res cogitans 315
res extensa' 315
rescaling of layers 252
result
impossible outcome 542
improbable outcome 542
returns
and path of humanity 929
and value paradox 929
diminishing, law of 148
explanation of the law of 146
law of 146
returns, law of diminishing 569
reversed dice 930
Ricardo, David 377
Richard III 469
ridge 148
Riele, Harry te 353, 851
Riele, Herman te 773
Riemann hypothesis 114, 570, 652
and societal innovation 702
and the path of humanity 816
bridge to recursive perspectivism 701
comparison Mertens with Bernoulli experiment 767
condensation sigma Möbius 768
equivalent phrasings 721
first proposal for a proof 738
formulation 704
importance to recursive perspectivism 701
minuscule segment from 1 795
mythical status 701
primorial development three categories of numbers 767
relationship with The path 816
second proposal for a proof 806
three alternative phrasings 767
three new viewpoints for proof 767
Riemann, Bernhard 8, 570, 596
risk avoidance 467
Robinson, James 402, 517
Rogers, Everett
diffusion of innovation 925
rolls of a dice 129
Roman Empire 140
Rorty, Richard 61, 293, 303
Rotmans, Jan 130, 235, 922
route
illusory or realistic 149
rubber band
and actor configurations 505
and three societal dimensions 235
number of perspectives and quality ... 215
rule of thumb for cubic symmetry 512
Rutherford, Ernest 513, 864

S

sabre-toothed tiger 301
Safranski, Rudiger 316, 325, 703
San 217
satisficing solution
Simon, Herbert 418

Sautoy, Marcus du....703
sawtooth pattern....744
and Pascal's triangle....747
becomes wave pattern....758
scale adjustment of layers....252
scale effects....138
scale invariance....468
practical....594
scales
of perspective....367
scales find each other....364
scarcity....219, 398, 399
and politics....413
scenario approaches....905
scenius....392
genius, scenius, societius....393
sceptical reader....53
schizophrenia....88
double, disadvantage of specialization 51
schizophrenia, mild form of....349
Schön, Donald....95
The Reflective Practitioner....27, 95
Schopenhauer, Arthur....281, 318, 344
Schot, Johan....235
Schrödinger equation....837
Schrödinger, Erwin.12, 113, 510, 571, 758, 814
Schrödinger's cat....742
Schumpeter, Joseph....398, 585, 611
'democratic' destruction....858
creative destruction....391, 590, 955
creativee destruction....234
Schwartzman, Simon....419
science....87
as a powerful prescription....93
at societal scales....419
characteristics....86
description of....93
fundamental....94
neglects some aspects....86
pure, fundamental....419
surrounded by societal competence....87
traditional and commerce....91
within societal frameworks....87
scientific rationality
and societal scales....420
does not work societally....420
scientist....95
and facts....76
scientists and practitioners....93
scorpion....368
Scott, Peter....419
scouts....124
S-curve
an innovative perspective....923
as transition curve....922
value curve....922
Searle, John....321
seasoned disciplinary specialists....976
second perspectivist balance....447
second proposal for proof Riemann
step 1 patterns....806
step 2 interleaaving....806
step 3 resemblance Mertens and Bernoulli....806
step 4 condensation....806
sectors, socioeconomic....107
seeing stars, example....311
segment....796
minuscule, from 1....795
self contained....294
self, as in "a self "....113
selfish act....174
selfish, are people....163
selfishness....163
conscious, cynical, unaware....172
entropic disadvantage....184
selfishness trap....165, 190, 967
senses
as supposed windows on the world....320
sensitivity, mutual

a dramatic shortage 968
sensorily 382
sensory stimuli, perception of 569
Separation of Concerns
coupling and cohesion 427
Edsger Dijkstra 427
SOC 427
SER 852
serendipity 64
setback 575
Shakespeare, William 469
Shannon, Claude
information entropy 177
shared world 284
shareholders 933
shifting
of perspectives 55
shimmering spectrum 92
ship building cycles 154
shipbuilding cycles 927
shortsightedness 150
Sierpinski carpet 342
Sierpinski triangle 345, 681
Sierpinski, Waclaw 681
sieve, prime numbers and Swiss cheese. 710
sigma Möbius 744, 745, 747, 766
introduction 731
results in 0 734
without interleaving, examples 745
Simmel, Georg 377
Simon, Herbert 239
bounded rationality 418
simplicity
of societal improvement 1004
simulation of Benford
stochastics in multiple datasets 603
simulations of Benford
how stochastics leads to Benford 601
stochastics leads to harmonic series .. 603
situated cognition 342
situation and change 332, 336
situations and processes 558
six value orientations 910
skin in the game 1007
slit detection 814
small cause, large effect 366
smallest particles, search for 462
SMART 613
criticism of 69
quickly kind of dumb 613
SMART and DIM 69
smeared 742
Smith, Adam 377, 435
needle production example 445
the invisible hand 198
The theory of moral sentiments 199
snow, kinds of 440
soap, wet piece in the tub 483
SoC, Separation of Concerns 427
soccer team 313
Social and Economic Council of the
Netherlands 852
Social Economic Council 1008
social improvement spiral 191, 967
social mechanisms
examples 387
social media 241
social psychologists 173
social value orientation ring
Griesinger and Livingston 173
socialist 166
societal balance 446, 949
and Monty Python 1019
societal balance model 106, 967, 979
and proficiency levels 969
Societal Balance Model 175
and natural logarithm 183
expresses a perspectivist balance 184
hugely promising 182
is recursive 194

what exactly does it express? 182
Societal broadening 913
in detail 944
societal canvas 961-963
definition 961
societal chains
advantages and disadvantages 109
societal cognitive dissonance 98
conservative pseudosolution 98
methodological solution 98
utopian pseudosolution 98
societal coherence and cooperation 81
societal competence
and quantum leaps 510
societal competence, three principles of .. 47
societal completeness 359, 853, 970
societal consciousness 242, 360
moves in a perspectivist mountain landscape 570
needs to catch up 245
societal development
acceleration of 138
and subatomic particles 836
as a bumpy ride 122
societal dissonance 98
societal dynamics
altruism trap 191
assertive improvement spiral 191
oscillation 192
selfishness trap 190
social improvement spiral 191
societal entropy 185
societal experiential worlds 287
description 288
societal experiments 156, 360
societal improvement
is simple 1004
source of 162
societal improvement force 33
societal improvement perspective 920
societal improvement practice 96
societal improvement spiral 400
societal innovation 114, 920
and sustainable development 851
arsenal of methods 901
basic prerequisites 883
description 862, 863
difference compared to the path 921
quantum-theoretical motivation 513
requires six value orientations 945
societal innovation course 124
societal innovation strategy 920
societal layers
the Backbone 946
societal logics 256
societal navigation 114
societal pathology 966
societal paths 121
societal perspective 360
societal plateaus 570
societal pleonasm 891
societal practice
and statistical pattern laws 516
has three levels 908
powerful 446
societal practices
and deep structure 345
are discrete, quantized 142
dealing with professionally 77
jumpy rearrangements 844
the better ones are higher on the diagonal 503
when they are powerful 441
why they creak 291
Societal practices 81
scale in number of perspectives 133
scale of 133
societal principles of acceleration, three 138
societal quality 96
societal quantum theory 510, 570, 839

demands of societal innovation.....844
what it explains.....570
societal reconfiguration.....151
societal sensitivity
lags behind as scales increase.....243
societal singularities, two.....284
societal spectrum.....135, 314
societal stagnation
six value orientations absent.....945
societal stratification
structured stratification.....948
societal value.....96
societally complete coalition
characteristic.....970
societay dynamic
turning the tide.....192
societies
city-states.....204
modern states.....204
plurimodern society.....204
sedentary societies.....204
societies
hunter-gatherers.....204
societies
like a house of cards.....507
societies
different levels.....507
society
according to recursive perspectivism..81
as a coherent improvement perspective.....119
as kaleidoscopic object–subject game..77
as multi-actor practice.....74
comparison to dice.....523
space
actor space.....442
perspectivische.....442
space
distinguished from time.....331
in perspective.....329
requires time.....331
spade, example.....472
sparkling
of a diamond.....405
of a team.....405
specialist.....703
specialization.....51, 220
weapon makers and hunters.....395
species
as a great philosophical puzzle.....153
perspectivist explanation.....153
spectral.....257, 283
experience is.....542
spectral consciousness.....313
spectrum.....294, 318, 380
Spinoza, Baruch.....112, 134, 316, 343
idea of.....309
Spinoza's idea.....11
Spira Mirabilis.....686
spiral dynamics.....216
spiral effect.....190
spiral of violence.....399
square-free numbers
share is a limit.....699, 700
square-free reservoir.....739
squares in prime factorizations.....699
Stabat Mater.....405
stairs.....663
stairs, perspectivist.....652
stakeholder.....933
Standard and Poor's.....167
state space.....471
statistical disintegration of atoms.....513
statistical double hypothesis.....930
description.....930
statistical entropy.....522, 648
statistical thermodynamics.....106, 585
statistics.....522
are hateful.....127
stealth technology

societal 417
stepping stones 609
and primorial products 753
over river 752
steps
and leaps 65
stepwise improvement 905
Stevens, Stanley
and Weber's law 468
Stieltjes, Thomas Joannes 701
Stirling, James 182
Stirling's formula 182
stirring sugar in your coffee 653
stochastic angle 653
stock market indices and exchange rates 65
stonesmith 394
stoning 58
strange 782
strange loop 97
strange numbers 735, 773
strange prime numbers 735, 773
strategy 390
street lamp
looking for innovation underneath the 1015
Stresemann, Gustav 5
strongly reflective pragmatist 103
structural landscape
of perspectivist configurations 822
structure and content 570
and Pascal's triangle 678
convergence of 651
fundamental connection 656
summary 684
structure of matter 510
stubbornness of societal competence
perspectivist explanation 359
students
are only people 200
stumbling forward 238
subjective 57, 316
description 62
subjectivism
extreme social sciences 922
rejection of 383
subjectivity
founded on objectivity 61
needs objectivity 71
subjectivity illusion 135, 526, 556
subject–object question
as a formidable hurdle 290
as a societal reference point 290
description 281
from dual to spectral 281
from rigid to flexible 281
making practical and instrumental ... 293
substance 134
succeed and fail 866
sucker's payoff 391
Sumerian cities 140
super conduction 805
super conduction in perspective 805
supermodern world government
is unlikely 250
supermodernity 250
supertransities 235
surprising discovery 980
survival camp, example 208
sustainable development
and late modernity 884
and recursive perspectivism 881
and societal innovation 851
as guiding principle 882
Brundtland definition 894
consciously follows the path 900
in the modern final stage 884
kinship with balance 884
kinship with *the path* 884
People Planet Profit interpretation (2) 888

Planet interpretation (1) 887
Sustainable Development Goals 885
the balance interpretation 898
the multi-actor interpretation (3) 894
the multi-actor preferred interpretation (3) 894
United Nations 885
Sustainable Development Goals
of the United Nations 885
Swaab, Dick 311, 364
sweep the stairs 934
Swiss cheese in hyperspace 710
syllogistic logic 165
symbol manipulation 992
symbolic programming languages 510
Symbolics 3600 992
symbolics.com 992
symmetry 145
correction 652
cube 498
cube symmetry 687
different symmetries 687
full 828
gradations 828
mirror symmetry 766
prime factors 687
rotation 512
rotational symmetry 766
types like symmetry 522
ultimate 828
system barriers 957
governance 957
systemic dimensions 509

T

tabula rasa 321
Taleb, Nassim Nicholas 248, 370
Tarde, Gabriel 924
Taylor, Charles
filosoof 350
Sources of the Self 350
Taylor, Frederick 445, 505, 507
Taylor's division of labour 505
Taylorism 427
team
as a hybrid of three extremes 409
at world scale, Team World 423
localized and delocalized 514
poor definition 403
team configurations
balance as the key 435
failed 431
seven different 410
societal 109
three dimensions 109
three extreme 407
team consciousness 360
team dimensions
extremes are soulless 430
uiterste posities 429
team identity 403
Team optimization 913
in detail 941
team spirit 109, 313, 404
and team consciousness 313
as a thrilling phenomenon 410
essence 404
Team World 107, 205, 235, 423
as a intriguing vision of the future 423
description 245
following from Brundtland 895
three perspectivist dimensions 424
teams
at various scale levels 423
technical analysis 927
technicians 915
technocracy 240
teenage sons 741

temporal scales 96
test tube 991
Thales 94, 106, 119, 123, 148, 222, 511, 584, 591, 690, 710, 865
in the well 150
Thales and the Thracian girl
hand in hand 154
the FMP model 968
The History Manifesto 90
The lame leading the blind 591
The lame man helps the blind man 106
The New Production of Knowledge 419
the path of humanity
and stable levels, layers 837
and the human scale 88
as condensed life experience 33
difference compared to societal innovation 921
intermittent development 140
representativeness 55
sketch 258
to the present day 29
The path of humanity
entropy as driving force 185
more and more actors 139
most imposing patternlaw 848
the path of the chimpanzee 393
the path of the crocodile 393
The path of the crocodile 392
theoretical
theoretical ability 56
theory approximates practice 597
theory of evolution 1019
thermodynamics
first law 563
second law 563
thesis 851
thesis antithesis synthesis 890
thin ice 703, 814
things 324
Think globally, act locally
as shaky slogan 953
thinking and acting
difference between 328
third perspectivist balance 453
Thomas, William
real in their consequences 306
Thompson, Clive 375
Thor
hammer of 995
Thor's hammer 299
thought becomes substance 312
Thracian maid 584, 591, 690, 710, 865
Thracian servant girl ... 106, 119, 123, 148, 155, 156, 511
in our modern society 150
we are all like her 124, 130, 149, 150, 153, 214
three categories of numbers 771
a fascinating game 783
factors 735
quadratic 735
square-free 735
three components of societal quality 425
three dimensions
as actors 442
experiencing in 508
in coherence, in balance 446
inversely proportional 442
overstretch or disregard 446
spatial and cognitive 508
why experience in 508
three dimensions of perspectivism
as actors 909
three dimensions of society
roots of 336
three foundations of sociability 206
three generations of sustainability 886
1 Planet 887
2 People Planet Profit 888

3 Multi-actor interpretation....894
along the path of humanity....896
three optimizing value orientations....912
three perspectivist dimensions....503
one common foundation....425
pluriformity....424
similarity....424
unity....424
three pioneering value orientations....913
three properties of societal competence
different, the same, one whole....53
three societal foundations.137, 406, 416, 424
and balance....139
inversely proportional....139
principles of acceleration....138
three spatial dimensions....503
three variants of coherence
competitive relationship....397
cooperative relationship....397
no relationship....397
three views of Team World....424
three-layered view of society....384
three-layered vision of society....299
throw-away program....537
Thwaites, Thomas....213
toaster....838
time
distinguished from space....331
in perspective....329
Newtonian and Bergsonian....922
requires space....331
time and space....336
not a priori....930
Tinbergen, Jan....154, 927
tiny stairs....613
tipping point of this book....235
tireless relationships between recursive perspectivism and Riemann hypothesis....816
Tit For Tat....389, 399
toaster....213, 868
together
has three dimensions....416
togetherness
along *the path of humanity*....417
Tomasello, Michael
children share fairly....386
ratchet effect....138
Tonomura, Akira....814
top medical specialist....357
top, single and double....678
top-down....953
totalitarian society....662
towers
pattern of increasing height....132
Toynbee, Arnold Joseph....35, 138
suicide and murder....216
Trade and the financial world
sketch....259
tradeoff
between speed and precision....502
trader....186
tragedy of the commons....450
Hardin, Garret....450
Lloyd, William Forrester....450
trampoline....441
transactional market norms....432
transactions....187
transcendental....542
transitions....852
description....235
transition management....922
transition, time of....30
transitivity....907
trap
altruism....191
selfishness....190
trick exploiting....905
Triple Bottom Line....888
criticism levelled at....888

summarizing critique....894
triple helix....854
triple innovation strategies....914
triple symmetry....694
tritropic point of balance....441
tritropy
and balance....439
as a driving force....439
as an alternative to entropy....439
as seeking and finding balance....439
threefold "entropic" balance....439
trouble-shooting....905
Trow, Martin....419
trust....170
Tucker, Albert
prisoner's dilemma....387
Turner, Nigel....559, 719
turning the tide....192, 450, 473, 979
turtle
less talking and more running....661
Twain, Mark....368
two-slit experiment....741, 814

U

Ulysses (James Joyce)....572
uncertainty principle
of Heizenberg....658
uncertainty relationships....114, 652, 658
and perspectivist dimensions....337
in perspective....663
unexpected, the....141
unification methodology....836
recursive perspectivism....10
uninhabited island, example....586
uniqueness illusion....526, 556
United Nations....35, 141
Sustainable development goals....885
universe, search for boundaries....462
unreality
as extreme improbability....650
unstable hybrid innovation strategy....915
unsustainability
as the sum of improvement processes
....896
uphill battle
of sustainable initiatives....957
on the level playing field....958
Uruk....221
use-by date....283
USSR (Union of Soviet Socialist Republics)
....507
utopian....27, 101, 123
utopian pseudosolution
to societal dissonance....100
utopianism, blind....978
utopic
in disguise....978

V

v
average value per perspective....451, 454
relativistic average value....465
relativistic effort on average....465
vacancies
as positions on the number line....772
Vaish, Amrisha....386
Vallée-Poussin, Charles-Jean de la....788
Valléé-Poussin, Charles-jean de la....781
value....360
absolute and experiential....922
and number of perspectives....120
and perspective....360
as a relativistic concept....451
average per perspective....120, 511
average value v....451
averaging adaptive mechanism....120

creation of 120
description 451
experiencing of 120
falls when competition is excessive 415
is inherently pluriform 924
is situated 361
objective and experienced 470
out of balance 361
pseudo-objective 489
requires creating together 415
takes effort 470
value and effort 575
and Albert Einstein 453
between subject and object 488
energy and mass 453
experience is relative 465
experience is relativistic 466
from linear to non-linear 488
value = effort 453
value balance
and statistical double hypothesis 930
and value paradox 928
description 928
is the solution of the value paradox 934
value content 911
value creation 120
Value Cube 115, 882, 910
value curve
S-curve 922
value experience
diminishing in accordance with the harmonic series 493
of 100 euros 468
value indicators 924
value orientation
pioneering 882
value orientations
1. Process optimization 882
2. Capacity optimization 882
3. Team optimization 882
4. Product and service innovation 882
5. Multiplication 882
6. Societal broadening 882
accents in 936
and different cultures 934
and innovation methods 882
dependencies 911
example of combinations 945
innovative 906
negative 920, 933
optimizing 882
positive 920
six in total (pos) 910
three optimizing 910
three pioneering 910
tied together by a rubber band 911
twelve in total (positive and negative) 933
value orientations, negative 920
value paradox
and life cycles 927
and returns 929
and statistical double hypothesis 930
and value balance 928
description 927
inversion leads to value balance 928
seems discouraging 927
the solution is the value balance 934
value sequence 449
value systems
bringing together under one heading 451
value, generating efficiently 113
value–effort balance 386
value–effort correspondence hypothesis 451
value–effort ratio 450
value-time domain 923
variations 634
Vézère Valley 394
violence 413
visible hand, route of 201
Volkswagen affair 200

Vroon, Piet 393

W

Waal, Frans de 385, 391
Wall Street protest 386
wave function 187
wave functions 752, 765
  collapse of 741, 742
  Copenhagen school 742
  the Schrödinger equation 837
wave pattern with noise 760
wave patterns
  excellently hidden 765
Wave patterns 652
wavepacket localization 758
wave–particle behaviour 814
wave–particle dualism 837
wave–particle duality 114, 514
We are our brain
  confusion 311
We are our brain
  Are we really our brain? 311
We avoid pain and seek pleasure 75
wear, logarithm books 125
Weber, Ernst Heinrich
  law of 468
  subjective experience 468
Weber, Max 47, 226, 377, 379
  Entzauberung 225
Weber's law 468
Weber–Fechner law 468
well-being 168
Welles, Orson 584
Western societies 506
wheel of fortune 769
whistleblowers 172
Why Nations Fail 517
Wielinga, Bob 94
Wikipedia 851
Wilber, Ken 216
WIMP interface concept 992
windfall 575
windfalls and setbacks 451
winding roads 129
windmills
  tilting at 62
wine bottle as focal point 326
wine bottle in perspective, example 325
winner-picking
  not all by itself 879
  not too early 921
winner-picking strategies
  are actually tactics 921
  are not pioneering 921
  are optimizing 921
  obstruct extensive innovation 921
winners 251
Winograd, Terry 349
win-win
  as sloppy formula 397
win-win-win
  and the third identity 397
Wittmayer, Julia 267
workshop
  furniture maker's 74
World Economic Outlook 154
world has gone topsy turvy 855
world spectrum 314
world view
  homologous' 317
  three-part 316
  two-part 316
worn sawteeth 765
Wright 782
Wyllys, R.E. 574

X

Xenophanes 59

Y

Yahtzee 532
young woman
  supporting or stoning 58
Young, Thomas 814
  interference experiments 741
Yucatan 242

Z

Zeno of Elea 521, 660, 661, 682
zeta function
  and harmonic series 704
  bridge to Riemann hypothesis 700
  converges when 704
  definition 704
Zipf patterns 690
Zipf, George Kingsley 113, 126, 572
Zipf's law . 105, 112, 113, 121, 127, 443, 517, 568, 569, 570, 571, 572, 573, 714, 848, 998
  and uncertainty relationships 659
  explanation 820
  mathematical explanation 581
  perspectivist explanation 578
Zipf's law
  introduction 126
Zonderland, Epke 452
Zugspitze 863

‘This book by Henk Diepenmaat is a magnum opus – a rich, substantial, and engaging book in which he takes us on a journey down the path of humanity. Instead of taking the “issue of the day” view of societal practices, he outlines his vision of a clear and long-term path of progress that is the product of deep reflection about how societies develop. His ideas and arguments shed a remarkable light on the erratic course of human development, and they represent a highly optimistic route to our future. The Path of Humanity is inspirational food for thought about both the nature of societal development and what we as people are capable of together.’

Jacqueline Cramer, Professor of Sustainable Innovation, Utrecht University
Former Netherlands Minister of Public Housing, Spatial Planning, and the Environment

Today's societies are at a breaking point, characterized by problems like the 'plastic soup', climate change, inadequate health care, and social isolation. It is a time of transition. Human nature, often rather self-absorbed, seems powerless to turn the tide.

Yet for hundreds of millennia our species has unconsciously been following an unseen path of improvement, with all its ups and downs, in our evolution from hunter-gatherers to agricultural societies, city states, modern nation states, and finally to the late-modern world of today.

By recognizing this 'path of humanity' and consciously following it, we can greatly improve and even accelerate societal development. Taking 'the path' offers humanity new opportunities for societal innovation and makes acting together as Team World the obvious choice.

The author shows how 'recursive perspectivism' enables us to see the experiential space in which we as actors shape our societal lives. This far-reaching hypothesis reveals a discrete numeric landscape of perspectives that explains empirical pattern-distribution laws such as the laws of Zipf and Benford, and the Pareto principle, with prime numbers playing a leading role. It gives a leading role to prime numbers.

The 'path of humanity' seems to be the most promising, and in the long term most likely, path of development through this landscape. Attractive and stable societies are generally located along this path. The experiential landscape has entropic, statistical, relativistic, and quantum-theoretical properties, all of which have implications for our journey.

These properties and their consequences call for methods for societal innovation that are adapted to the particular situation at hand, with colourful names like the 'penta helix', 'multi-actor process management', the 'societal innovation cube', and the 'backbone'.

The Path of Humanity **provides fascinating insights for anyone wanting to understand and foster our shared journey to the future.**