It's about us.

Meaning, Emotions and Mental Health in Post-Newtonian Reality

Ton Baggerman

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Our present day common worldview is aging. It springs from the Enlightenment, some 350 years ago, with Descartes' assumption of the division of mind and matter at its core. From these ideas Newtonian physics developed and many more of the cornerstones of Western society. The Cartesian/Newtonian worldview has become self-evident, causing us to forget it is ultimately based on a set of assumptions, not facts. For over a century, it is being challenged by findings in fundamental physics pointing at aspects of reality yet to be recognized in mainstream awareness. The subject is highly academic, to say the least, accessible only to those who are well proficient in physics and the philosophy of science. What we need is a sufficient language in which to speak of these findings.

This book is a natural follow up of 'The Universe, Life and Everything. Dialogues on our Changing Understanding of Reality' by Sarah Durston and Ton Baggerman (2017). It describes – in accessible and 'everyday' language – the essentials of the Newtonian paradigm, quantum physics and relativity theory. It does so by relating strange concepts such as relativity, the Schrödinger equation, the Zeno effect, entanglement and entropy to experiences we all have, such as our attempts to lead meaningful lives, our emotions and mental health. Also, this book offers suggestions on how these concepts could have a place in present day psychology and extend its predominantly Newtonian based view. Overall, the book encourages a view of reality in which we humans are not just spectators of an 'out there' kind of reality but active partakers in its coming about. It's about us.

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the living proof of the existence of a meaningful direction in nature.

It's about us.

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Preface

Curiosity killed the cat and satisfaction brought it back. There is plenty of satisfaction to be found on the pages to come. They follow-up on the book I wrote with Sarah Durston which touched upon the same issue of the possibility of a paradigm shift, or rather a paradigm extension. The point that is made is that we should probably consider including 'non-physical' concepts like meaning and consciousness into our conception of reality, whereas the present Newtonian paradigm consistently rules those aspects out. That first book primarily meant to arouse attention to the subject, in which we did succeed to some extent. In this book, I investigate in more detail some of the scientific reasons for a shift of paradigm and the way it could possibly translate to our everyday lives. Now that attention has been aroused, here is an invitation to move up to the next level.

Still, this book too is primarily an essay, as it cannot be but an essay. There is no way to be sure yet about the issues it discusses. It is an attempt to find a way through the unknown territories beyond our familiar worldview, moving about as carefully as I can. One reason for this attempt that personally motivated me is the present surfacing of serious systemic problems of our modern society that can be traced back to its Newtonian roots, as described in book #1. We are experiencing crises in our economic system, in society and climate. You may not agree with these 'opinions', if you will, but please share in my curiosity, and allow yourself to be discomposed just a bit by the mildly entropic content of what is about to come.

Contents

1. A changing worldview

All there is, are possibilities. Whether material object or mental experience, all is in continuous process towards becoming something else. This process has a formative tendency towards ever more complexity and is open to conscious effort. It gives us humans an active role in the creation of reality. It's about us.

This is the short version of what is said on the pages to come[1]. This book describes how a series of innovative findings in twentieth century physics opened up new areas of reality for us to explore. These findings themselves concern mainly the very small and the very fast parts of nature but they changed the way physics understands reality overall, which is why they bear relevance to our 'everyday' understanding of reality also. However, we are picking up that relevance only very hesitantly because the new insights are so different from our present worldview. The very small and very fast areas of reality turn out to not obey what we thought were the universal laws of nature. Also, they hint at a rather intimate relationship between mind and matter. This has been putting pressure on 'our paradigm' - the basic set of assumptions by which we automatically understand the world around us[2]. That paradigm is in need of an upgrade if it is to remain credible and useful for addressing some of the crises of our times. Along with that, we need new language - new words and expansions of existing ones - to be able to speak about the new findings from physics.

This book describes the changing paradigm and some of the possible directions for its further expansion. It translates some of the strange new insights from physics into a more 'everyday' and intuitive kind of

1 It is also a very short outline of the book I wrote with Sarah Durston (Durston & Baggerman, 2017) in which we investigate the ongoing paradigm shift in science.

2 A comparable definition of paradigm is given by L'Abate: *'a worldview, how reality is perceived and validated by more than one individual or method, a value or an aggregate system of values about how to perceive reality.*' (L'Abate, 2012a, p. 7.). Overton discusses a paradigm as an overarching *metatheory*. Using Kuhn's original discussion of paradigms (Kuhn, 1970) as a starting point, Overton arrives at the following definition: *'Scientific paradigms are coherent interlocking sets of principles that function in nested hierarchies ranging from narrow relatively concrete models to broad abstract worldviews. Paradigms, which we also refer to as* metatheories *introduce a sociological dimension into science. They provide concepts that ground, constrain, and sustain scientific theory and methodology, and they are necessary indissociable components of any domain of scientific inquiry.'* (Overton, 2012, p. 58).

language and gives 'old' words 'new' meanings. The field of psychology will show to be an especially suitable vehicle for that purpose as it concerns experiences that everyone of us is familiar with. To give you a sense of the relevance of the ongoing paradigm shift - and a reason to read this book - this introductory chapter offers a short overview of what it is about. Chapters 2 and 3 describe aspects of the ongoing paradigm shift in more detail.

1.1 The Newtonian paradigm and its limits

Present day science has its roots in the period of the Enlightenment, roughly dating back to halfway the seventeenth century[3]. Among the many enlightened thinkers during this era two play a key role in the development of what would become the ruling worldview in the centuries to follow: René Descartes and Isaac Newton. It is because of them that our present scientific paradigm is often referred to as the 'Cartesian' or 'Newtonian' paradigm and sometimes even 'classical' paradigm which underscores its dominance over the past three centuries. The core of this paradigm is Descartes' assumption that mind and matter are two separate aspects of reality and that the natural sciences should focus on the latter. By focusing on the material aspects of reality and by leaving out any mental or spiritual explanations nature became measurable, predictable and controllable, primarily through the language of mathematics. This is most prominently exemplified in the system of physical laws formulated by Newton. The metaphor of nature as a giant machine or clockwork with all of its elementary parts working together in a predictable way, captures much of the essence of Newtonian thinking.

The division of mind and matter may seem obvious to most of us nowadays. We are hardly ever aware of this assumption in our daily lives, it has become self-evident. But in Descartes' times it was a radical idea. For most of his contemporaries, the world was a place where an almighty God ruled, whether directly from Heaven or through His 'representatives' here on Earth. Natural phenomena were seen as subjected to the hand of God and evil forces could take possession of innocent souls, causing physical and mental illnesses.

3 The description in this paragraph is my summarized interpretation of several essential sources, each based on and referring to a broad collection of literature: Heisenberg (1958), L'Abate (2012a), Mansfield (1995), Stapp (2009), Wendt (2015).

Nobles and clerics decided over life and death and imposed harsh measures as they wished, referring to their divine mandates to which logic and reason were often subsidiary at best. It is hard to imagine how it must have felt for our ancestors of the late Medieval period to live in their world. Perhaps it was a wondrous and spiritual place to live in, but also one in which self-determination and freedom - concepts so highly valued in our own times - were scarce.

The impact of Descartes' and Newton's ideas on society can hardly be overestimated. The Cartesian / Newtonian shift away from spiritual dependency towards logical thinking in terms of matter, numbers, quantities and math, caused a shift in the balance of power in society. The new ideas and their successful application in areas such as physics, engineering, commerce, law and civics brought freedom and power to those who mastered the new language. The development of medical science lifted people's health to a level like never before, raising their chances of unfolding their potential. Economic science helped to increase wealth to an unprecedented level and scale. The world with everything in it, including us human beings, really did seem to be 'makeable' just like a machine: if some desired outcome of that machine stays away, one of its parts probably needs to be modified in order to make it do what we want. To be certain: the development of the Cartesian / Newtonian paradigm went with serious and sometimes dramatic hick-ups and crises but in the long run, it shaped and touched upon all aspects of present day society, globally.

Similarly to how Newtonian physics spawned an all-encompassing paradigm, it is once again physics that is pointing at its shortcomings. During the better part of the twentieth century fundamental physics has been producing insights that are incompatible with the ruling Newtonian paradigm - to a point where even its original assumption of the separation of mind and matter has become open to debate. The Newtonian paradigm is subject to strong pressures towards modification and expansion - a process that is ongoing and may not lead to a conclusion for some time to come. The ones primarily responsible for these pressures are quantum physics and relativity theory.

When Planck discovered the quantum, as far back as the year 1900, he soon realized that this challenged the foundations of Newtonian science. Until then, science had assumed that the material building blocks of nature can be analyzed into ever smaller particles, provided one has measurement instruments of the right precision. This was one of the Newtonian paradigm's central assumptions. But Planck discovered that its reach was limited: at some point nature (be it matter or light beams or any other physical phenomenon) cannot be divided into smaller units. This point is what Planck called a 'quantum': the smallest, basic unit of energy. A few years later Heisenberg showed that bits of nature as tiny as quanta do not have any particular qualities of their own. The quantum itself is essentially a possibility of becoming something - energy awaiting to be shaped into something (anything) else. For that, the minuscule quantum depends on contact with its surroundings, for example an observer performing measurements on it. The measurement itself is a form of contact that causes the quantum to take shape. And as the choice of measurements partly depends on the intentions and values in the observer's mind, this implies that her mind *co-creates* the things she is observing. Thus, the most central of all Newtonian assumptions - the separation of mind and matter - could not hold.

In that same period, Einstein proposed his theory of relativity of time and space, stating that time and space are not the absolute parameters Newtonian science assumed them to be. Einstein's mathematics lead him to conclude that the speed at which an observer moves *relatively* to another observer, affects these observers' relative measurements of time. In other words: time's pace is personal, it depends on your speed as compared to that of someone else. Such a finding is unthinkable within Newtonian physics, which assumes time and space to be fixed and constant everywhere, always.

In the period following these discoveries, relativity theory and quantum physics have produced many more fundamental insights into reality beyond the Newtonian paradigm. A thought-stimulating one started out with a famous thought experiment of Einstein, Podolsky and Rosen in 1935 which was theoretically confirmed by Bell later on. The experiment shows how two particles can be connected in a way that is independent of time and space. No matter how far apart these

so called 'entangled' particles are, the manipulation of one *instantly* coincides with a change of the other. They behave in a *synchronous* way, without any apparent working mechanism to account for that. This was not in line with what Einstein had tried to argue when he designed the experiment. He predicted at least some small amount of time to allow information from the manipulated particle to travel and cause an 'effect' on the other. But the synchronous behavior of entangled particles seemed to mock our intuitive (Newtonian) understanding of cause and effect. For Einstein it was difficult to accept that nature could behave in this way. For us fallible mortals it can be a comforting thought that even he was not always right all of the time. Meanwhile, the concept of entangled particles is finding its first applications in the development of quantum computing, bringing faster ways of processing larger quantities of information.

1.2 Beyond the Newtonian paradigm

Part of the reason why the findings of Planck, Einstein and Heisenberg left the scientific community of their time at a loss (as they still do to some extent) is that the *assumptions about* reality within Newtonian science had come to be confused with *descriptions of* reality (Louth, 2011). Over the years, we forgot what they are: pragmatic assumptions about reality, not knowledge about the nature of reality itself. The assumption of the separation of mind and matter has proved to be an extremely productive one but this does not necessarily mean that mind and matter are *really* two separate phenomena. Reality, and we humans along with it, may sometimes seem like a clockwork, but to assume that it really *is* a clockwork may well be besides the truth. Relativity and quantum physics suggest that reality is more fluid, co-creational and non-causal than the clockwork metaphor assumes.

We cannot be sure that beyond the limits of the 'old' paradigm lies a new and better one. Perhaps the whole notion of science developing within a coherent paradigm will have to be reconsidered and a system of various complementary paradigms will prove more appropriate. Some basic outlines seem to be taking shape though, as will be elaborated on the pages to come (see also Durston & Baggerman, 2017):

1. the 'stuff' of which reality is made are quanta: basic 'possibility-units' that can actualize into specific shapes through the specific interaction with their surroundings (such as an observer);
2. reality is thus not a fixed objective state but a process of continuous interactions between quanta and their surroundings. Insofar as these surroundings are an observer, this observer can thus be said to co-create what she is observing;
3. this process has an inherent formative tendency which most basically manifests itself in the mere 'being there' of possibilities. From there on the formative process leads to the actualization of those possibilities and to their development into ever more complex interactions;
4. this formative process is open to the conscious effort of an observer who can intentionally choose to observe in a specific way. This means that the reality-process of actualizing possibilities is not entirely random but intentional to some degree;
5. since the conscious co-creating observer is just as much part of reality as the subject of observation itself, reality can be said to be consciously observing and co-creating itself.

To have reached the limits of the Newtonian paradigm does not mean it has become obsolete. It merely tells us that there are areas of reality which cannot be understood within the Newtonian set of assumptions. There is no reason to question the paradigm's validity within the areas to which the assumptions do apply. By all means, engineers should stick to Newton's formulas for designing bridges and airplanes. Likewise, there is no reason to doubt that the Influenza virus causes the flu and the balance of powers is an extremely useful civic construct – to mention only a small fraction of the achievements of the Newtonian paradigm.

1.3 Everyday life

The new findings from physics have been there for over a century now, begging to be noticed by scientific fields 'higher up the ladder of abstraction' such as the social sciences. As the social sciences focus on more 'everyday' levels of reality such as human behavior and mental

health (psychology), human relationships on group level (sociology, political science) and financial decision making (economics), they might well offer ways for the new ideas to permeate from physics into our common awareness. But the social sciences have remained awkwardly silent when it comes to investigating these ideas, let alone to investigate their possible application. Some attempts were done, such as the work of psychoanalyst Jung and quantum physicist Pauli as far back as the early days of quantum physics (Jung, 1973; Mansfield, 1995; Meier, 2001; see chapter 5 for a more detailed discussion). Jung and Pauli seriously invested in a cross-over of quantum physics and psychology. They recognized such phenomena as entanglement and synchronicity in our daily lives and worked out methods to make more sense out of them. The key to that was to gain access to our unconscious within a psychoanalytic therapy. Jung and Pauli supposed that the unconscious holds a deep source of knowledge and meaning which we can use to improve our mental health, if only we succeed in interpreting the symbolic language it speaks. But along with the decline of psychoanalysis as a primary strand of psychology these ideas seem to have moved to the background.

As we will see later on in this book (in chapter 4) Rogers' person centered approach, another major variant within the field of psychology, does use some of the new ideas from physics (Rogers, 1961, 1980). Rogers explicitly refers to a formative 'actualizing' tendency in nature, recognized by modern physics, that can be capitalized on in psychological treatments. The person centered approach basically trusts the person's innate formative tendency to point out particular paths of development back towards mental health. The role of the therapist is primarily to provide an empathetic, personal and respectful climate in which the client can get this formative process going. These basic aspects of the person centered approach have been adopted by many other approaches to psychotherapy. However, the link that Rogers saw with physics has not yet received much attention.

Still, the social sciences have much to gain from looking into what modern physics has to say. As Wendt describes:

'{…} the basic idea - that the mind and social life are macroscopic quantum mechanical phenomena - hit me as just the kind of thesis that could help move philosophical debates in the social sciences forward. That is because it calls into question a foundational assumption taken for granted by all sides – namely that social life is governed by the laws of classical physics.' (Wendt, 2015, p. 2)

Wendt seems to be in good company notably of Heisenberg, one of the founders of quantum physics, who disapproved of classical mechanical reasoning about the psyche of human beings:

'{…} this frame was so narrow and rigid that it was difficult to find a place in it for many concepts of mind, of the human soul or life. Mind could be introduced into the general picture only as a kind of mirror of the material world; {…} in the science of psychology, the scientists were always tempted – if I may carry the comparison further – to pay more attention to its mechanical than to its optical properties. Even there one tried to apply the concepts of classical physics, primarily that of causality.' (Heisenberg, 1958, p. 169).

A look at the present state of affairs within the field of psychology suggests the same: it has yet to take into account what modern physics tells us about essential aspects of reality (e.g. L'Abate, 2012b; Overton, 2012). Professional guidelines and even legislation strongly emphasize the use of scientifically validated methods for psychological treatments. However, the science these guidelines refer to is classical Newtonian science. A clear analysis of this is given by Wampold (Wampold, 2010, 2015). He focuses on the scientific basis for modern psychotherapy[4] and concludes that studies into its effectiveness wrongly use the same Newtonian-based design as studies within the medical model:

'The development of psychotherapy as a modern treatment is complex. One strand of this development has been closely intertwined with the development of modern medicine since the late 19th century; this strand appears to be the most apparent in scientific discussions of psychotherapy.' (Wampold, 2010, p. 49).

4 Most of the discussion of psychology in this book will actually concern the sub-discipline of psycho*therapy*. Psychotherapy is defined by the American Psychological Association as: *'the informed and intentional application of clinical methods and interpersonal stances derived from established psychological principles for the purpose of assisting people to modify their behaviors, cognitions and/of other personal characteristics in directions that the participants deem desirable'* (APA, 2012, referring to Norcross, 1990, pp. 218-220).

Wampold describes how the medical model for evaluation of treatments assumes that treatments consist of various separate ingredients. Some ingredients are held to be more potent than others for curing a specific ailment. Treatments using superior ingredients should therefore render the best results. Translated to psychotherapy this means that psychotherapies are assumed to consist of various interventions by the therapist that lead to different effects on patients' different 'mental disorders'. Some interventions are expected to be superior to others, leading to better effects in terms of curing the disorder. By identifying best-practice interventions we can then formulate protocols for effective treatments of psychological disorders. The Newtonian roots of this mechanical 'clockwork' reasoning are evident: the patient's body and mind are seen as consisting of various 'parts' of which some are disordered and can be 'fixed' by administering a specific protocolled intervention onto them. From this a cure will then follow. Of course, this description is a bit of a caricature. No medical doctor or psychologist will actually relate to a patient as if she were a kind of clockwork. Still, the classically based *methods* for treatment rely on the assumption that this is how the curative process works.

The above suggests that contemporary psychology is either not aware of physics' post-Newtonian insights into reality, or does not know what to do with them. In this respect psychology seems to be exemplary for science and actually society (Wendt, 2015; Durston & Baggerman, 2017): the post Newtonian ideas from physics are yet to permeate into our common worldview. Why is this? Given that the bracketing of the Newtonian paradigm has been going on for over a century now this question seems appropriate. In our prior investigation, Sarah Durston and I found several factors, such as the values and culture in academic practice. However, the lack of an appropriate language to talk about the strange new ideas appears to be the biggest problem. Physics itself primarily uses the language of mathematics which is hardly suitable for the concepts that are studied in the social sciences and even less so for interactions in everyday life. Moreover, the ideas themselves seem too alien compared to what we are used to in our deeply engrained Newtonian mind-set. How to speak about 'reality as a possibility' when I can evidently see and touch objects that are definitely there? How to understand our own co-

creational role when I observe no influence of my thoughts on those objects nor on other aspects of nature such as the course of time? How to explain the synchronous behavior of two particles that are light years apart? What is a 'particle' or a 'quantum' anyway? Again we find ourselves in the company of Heisenberg when he states:

'One realizes that the foundations of physics have started moving; and that this motion has caused the feeling that the ground would be cut from science. At the same time it probably means that one has not yet found the correct language with which to speak about the new situation {…}. *The improved experimental technique of our time brings into the scope of science new aspects of nature which cannot be described in terms of the common* [Newtonian] *concepts. But in what language, then, should they be described?'* (Heisenberg, 1958, p. 145, bracketed text added by author).

Heisenberg expected the development of an appropriate language to be crucial for different fields of science to be able to communicate and - probably even more important - for them to communicate with society. Literature offers many examples of other scientists emphasizing this problem and the difficulty to solve it (e.g. Mansfield, 1995; Overton, 2012; Rogers, 1980). Bohm, another leading physicist from the twentieth century even ventured into designing a new and non-dualistic language which he called the Rheomode (Bohm, 1980).

Another reason for our slow acceptance of the new ideas from physics is the success of the Newtonian paradigm. The Enlightenment, with Newtonian science as its primary vehicle, brought us unprecedented health and well being. We would not be so unwise to do away with it, would we? What would follow, the reintroduction of absolute rulers with divine mandates? Is the world going to be flat again? Should we embrace shamanism in our hospitals? For sure, these are good reasons to be protective of the achievements of the Newtonian paradigm. They should not be reasons, however, to close our eyes for new ideas that point towards other areas of reality in need of other explanations. Sticking to what works well is fine but sticking to it too stubbornly is negligence.

1.4 Why this book?

As I intend to illustrate in this book, the new insights beyond the Newtonian paradigm hold intuitively graspable aspects that can be put to words fairly well in everyday vocabulary. Various fields within the social sciences each offer opportunities for the development of such vocabulary, as our preliminary study suggests (Durston & Baggerman, 2017). For now, I will rely on the framework of psychology since my own professional experience is mostly in that field and I know my way around in it to some extent. This is not to say that this book explicitly or exclusively addresses fellow psychologists, although it does contain some ideas for practical application which they might like to consider. Rather, psychology as such seems to be a suitable vehicle for the translation that physicists such as Heisenberg and Bohm were looking for. It focuses on broadly shared and everyday human experiences to which any reader can probably relate, such as our attempts to lead meaningful lives, our emotions and mental health. Keeping in mind the goal of contributing to an accessible language, I will limit the use of psychological jargon to a minimum, so that readers with all kinds of backgrounds can stay tuned to the book's basic argument.

What will emerge from the translation of post-Newtonian ideas in the chapters to come is a fluid conception of reality, not the fixed division of mind and matter that we have become used to. This fluid conception seems to correspond better to our experience of how it is to be a living human being. Living itself is never a static and fixed experience but always one of movement and development, however small or big. Neither is it a dualistic experience like Newtonian science would presuppose: we do not experience our material bodies to be independent from our feelings and thoughts and intentions. This point is illustrated in Rogers' almost desperate call:

'Most of us spent twenty or more years in educational institutions where the intellect was all. *Anything that counted, anything of any importance, occurred above the neck – in absorbing and memorizing, in thought and expression. Yet in life, in therapy, in marriage, in parent-child and other intimate relationships, in encounter groups, in university faculty meetings, we were forced to learn that feelings were an equally important part of living. But, due largely to our education, we still tend to dichotomize these two aspects.* {…} *So the thread that I see in the issues I have raised is that each one represents a possible move toward the enhancement, the*

deepening, the enrichment of our profession. {…} *the final question I would leave with you is, Do we dare?'* (Rogers, 1980, pp. 248-258).

Following from the above, the aim of this book is twofold:

- to investigate the opportunities for psychology of the scientific findings from beyond the Newtonian paradigm;
- by doing so, to contribute to the development of a more 'everyday' kind of language in which to communicate about those findings so that they can permeate into our common knowledge.

In the following sections of this book, you will find:

- a discussion of the main characteristics of the Newtonian paradigm (chapter 2);
- a discussion of various scientific findings that suggest a more fluid, directional, perhaps even conscious conception of reality (chapter 3);
- suggestions for simple applications of these findings in psychology and, along with that, suggestions for a more everyday kind of language (chapter 4);
- a wrap-up and look ahead (chapter 5).

Judging by the Newtonian paradigm's effects on science and innumerate aspects of our society, we can expect to find an immense number of opportunities in the extraparadigmatic domain also. But there is another, rather grim and urgent reason for us to look beyond our horizon. Our clinging to the dualistic assumptions of the classical paradigm is causing crises, as we can see for instance in the ongoing damage to our natural environment and the tragedies of refugees all over the world (e.g. Stapp, 2009; Scharmer, 2009). As a matter of fact these crises illustrate why an interaction-based paradigm is more realistic. We need a more fluid conception of reality in which there is less of a fissure between 'us' and 'nature' and between 'us' and 'them'. We are starting to experience that nature *is* us and we *are* nature. The Newtonian assumption that the two can be treated as separate things has a limited validity and there is much to gain by complementing it with assumptions about interaction, process and co-creation. If we do so, our awareness of our active and creative role in reality may grow

and we may feel encouraged to take the lead in necessary improvements instead of assuming that we are just spectators to an out-there reality that is unfolding before our eyes. It's about us.

2. Newtonian science

Relativity theory and quantum physics have yielded ideas about reality that can be hard to accommodate at first sight. They may have a counter-intuitive feel to them, as for instance when we try to fathom the implications of a quantum phenomenon such as entanglement, where a distant particle can react *instantaneously* upon an experimenter's manipulations to its 'twin' particle. For most of us this is too far out to easily understand what is going on. We are used to look for the cause of what we see happening but in entangled events such a cause is not there: the two particles act synchronously as if they were one, whereas 'classical' causation would demand at least some delay between the moment of manipulation of one particle and the reaction of the other.

That quantum phenomena such as entanglement should feel counter-intuitive is not inherent to those concepts themselves - they are findings from measurements, grounded in sound mathematics. What makes them counter-intuitive is our common understanding of the world which leaves no room for instantaneous actions at a distance, nor for the notion of us having an active role in the coming about of reality. We perceive ourselves as a 'distinct I' living in 'the world around me', a material place full of physical objects and cause-effect relationships. These are aspects of the Cartesian / Newtonian worldview that have become ingrained into our everyday thinking so that they are automatic and self-evident. Although for some this holds more than for others it seems safe to say that we have come to think this is how the world *is*, that our world *is* Newtonian. We are often not aware that our view is one of many possible views and not reality per se. Still, our interpretation of the world around us and ourselves is full of assumptions – it is a paradigm. All this reflects the success of the classical paradigm in the past few centuries. It has brought us an immense increase of knowledge, health, wealth, societal structure and achievements that had been held impossible. No wonder its underlying view of reality is still very convincing.

This chapter offers some inquiry into our automatic (Newtonian) ways of understanding the world[5]. It is meant to facilitate the investigation later on in this book of the relevance of relativity theory and quantum physics for a more 'everyday level' of reality. Awareness of one's (automatic) way of thinking creates some 'distance' from which one can easier contrast and investigate strange new ways of thinking without discarding them too quickly[6]. That in turn, can help to decide if and how to adopt them, as the 'extraparadigmatic' domain might well hold opportunities and solutions to problems that cannot be solved with an 'intraparadigmatic' way of thinking. Section 2.1 below offers a comprehensive description of the defining assumptions of our present Newtonian worldview. A description of essential features of relativity and quantum physics follows in chapter 3. Section 2.2 below provides a short description of the Newtonian influences on contemporary psychology. It serves to facilitate the proposed integration of concepts from physics and psychology, further on in chapter 4.

2.1 Axioms of the Newtonian paradigm

The roots of Newtonian science can be traced back to the intense debates between the philosophers of ancient Greece and their ideas on what reality is made of (Heisenberg, 1958). Of particular importance are their questions about the existence of distinct mind- and matter-aspects of reality and, if so, about the relationship between those two aspects. Is the mind solely a human privilege or is matter 'mindful' also? If matter is mindless, then what is the basis of our human minds in our material bodies? How can I understand reality with my mind when information about reality is coming in through my material senses of which I have only five? Can I even be sure that there is a 'world around me', or could it all just be a dream I am dreaming? If there is a material world around me, then how can I exert some influence over it so that I can do what I feel is important?

5 Again: for reasons of accessibility of this text, I have kept references to various sources in literature as lean as possible within the margins of responsible and accountable writing. The sources I have used for this chapter are seminal and encompassing: (Heisenberg (1958), Bohr (1958), Pauli (1994), L'Abate (2012a), Bohm (1980), Mansfield (1995), Stapp (2009), Wendt (2015). Specific references are given for particular topics.

6 'Distancing' as a way of facilitating investigation and idea-formation is what philosopher Husserl called an 'epoche' (see Hut, 2001).

Some of the essence of this debate is reflected in Plato's ideas about a 'phenomenological' nature, in which he emphasizes that our understanding of reality depends on our sensory input and thus our *experience*. Plato illustrates this with a thought experiment which is called the 'simile of the cave'. Plato imagines a group of prisoners living their entire lives chained tightly in fixed positions in a cave. The only thing they can see is the cave's wall. On it are flickering shadows, caused by a fire that is located behind them outside of their scope. The cave is these men's reality and without any other experience they are led to believe that the moving shadows on the cave's wall are real entities. Once one prisoner manages to escape and steps out of the cave, the richness of other aspects of nature is unlocked to him, whereas the others are still locked in their restricted experience of reality. The essence of what Plato is telling us here[7] is that we can know only as much about reality as our senses and our situation allow us to and lead us to believe. In some sense we are all like the men in Plato's cave: limited by our senses and in the middle of our own situations. So how can we tell for sure if what our eyes see is the truth or an illusion created by our own minds?

The Greek philosophers regained attention in the Italian Renaissance (covering roughly the 15th and 16th century) after an era of religious preoccupation with the human soul and its relation to God. Nature and the world outside of us became the topic of interest once again and so did the debates of the ancients Greeks about how to study it. In 1637, when the renewed interest in nature had gained momentum, René Descartes articulated his axiom of the duality of mind and matter[8]. This axiom offered a pragmatic way around the philosophical debate on how much we can ever objectively know about nature: Descartes proposed that our ability to make the mere observation 'I am thinking' proved for a fact the existence of at least one aspect of reality: our thinking self ('res cogitans'). Elaborating on that finding, he noticed a strong inclination of the thinking self to experience a material outside world ('res extensa'), including our own material bodies. By supposing that God would surely never deceive us into experiencing a material world that is not actually there, Descartes

7 Plato's simile of the cave is also an illustration of what happens in a shift of paradigm (e.g. from the Newtonian to a quantum worldview).
8 See annotated edition, Descartes (1988).

'proved' that this material world is not just one of our own illusions. The essence of Descartes' reasoning is far reaching. Although he still reverts to God in order to prove the existence of the material aspect of reality, his reasoning was truly innovative in pragmatically separating the mind (the 'I') from the rest of nature so that science could focus on nature's material and measurable aspects. From there on, science could confidently leave the ever elusive mind out of the equation. It is what paved the way for Isaac Newton to formulate what became the classical laws of physics.

In 1687, Newton formulated in his *Principia*[9] three elementary mathematical laws of the motion of material objects. Together, these laws allowed for detailed calculations of the speed, trajectory and mass of material objects in relation to each other. With this practical mathematical 'tool' in hand, all sorts of mechanical applications came within reach of engineers, leading to a profusion of applications that soon changed Western societies in a fundamental way. The industrial revolution and other technological developments later on as well as medical science ultimately have their foundations in the ideas of Descartes and Newton. Along with these technological changes came a growing and widely shared conviction that Newton's laws contained a principle that applied to various aspects of society also, such as the rule of law, economics and politics. For instance civic systems and institutions were modeled to the principle of separate objects balancing each other. Philosophers such as Locke and Montesquieu devised a system for the governance of states in which governmental tasks are separated and balanced over different independent branches: the 'Trias Politica' or 'Separation of Powers' defines a legislative, executive and a judiciary branch, each with their own responsibilities for the common good. This civic system is still the basis for democratic state governance in our time.
As Newton's ideas pervaded into all levels of Western society they came to constitute a broadly shared worldview, the so called 'Newtonian paradigm'. Moreover, largely due to their success, it became tempting to regard them as a *description* of what reality *is*. Louth (2011) describes how over the years, we were inclined to forget that these ideas are based on the pragmatic Cartesian *assumption* about

9 See annotated edition (Newton, 1934).

reality that mind and matter are separate. Newton himself was well aware of this axiomatic basis for his work but the more his ideas were applied to various domains, the more the word 'Newtonian' got 'stretched' to describe all sorts of aspects of reality. Illustrative of this is that over time various synonyms arose to refer to the Newtonian paradigm such as 'classical', 'mechanistic', 'positivist' and 'reductionist', all referring to some relevant aspect of it. This inflationary use of the term 'Newtonian' went along with a loose handling of its origin as a set of assumptions about reality. More and more we came to believe that the world really *is* a giant clockwork instead of keeping in mind that this is a Newtonian metaphor based on assumptions.

Despite the inflationary pull over the years, the core of the Newtonian paradigm has remained rather unaffected. Wendt describes how this core is composed of six basic assumptions or 'axioms' that grew from the original Cartesian split of mind and matter (Wendt, 2015, pp. 58-69; see also Durston & Baggerman, 2017 pp 8,9). They all concern particular, partly overlapping, aspects of reality as assumed within the Newtonian paradigm.

Materialism resembles the original Cartesian assumption of a 'res extensa', a material world around us which exists separate from the mind ('res cogitans'). However, the axiom of materialism carries Descartes' assumption one step further in stating that reality is *exclusively* made up of matter. There is no place for the mind in this axiom. The material particles that make up reality are dead – more accurately put: lifeless, void of life. This also means that life itself is more or less an illusory phenomenon, as it is merely the cause-and-effect interactions of a bunch of lifeless material particles, constituting the organisms that behave in ways we are inclined to view as 'alive'. It seems obvious that materialism leaves even less room for ethereal concepts such as free will, meaning and consciousness.

Atomism is an axiom stating that the particles of which the material world (with everything in it, including the stellar realm and our material bodies) consists, are separable. In this view, matter is seen as made of ever smaller particles of matter, all the way down to the subatomic level. In principle there are no boundaries for further

analysis, whether we look at large scale structures like stars and galaxies or at small scale structures like atoms and electrons. This approach can also be applied to other natural phenomena like time, space, light and energy. Our ability to analyze any natural phenomenon, is limited only by the suitability and the precision of our instruments for the measurements we want to make.

Determinism refers to the idea that material objects strictly follow Newton's laws of motion. By applying these laws, one should in principle be able to predict any development of anything (for instance an object's speed or location), provided one has sufficient computing power. Likewise, one should in principle be able to trace back in time the causes of any present situation. This axiom states that what we observe did not come randomly out of nothing even though sometimes it may seem to do so. It is always preceded in time by the things that caused it. Also, it is itself a cause for what follows upon it.

Mechanism states that, given the laws by which matter 'behaves', the cause of what we observe is always material. Of course there are 'forces' like gravity and magnetism that travel the distance between objects, but these forces are assumed to exist only by virtue of the material objects that cause them. One of the implications of a mechanistic worldview is that there is no such thing as 'free will' since something in the future can never be the cause for what is happening in the now. 'Morality' exists only insofar as it serves the individual (see also Stapp, 2009, p. 183). We think we control our behavior with our thoughts, feelings and intentions but in fact it is the other way round: we live our lives looking at the 3D 'movie screen' on which reality unfolds, never able to influence the script. Our intentions are part of that script which has been written long ago when a chain of events was set into motion that will continue no matter what we think or do. Our thoughts and actions themselves are part of that chain of events. We may experience them as our contributions to the way of the world but that is just us living our illusions.

Absolute space and time is an axiom stating that space and time are objectively measurable and independent phenomena that set the 'stage' on which material processes evolve. They are 'given' or what is

often referred to as 'a priori'[10]. The stage itself is callously immune to whatever does or does not happen on it. Of all the Newtonian assumptions, this one may well be the most intuitive one. We all have experiences of time ticking away at its own stubborn pace, however hard we wish it to go slower or faster. Comparably, distances are often frustratingly insensitive to our wishes also.

Subject-object distinction concerns the assumption that the mental aspect of reality (provided that we are willing to recognize a mental aspect at all) is separate from and non-causal to the material world. From this it follows that the material world is not affected in any way by our observations of it. Scientists can regard themselves as neutral 'spectators' of reality, their presence alone has no influence on the course of events, nor has any other of their 'mental' characteristics, such as their intentions or values. This allows, among other things, for the scientific motto of replicability of experiments. As long as the same procedures are administered different scientists should get equal results from a measurement, every time. If not, this means some procedural aspect must have been overlooked.

Overall, one could say that the machines which are the products of the Newtonian paradigm have become the metaphor for its own view on reality. Nature is seen as a machine with interacting parts just like a giant clockwork. If only the machine is analyzed into its constituting parts and their mutual cause-effect relationships, it can be understood and manipulated.

The underlying assumptions of the Newtonian paradigm have proven to constitute a powerful framework from which many branches of science could grow. Within physics and most of the applied sciences that draw from it, the Newtonian paradigm remained unchallenged until late nineteenth century. By then ever more domains of nature had been included within the paradigm's reach, providing a host of applications. Besides primary application of Newton's laws to mechanical engineering, they proved to apply to areas such as hydrodynamics, aerodynamics, acoustics, astronomy and - although only to some degree - even non-mechanical phenomena such as

10 The concept 'a priori' is an important aspect of the philosophy of Kant.

electricity, magnetism and heat. Heisenberg describes how towards the end of the nineteenth century there was a broadly shared belief that the Newtonian paradigm was 'final', in the sense that it was believed to cover (or could cover, in principle) all aspects of nature (Heisenberg, 1958, p. 85). With the turn of the century, this belief was abruptly disturbed and shown to be too optimistic. Within a few years it became clear that the classical paradigm had reached the limits of its explanatory power and span of applicability. With the arrival of the theory of relativity and quantum physics, other domains of nature were discovered to which Newton's laws did not apply, especially the very fast and very small domains. Newton's laws prove to cover only macroscopic mechanical systems in which bodies move at 'low' velocities compared to the speed of light. Of course, this applies de facto to most everyday aspects of our material world, which leaves ample relevance to Newtonian science. But the description and explanation of more exotic phenomena that are non-mechanical, of atomic size and below or travel at (nearly) light speed, lies outside of the reach of Newton's laws. The essence of heat, for instance, is much better described by applying statistics and non-Newtonian concepts such as energy and entropy. Phenomena such as electricity, magnetism and light are best understood by Einstein's theory of relativity. Finally, (sub-) atomic phenomena are best described by quantum theory.

Arguably, the reach of these theoretical systems can be seen as incremental, describing a bigger portion of nature along the chronological line from Newtonian physics to quantum physics (Bohm, 1980, p. 105). In this view, relativity theory can be seen as describing the Newtonian portion of nature and more, but quantum physics can be seen to describe both of them and more. Whether other theoretical systems will arise within physics besides - or rather: overarching - the four mentioned here, remains a question (Heisenberg, 1958, pp. 89-90). Fact is that neither of these four can sufficiently account for complex phenomena such as 'life' or 'meaning' or 'consciousness'. Although quantum physics does explicitly bring the mind ('res cogitans') back into the equation, it does not offer an explanation for what mind essentially might be. This question will be addressed in the next chapters of this book.

2.2 Newtonian aspects of contemporary psychology

Traditionally, the field of psychology consists of two strands: the materialistic and the humanistic strand (Wampold, 2010; L'Abate, 2012b; Ryback, 2012). In the light of the above discussion of Cartesian and Newtonian axioms, materialistic psychology can be said to go along with the separation of mind and matter and take the 'res extensa' as its primary focus. Humanistic psychology does not explicitly acknowledge a strict partition into mind and matter in the first place. It regards the human being as a whole which places a discussion in terms of mind- and matter-aspects at the margins of its focus. Materialistic psychology is therefore the most 'Newtonian' oriented of the two. It is the dominant form of psychology nowadays and strongly inspired by the medical model (e.g. neuropsychology, psychiatry) and elementary principles of learning (e.g. cognitive behavioral therapy).

Ryback discusses the Newtonian roots of behaviorism, the prototypical form of materialistic psychology (Ryback, 2012), developed by Skinner. Skinner proposed in 1955 that only directly observable human behavior can be a logical subject of study by psychologists. The mind - as in: thoughts, emotions and intentions - cannot be directly observed and is therefore not relevant. It is a 'black box'. All that counts is behavior and all complex types of behavior should be analyzed down to their most basic elementary behaviors if we wish to study and influence them. Building on Watson's theory of behavioral learning, Skinner saw the reinforcement (reward) of simple stimulus-response combinations as the basis for all human behavior and change. Just like a lab rat in a cage can learn to push a lever by being rewarded in the right way, so do humans learn to live their lives by being rewarded for countless elementary behaviors which add up to complex patterns over time. A behavioristic approach to mental health implies for instance that in order to help a depressed or anxious person to feel better, the therapist should work out the basic elements of their depressed or anxious 'behavior' and consequently reward opposite behaviors.

For over a decade, behaviorism was the dominant theory within the materialistic strand of psychology. This changed halfway the 1960s, partly due to ideas from quantum physics that rehabilitated the mind

as a relevant aspect of reality (Overton, 2012). Psychologists widened their focus to more covert but still measurable (although only indirectly) 'behavior' such as thoughts. Pure behaviorism was no longer credible and evolved into what is called cognitive behavioral psychology which is one of the main theories in psychology nowadays (e.g. Beck, 2011). With this, the mind was taken into account to some extent, although the materialistic standpoint was not abandoned. Cognitive behavioral psychology's primary focus still lies in observable behavior as the basis for change and improvement and the format of stimulus-response learning is still its foundation (Samoilov & Goldfried, 2000; Whelton, 2004). The mind as such is essentially not reflected nor elaborated on. Later on, a materialist take on our thoughts and emotions was reinforced as medical treatments with various forms of psychotropic drugs became commonplace. Drugs evidently intervene in material, bodily processes which makes it tempting to see a material basis of our thoughts and feelings also. Adding to that more recently, neuroscience has strengthened the belief that the body and not the mind should be the basis for understanding of human behavior, resulting in the motto: 'We are our brains' (e.g. Swaab, 2015).

As discussed in section 1.3 above, another materialistic aspect of contemporary psychology is the notion of specific mental 'disorders', a way of looking at mental health that resembles the Newtonian clockwork-metaphor in materialistic psychology. This notion is worked out in detail in the Diagnostic and Statistical Manual of Mental Disorders (DSM, American Psychiatric Association (2013)), an extensive taxonomy of behavioral and psychological patterns that can be grouped and classified into mental disorders, each labeled with a specific numerical code. The idea that the way we experience and act upon various situations is in fact a collection of separate and distinctive elements (e.g. thoughts, emotions, behavior) suggests an underlying assumption of atomism, which as we saw is one of the central axioms of the Newtonian paradigm. Although originally meant to enhance unambiguous communication among healthcare professionals, the DSM is used more and more as an instrument for diagnosis and decisions about treatment. In terms of the clockwork metaphor of reality: the DSM provides the manual in which we can look up the various parts that are broken and from there on decide

how to fix them. Congruent with this line of reasoning, treatment protocols have been developed for specific DSM classifications. Vice versa, professional guidelines prescribe specific treatment protocols for DSM classifications. To be certain, this approach to mental health has shown its merits in scores of scientific studies and clinical practice. However, given its Newtonian foundations, it seems to contain the same risk of forgetting about the assumption-based view of reality that was described in the sections above. Developing categories and labels for the patterns we observe in people can be a useful practical tool for diagnosed treatment, but it does not per sé mean that reality *is* how we assume it to be in our taxonomies.

This short overview of the Newtonian roots of the dominant strand of contemporary psychology concludes this chapter. In the coming chapter we will turn to some of the insights from relativity theory and quantum physics that challenged the Newtonian paradigm in a fundamental way. We will get back to what this could imply for the field of psychology in chapter 4.

3. Directions in post-Newtonian science

So what about the new ideas from physics hinted at in the previous chapters? What is it about them that might convince us to revise our view of reality? The Newtonian paradigm still offers a strong and practical way of relating to the world in many situations, posing quite a challenge for any new take on reality to qualify as a successor. Relativity theory and quantum physics in particular have already been accepted as more appropriate worldviews within physics. The new insights they offer are waiting to be translated to the level of our everyday lives and once they are, they might well become as broadly shared as the Newtonian paradigm is nowadays. If only they weren't so deviant… This chapter is intended to help catch up on the basics of the twentieth century 'tectonic shift' in physics and its implications for our understanding of the world *and our role in it* (see also Durston & Baggerman, 2017, pp. 26-30). It starts with a description of some essential developments within physics in the beginning of the twentieth century and how they challenged the classical axioms. Next, it describes how modern physics suggests a view on reality that is probabilistic, relational, dynamic and directional.

3.1 Reality is a possibility (probably)

The same materialistic assumptions that account for the classical paradigm's success also set its limitations, as became clear in the first decades of the twentieth century. By then, physicists had inquired ever further into what had been held as the 'a priori' characteristics of reality, such as time, space and matter. Doing so, they discovered how these characteristics are not quite the absolute 'a priories' they had held them for. Einstein for example, discovered that time and space are neither absolute, nor 'given'. Instead, they are closely related and subjective: the course of time for two individual persons will differ as they travel through space at (highly) different velocities. In that same period, Planck discovered that energy comes in small packets of a discrete and minimal size which he labeled 'quanta'. This suggested a limit to the analyzability of nature, contrary to what the classical axiom of atomism states. Even more challenging to the Newtonian paradigm was that the idea of quanta indirectly challenges the axiom of the separation of mind and matter, as we will see in the coming sections

of this chapter. How could all of this be if the classical axioms were true?

Einstein's concept of relativity

Einstein's reasoning built on several decades of empirical and theoretical research into the nature of electrodynamics in the second half of the nineteenth century (Heisenberg, 1958). In that period, scientists such as Maxwell, Foucault, Lorentz and Michelson had asked and answered questions as: 'if light can travel through an empty space, without the material molecules of the air as a mechanical vehicle, does this mean there exists another - non-mechanical - medium (often referred to as 'ether') that can account for its propagation?' and: 'how fast does light travel through space?'. Step by step, the picture was filled in until it was clear that light travels through space without the need of any medium and is bound by a maximum speed of about 300.000 kilometers per second. Also, it became clear that if light cannot go faster, nothing else can either (Bohm, 1980, p.155). This holds for all phenomena, material and non-material alike. Einstein combined these insights and implemented them into his theory of special relativity, published in 1905 as one in a series of seminal papers on closely related issues.

Based on the newly found natural constant of a maximum light speed, Einstein uncovered the relationship between time, space and speed. First of all he defined 'time' as being comprised of 'past', 'present' and 'future' (Heisenberg, 1958, p 102-103). The past can then be defined as 'all events we could know of, at least in principle'. Likewise, the future can be understood as 'all events we can influence, at least in principle'. The present is defined as the interval between past and future. The crucial innovative element of Einstein's argumentation is that, because any object or phenomenon is bound by light speed, any event comprised of such objects and phenomena, can come to our knowledge only as quickly as the speed of light allows it to. If we ourselves travel away from such an event as it happens, it will take more time for that event to 'catch up with us' and come to our knowledge. Of course, this applies especially at very high speeds that usually don't occur in everyday life. But on a cosmological scale, very large distances and near-light speeds are much more common. Countless objects are moving in many directions at various speeds.

This means there is not one 'true' frame of reference. Everything is relative, nothing is absolute. For instance, the light that comes from the event of an exploding star takes ages to travel the distance to our eyes and thus to come to our knowledge. This event remains unknown to us for even a longer period of time if we should start to move away from the explosion at high speed, increasing the distance for the light to travel and reach our knowledge. This means that it takes longer for it to reach our present. Our acceleration causes our present to 'stretch' compared to the time at the locations we leave behind us. Likewise, our own ability to influence events in the future is bound by the speed of light also. For instance if we were to signal instructions by radio to someone on a far-away planet, our message would have to travel as many seconds as the distance to that planet in kilometers, divided by 300.000. On a cosmological scale such distances are no exception. Now, in the case that we should accelerate to near light speed away from the intended receiver while we were sending our message, this would increase our distance and lengthen the time it takes for our radio message to reach her. It would take more time for us to influence the course of events. Our present time would last longer because the future begins later. This shows how time, space and speed are not as absolute and fixed as classical science assumes them to be. Instead, as Einstein shows us, they are intimately related. They are *relative*.

Shortly after Einstein's paper on special relativity was published, the same principles were applied to show a relationship between speed and space also, leading to the concept of 'spacetime'. Without entering the details of this follow-up on Einstein's theory of special relativity, it is safe to say that his work revealed the limits of the classical axiom of absolute time and space: it applies to 'everyday' kind of distances and speeds within our lives here on Earth but not to the realm of (near-)light speed and cosmological distances.

Quantum physics: from Planck to Heisenberg

Another challenge to the axioms of the Newtonian paradigm arose when Planck discovered in 1900 that heat-radiation comes in fixed minimal 'packets' instead of in quantities that can endlessly be split up into smaller quantities (Heisenberg, 1958; Bohm, 1980, Pauli, 1994, Stapp, 2009). In the years before Planck's discovery, physicists had

already found out that heat was to be understood as the result of the oscillations of the atoms in the heat-emitting object. According to the classical assumptions, one would expect the oscillations of the atoms to vary *continuously* from no oscillation to ever more oscillations, as energy is added to an object and it starts to heat up. However, Planck's calculations of the exact incremental oscillations of heat-radiating black objects stubbornly yielded only discrete figures. The oscillations appeared to increase in steps, not in a continuously sloping line. After due consideration Planck could do nothing else than to conclude that radiation turned out to have a minimal 'size' instead of being infinitely 'small'. This suggests a picture of small elementary 'chunks' of heat being emitted by a hot object. Contrary to what the classical axiom of atomism demanded, Planck discovered there is a smallest possible amount of energy below which no smaller amount can exist. Planck defined this minimal amount as one 'quantum' (of heat, radiation, energy).

This principle of quanta of energy (also referred to as 'Planck's quantum of action') was soon recognized within other areas of physics also. In 1905 for instance, Einstein discovered how light is emitted in quanta. Somewhat later, in 1913, Bohr used the concept of quanta to understand the basic structure of the atom. Until then, the metaphor of a mini-solar system was used to describe the atom: the electrons circling the atom's nucleus resembled the planets in their orbit around the sun. It was assumed that Newton's laws of motion applied to the atomic level of nature as much as they did to the level of planets circling the sun (or apples falling from trees, for that matter). However, atoms turned out not to obey Newton, much like Planck's hot objects persisted to heat up in discrete steps. As energy is added into an atom's system, for instance by shooting photons at them, the trajectories of the electrons can be seen to suddenly 'jump' to another level around the nucleus. Again, a gradual progression towards a higher trajectory would be expected when following Newtonian assumptions, but was not found. Bohr explained the 'step-wise' change of the electron's course with Planck's concept of the quantum: energy is added in discrete packets of quanta and the electrons can be seen to react accordingly by 'jumping' instead of migrating gradually.

Planck's discovery posed two major challenges for Newtonian science (see also Durston & Baggerman, 2017, pp. 27-29). First of all, it proved the atomistic axiom of infinite analyzability of nature was wrong: at some point - the size of one quantum - nature cannot be divided any further. Second, it uncovered a lower limit to the precision of scientific measuring instruments: it is simply impossible to make instruments as small as a quantum. In the absence of such instruments, our conclusions about (sub-)atomic nature cannot be fully empirically validated. There is no way we can know for sure about aspects of nature below the size of one quantum. Third, it meant that there is a limit to the precision with which very small structures can be observed without influencing them by our observations. For example: to 'see' an electron orbiting around the nucleus of an atom requires that we shine light on it which can then reflect the electron's image to be captured by our microscope. If our aim is merely to observe the electron in its natural state, without disturbing it in its doings, we must not use too much light. The tiny electron would be pushed out of its orbit by the energy of our light beam, leaving us with an observation of the electron spinning away. We thus couldn't observe it as it describes its orbit. In fact, in order to see the electron orbiting, our light beam would have to be smaller than one quantum of light and as Planck had discovered, that is impossible. So anyone trying to study an electron has to choose between either observing it while disturbing it, or not disturb it and deduce its position and trajectory in a mathematical way without ever actually seeing it. In the first case, we end up with doubts about what we have actually observed: the electron, or something we have caused ourselves through the act of observing, which is possibly something completely different from what it would have been if we had never tried to observe it. In the latter case, the properties of the electron and its orbit will not be empirically observed and will at best remain an assumption with an estimated probability such as the 'wave' function of light. This trade-off between direct observation versus probabilistic calculation, is what Bohr named 'complementarity': because of the inevitable interaction of the observer and the observed, on quantum-scale level one can only know either one of two complementary parts of reality at the same time (Bohr, 1958). Either way, at the quantum level, science cannot draw conclusions with absolute certainty, only

with some degree of probability. This leaves them subject to our human interpretations.

In 1927, Heisenberg completed the scientific U-turn of quantum physics by denying the duality of mind and matter on the most fundamental level of nature. He pointed out how our choice of questions about reality not merely determines what aspect we are going to observe of it, but actually determines reality's properties. For instance if we assume that light consists of particles (photons) and set up a particle-measuring device to make measurements of a light beam, we will cause that light beam to manifest itself as a beam of particles. However, if we assume light to consist of waves and measure it accordingly, it will manifest itself as waves. Since Heisenberg worked in Bohr's group in Copenhagen, this take on quantum reality is referred to as the 'Copenhagen interpretation'. In this quantum physical paradigm reality is viewed as the addition - the 'superposition' – of all of its possible states (e.g. the possibility to become a particle or a wave) right up to the moment we ask our question about it and perform our measurement. Before we have made our measurement, reality can be understood as a 'wave' of possibilities, each with its own probability (tendency) of becoming real. It is a *'probability wave'*. In the words of Heisenberg, reality at this level is:

'{…} standing in the middle between the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality.' (Heisenberg, 1958, p. 42).

Depending on the kind of question we choose to ask about reality, the probability wave 'collapses' into one actual reality[11]: the kind of measurement we choose to perform causes a particular *actualization* of reality. All of the other prior probabilities are eliminated at that same instant. Had we asked a different question for which a different measurement device was used, the superposed probability wave would have collapsed into a different reality. In the case of measurement of light: once actualized into a beam of particles, the light beam can no longer be a wave. This is where subjectivity and co-creation enter into the nature of reality: the act of asking questions about reality co-creates that very reality. This means reality is an interactive process,

11 The collapse of the wave of probabilities is also referred to as 'decoherence'.

which shows the limits of the classical axioms of materialism and subject-object distinction. Choosing a question is an act in which mind-aspects such as individual histories, thoughts, emotions and values can play a role. As it turns out: mind does matter when it comes to the making of reality.

A quantum of possibility

In relativity and quantum theory reality is understood as profoundly indeterminate and malleable. Previously unshakeable constants of reality such as the absoluteness of time and space are dismissed. Matter turns out not to be the fundamental stuff of which reality is made. In their place comes a view of reality as being 'made of' potential: the possibility to become something. In the words of Heisenberg:

'If one wants to give an accurate description of the elementary particle – and here the emphasis is on the word 'accurate' – the only thing which can be written down as description is a probability function. {…} *It is a possibility for being, or a tendency for being.'* (Heisenberg, 1958, p. 67).

Thus, material particles and any other physical phenomenon can be seen to pop up out of seemingly nothing, but what may look like nothing is in fact something: potential, energy. Bohm, another influential physicist in the twentieth century puts it this way:

'Every physical situation is now characterized by a wave function {…}. *This wave function is not directly related to* actual *properties of an individual object, event or process. Rather, it has to be thought of as a description of the* potentialities *within the physical situation.* (Bohm, 1980, p. 163).

The potential of the fundamental 'stuff' of which nature is made can indeed be seen all around us. Not only do substances change their appearance by transiting from solid to liquid, from liquid to gas and vice versa, they can also be seen to change into other substances. This happens for instance in chemical reactions, radio-active processes and in high-energy collisions. But besides changes of a material kind, substance can also change into non-material phenomena, for instance when an electric current heats up an object, causing it to glow and spread heat. Then there are the transmutations from 'mind-stuff' into

material substance and vice versa. For instance, a scientist's values and intentions define her choice of a specific type of measurement which in turn translates into what aspect of nature is going to actualize[12]. In turn, the scientist interprets the actualized outcome of her measurement into new mind-stuff such as knowledge and emotion: the outcome may be unexpected causing her to feel pleasantly surprised or sad, depending on her prior expectation. All in all, the quantum nature of reality seems to lead to a constant chain of material and experiential events in which everything is changing and developing continuously and nothing ever really stays the same. The quantum's potential for change has also been described as 'energy', for instance by Pauli:

'Taking the existence of all these transmutations into account, what remains of the old ideas of matter and substance? The answer is energy. *This is the true substance, that which is conserved; only the form in which it appears is changing." (Pauli, 1994, p. 31).*

To be a quantum

The above description of the basics of quantum theory is rather intellectual, which might blur the fact that in essence it contains some rather intuitive concepts. If those concepts appear counter-intuitive and alien, this might well reflect our lifelong training to understand reality in the 'old' Newtonian way. To acquire a better sense of what a quantum of energy is, the following illustration may be helpful[13]. Take some time to imagine yourself shrinking down to a size of one centimeter. Ask yourself how you would experience such an event. Suppose that as you are shrinking, you manage to stay focused on your surroundings and not mind the fear you will probably experience, you will see the objects around you grow to huge dimensions. Dust-particles will grow to the size of bricks, a sandwich will be the size of your house and you will probably not know how to eat it. The fear you may feel, reflects your loss of control over your environment.

12 A Newtonian reflex would be to object and say that our intentions come from our material brains and could still be explained in a classical mechanistic way. Following that argumentation, there is no such thing as mind-matter causation. However, quantum physics shows that the basis of our material world (and thus our brains) is not matter but the potential of the quantum. This leaves room for mind to have an immaterial basis and influence the material world from there.

13 Imagination-based illustrations and exercises such as this one can aid the understanding of quantum physics' intuitive aspects. See also: Tarthang Tulku (1977).

Instead, your environment is gaining control over you. A tiny ant will be able to do with you what it wants, a minor draft is capable of blowing you over, and so on. You are starting to experience a little bit of how it may 'feel' to be a quantum: it feels like you are handed over to the actions of entities within your surroundings. Now imagine you shrink even further. As you shrink, you will lose ever more of your qualities. Let us conveniently suppose that 'feeling afraid' is one of the qualities you lose first, so that you will be able to monitor what is happening in a neutral way. You will experience how your environment gains ever more influence over you, until at a certain point the mere proximity of a molecule is quite a big deal. It can for instance change the trajectory you were following or pull you into its structure. Now imagine you shrink to less the size of an atom. You are now so small that you have lost almost all of your qualities. You have no senses, no color, no temperature, no shape, no dimensions, no time. It cannot even be said whether you are 'material'. You are a basic elementary bit of energy. Your only remaining quality is that you possess a potential, a possibility of becoming something but only under the influence of something else. Depending on what that 'something else' is, you will actualize either as matter or any other phenomenon such as time, space or light. The only thing you are is a wishing to become.

Non-causal relationships: just because they can

In a world as relative and probabilistic as the above suggests, one would be tempted to think that anything is possible as long as it is not faster than the speed of light and smaller than the size of the quantum. Indeed, in the years following the development of relativity and quantum theory more findings came up that illustrate the deeply probabilistic nature of reality. A well-known example is the outcome of one of Einstein's thought experiments (Einstein, Podolsky & Rosen, 1935). The 'EPR experiment' meant to challenge the probabilistic core of the Copenhagen interpretation of quantum physics, particularly where it states that events do not necessarily have a cause and can happen just because they are possible. In quantum reality new particles can pop into existence out of nowhere and 'entangled' particles behave synchronously as if they are one, no matter how far apart they are. The probability of these events may not be high, but that is not the point. The point is that they happen just

because they can. Einstein was not prepared to accept the existence of these 'causeless' quantum events[14]. In line with the Newtonian axiom of determinism he valued the idea that there is always a cause for something and nothing 'just happens'. To test this claim, the EPR experiment makes use of a situation of two 'entangled' atomic particles. These particles are like 'identical twins' to the extreme. For instance, the direction of their rotation - their 'spin' - is paired: the spin of one particle is always accompanied by a certain spin of the other. Likewise, if we change the spin of one particle this is always accompanied by a change of the other's. A classically causal explanation would be that changing the spin of one particle somehow influences the other particle and causes it to change its spin also. This influence would typically need some time during which it can 'travel' - no faster than light speed! - and reach the other particle. Therefore we would expect a time-lapse between the change of spin of the one particle and the reaction of the other particle. The greater the distance between the entangled particles, the longer the expected time-lapse. On the other hand, if no time lapse is observed this would prove that their relationship is non-causal: there is no time for any cause - even when traveling at light speed - to exert an influence on the other particle. After decades of debate Bell was able to decide the case in favor of quantum physics (Bell, 1964). Entangled particles did in fact behave synchronously, without any time lapse, no matter how far apart. Apparently, some other explanation is needed than a classical cause-effect relationship. This result was repeated in various other experiments later on[15], confirming what Einstein had hoped to deny.

Some scientists infer from the principle of entanglement that reality is even more related than we thought, that it is in fact more 'holistic' (e.g. Bohm, 1980; Pauli, 1994). Entangled systems are examples of how a change at some place in the system instantly implies a change of the total system of which it is a part. In Pauli's words:

'These probabilities are determined by fields in multi-dimensional spaces {…}. *Making a measurement at* one *place means that we pass to a* new *phenomenon with altered initial conditions to which belongs a new set of possibilities to be*

14 His well known statement 'God does not play dice with the universe' was made in this context.
15 E.g. Hensen et al. (2015).

expected, and accordingly a new field has to be stated everywhere. *Thus in atomic physics phenomena have a new property of* wholeness*, in that they cannot be decomposed into partial phenomena without thereby in each case changing the whole phenomenon in an essential way.'* (Pauli, 1994, p. 152).

Pauli is referring to the idea that once we let go of the classical assumption that there is a cause for everything, other types of relationships become possible. For instance, the classical logical argumentation is that if something is either 'a' or 'b', this leads to the conclusion that if we find a, it cannot be b at the same time. Likewise, if we find b, then it is safe to say it is not a. However, we can learn from the EPR experiment that there are situations in which this classical logic does not hold (e.g. Kauffman, 2002). If we measure the spin of two entangled particles, the distinction of 'particle a' versus 'particle b' cannot be made. Instead: measuring the spin of one particle immediately determines the spin of the other. The entangled particles are somehow related by the *'field'* of probabilities that acts as a whole, in such a way that the probability wave of *both* entangled particles collapses synchronously when we measure just one of them. In these cases, we can say that if we find a, then b is also true.

This links to a more recent example of thinking about the probabilistic nature of reality in terms of 'information' (Verlinde 2010, 2016; Durston & Baggerman, 2017, pp. 49-53). Reality at the fundamental level can be seen as consisting of 'bits' of information. In computer programming these basic elements have a value of either 0 or of 1. However in quantum reality, values can be 0 *and* 1 at the same time. Therefore we can say that at the fundamental level, reality is made out of qubits (quantum bits). The amount of qubits available in the universe is of course immense. A fraction of it is known to us, as for instance the stars and planets we can see or measure otherwise. Most of the universe is however still unknown to us, it lies outside of our field of experience. It is what is sometimes referred to as 'dark matter' or rather 'dark energy' which corresponds more appropriately to the idea that it is still a vast reservoir of potential that may actualize into our reality in the future. Until then, we do have some hints of its existence. Gravity, for instance, can be understood as one such hint. It can be understood as resulting from the differences in information that exist on cosmological scale (Verlinde, 2010, 2016).

3.2 Reality is a process

Now that we have discussed a view of reality as fundamentally 'made of' possibilities, the next step is to understand how this 'making of reality' happens. It suggests that reality is not a fixed *state* but a *process*. If so, then what can be said about that process? How does it come about? What does it lead to? The sections below describe some of the ideas about the process aspect of reality, mostly resulting from further theorizing on the discoveries of quantum physics by quantum physicists such as Schrödinger, Von Neumann and Stapp.

Schrödinger's equation

As we have seen, a crucial idea about reality within quantum physics is that it exists only as a 'field' or 'wave' of probabilities until we make an observation of it. It is our observation that causes the wave to 'collapse' and 'actualize' into the physical reality that we observe. This idea was most prominently elaborated by Schrödinger, one of the quantum physicists of the first hour. Both the metaphor of the probability wave as well as the equation that makes it possible to describe it come from him (e.g. Wendt, 2015, p.47, Durston & Baggerman, 2017, p.50-52). Schrödinger pointed out that we can never be sure about the development of reality until we observe it. Until then, all we have is a probability that something will turn out to be 'such and such' if we decide to observe it. Moreover, after we have stopped observing, the same principle will start all over again: the probability wave will start to rebuild until we make our next observation. Once we stop looking, we cannot be sure we will see the exact same thing if we look again. To explain this in everyday language Schrödinger used what became the widely known thought experiment of the cat in the box[16]. Schrödinger imagined a cat in box, together with a vial of poison that may or may not be activated. Activation occurs if a device - also present in the box - detects a radioactive particle and breaks the vial which causes the poison to spread and the cat to die. The crucial element of the experiment is that this *whole* chain of events is a quantum event: the radioactive particle is in superposition as long as we don't measure it and the same goes for every step that follows: the device may or may not have detected the particle, the vial may or may not break, and so on. In other words, it

16 Thought experiments such as this one and the previously discussed EPR experiment are frequently used by physicists.

might have happened but we don't know for sure. Likewise the cat being dead or alive is a superposition until we open the box and look inside which would mean that our observation causes the probability wave to collapse and the cat to either live or die. Schrödinger used this metaphor to show to what bizarre scenarios quantum physics may lead if it is extrapolated to the macroscopic level of everyday objects and creatures. His point was that in real life the cat being dead or alive would surely not depend on us looking at it or not. But still, the level to which superposed situations can build up and depend on an observation to actualize, remains a matter of debate. The cat in the box is a good illustration of how quantum physics looks at reality in principle: reality is a 'smear' of all the possible experiences we might have right up to the moment we make a definitive observation. Although the above illustrates Schrödinger's hesitation to translate findings from the quantum level to the everyday (macroscopic) level, the basic mathematical equation that captures the smeared out superposition of reality was designed by him and is known as 'Schrödinger's equation'.

The actualization of possibilities

We have now come to the question of how reality can progress from probable to actual. For instance, if we measure the electric current in a system the pointer of our measurement device usually points out one specific value instead of a 'smear' of all possible values at the same time. Our measurement somehow pins down reality so that it actualizes - out of all possible values - into us reading out just one specific value. How does this happen? Why do we experience one particular reality when in fact, its core is probabilistic? And how about situations that go beyond mere observation and concern our willful acts to manipulate reality? How are we able to actualize our intentions into, for instance, a simple act as the raising of our arm? In classical science there is no clear understanding of how our intentions exert an influence on our actions. After all: how could they, when mind and matter are considered to be two separate things?

These questions are the focus of interest of quantum physicist Henry Stapp (e.g. Stapp, 2009, 2014; Epperson, 2009). Building mostly on the works of physicists such as Heisenberg, Dirac and Von Neumann and philosopher Whitehead, Stapp describes how reality can transit

from the possible states of a probability wave to the actualized states such as the ones we experience. A central concept in this process is what Stapp calls the 'Heisenberg cut': the specific event in which a smear of possibilities actualizes. Heisenberg cuts take place on all levels of reality, from the atomic level to the cosmic and from the inanimate world to consciously experiencing human beings. Metaphorically speaking, a Heisenberg cut is the hinge in the process that reality is. Stapp focuses on the particular level of nature where possibilities actualize into our human *experiences*, that is: our conscious thoughts and feelings. Note the emphasis on the word 'experiences'. This refers to the idea that the observer and the observed cannot be said to be completely separate - an old idea that was revived by quantum physics as we have seen in the above. The collapse of the wave function leads in the first place to an experience of the observer. This experience, a *mind*-phenomenon ('res cogitans'), is just as much part of the actualization of reality as the physical reality ('res extensa') that arises, as was so clearly illustrated by Schrödinger's cat in the box experiment.

Stapp describes how actualization consists of two sub-processes. Process 1 is a Heisenberg cut, consisting of two steps: a person asking a question to 'nature'[17] followed by nature providing a 'yes' or 'no' answer. Any observation or measurement could be considered to be such a question, as they increase our knowledge about the nature of what we are observing. The question in the first step is typically framed in terms of an experience. Simple questions are, for instance: 'will I see the pointer of this device go left?' or 'will I see a living cat in this box?'. In the second step nature reacts with a yes or no answer which is in fact the probability wave collapsing into the particular experience we have. At that very instant nature eliminates all other possible answers to our question. As soon as the answer is given and we have our experience, process 2 starts: our experience forms a starting point from which a new probability wave starts building up again. In other words: Schrödinger's equation starts all over again, right up to our next question.

17 Stapp uses the word 'nature' to refer to reality, following Dirac's expression: 'choice on the part of Nature'.

The Zeno effect

The crucial point in Stapp's description is that the first step of process 1 offers ample opportunity for us humans to influence how nature is going to answer. First of all we can, for whichever reason, actively decide which questions we ask and which ones we leave out. This choice of questions already filters out other directions of reality that might have developed, had we asked different questions. Second, we can let our values and interests have a say in our choice of questions and thus in our creative role in reality. Moreover, the more accurately we pose our questions, the more accurately nature can provide us with a relevant answer. And the other way round: sloppy questions give sloppy answers. All in all, this means that the more aware we are of our values and the better we phrase the questions derived from those values, the better we can co-create our own portion of reality. The implications of this are reaching well into the level of our everyday lives as will become clearer after the following discussion of a next part in Stapp's argumentation: the so-called 'Zeno effect'[18].

Actualization processes 1 and 2 can be applied to situations in which we intend to perform some action such as raising one of our arms. Stapp shows how these situations essentially resemble the measurement situation described above. The intention to raise your arm and then doing it, can be broken down into a process 1 and 2 description. Phrased in this terminology, what happens in step 1 of process 1 is that you ask nature whether you will see (experience) your arm rising. When you pose your question accurately, nature answers yes or no in step 2 and you will experience your arm rising or not. If the rising of your arm is somehow important to you (a 'value'), you can ask the question in a more intense way. In terms of step 1 this means that you ask the same question in quick succession and promptly react to nature's answer. As soon as nature answers 'yes', you will see your arm rising and if you still want your arm to rise you must quickly ask the same question again in order to receive the same answer from nature because process 2 has not had enough time to develop into other possibilities yet. As long as you repeat this, you will have the experience of raising your arm. As soon as you let go of your

18 The term "Zeno effect" refers to the paradoxes of the ancient Greek philosopher Zeno of Elea. One of his paradoxes was the 'arrow paradox': observing a flying arrow during a sufficiently short moment will make the arrow look as if motionless.

focused questioning, reality will start to develop into other scenarios, as Schrödinger's equation (process 2) demands, leaving you with no certainty about the subsequent course of events. The quicker you ask your question (i.e. the more focus and effort you invest), the less opportunity there is for Schrödinger's equation to do its job and the more certain you will be that you impose your will onto nature. In other words, nature will more likely 'give you what you want' in terms of a rising arm. This is called the Zeno effect: provided that you can put enough value and effort into your question to nature in step 1, which allows you to rapidly repeat your question for some period of time, nature's answer in step 2 will be the same every time you repeat your question.

All of this may sound rather artificial at first, which makes it exemplary for the difficulty of translating concepts from physics to our everyday experiences. We are not used to understand everyday behaviors such as raising an arm as if we were 'asking questions to nature' and 'preventing Schrödinger's equation from developing'. But in a way, the essence of our actions is that our mind-reality is interacting with the probability wave of our bodily material reality. The more we want something to happen, the more effort and focus we may put into our actions and the more likely we are to gain some grip and control over the resulting course of events. These are everyday terms that overlap with the essence of the term Zeno effect. Later on in this book, chapter 4 describes in more detail how the Zeno effect could bear relevance for our everyday experiences of emotions and mental health.

Evidently, there are limits to the Zeno effect one can install and uphold, set by for instance one's physical strength and endurance and one's mental capabilities to focus on an ongoing issue. Amidst all the noise and activities of daily life, it is often hard enough to recognize what is really important and valuable to us, to focus on that and finally to formulate it into a decent 'question to nature'. Moreover, a Zeno effect is not necessarily a conscious process: our bodies are constantly upholding Zeno effects without our conscious effort, such as our metabolism and respiration processes. These processes are all ways of exerting some control over our material realities and allowing us some sustainability.

All in all, Stapp's reasoning illustrates how quantum physics may provide an answer to the age-old enigma within classical science: the interaction between mind and matter.

3.3 Reality's direction

Over a century of developments within relativity and quantum theory have thoroughly expanded physicists' view on reality, as the above may show. The Newtonian image of reality as a fixed state with 'a priori' characteristics has been put into perspective and expanded. The view on reality that surfaces is one of a probabilistic process in which we ourselves can have a creative input. One obvious follow-up question seems to be whether this process perhaps has some direction? Does the process of reality have a 'purpose', a 'meaning'? We ourselves have purposes for many of the things we do and choose, whether they concern simple acts as raising an arm or more complicated acts like attracting the attention of someone we fancy or applying for a job - to mention just two examples of meaningful situations. If we humans have purposes, and we are part of reality, can reality as a whole be said to have a purpose also? Carrying this question further leads to wondering whether reality has some way of evaluating and controlling the direction in which it is actualizing? If reality is indeed an interconnected field of possibilities, as for instance Bohm and Pauli suppose, does this suggest some form of 'consciousness'[19]? Somehow, these questions feel tricky. They suggest that matter could possess some sort of mind-aspect and that the most fundamental axiom of the Newtonian paradigm, the separation of mind and matter, does not hold up. Suppose we do reject the Cartesian division of matter and mind, would that lead us back to what Newtonian science has liberated us from (shady spiritualism, feudal society, social injustice)? To be certain, these are legitimate questions. But so are the questions that arise from relativity and

19 Durston & Baggerman (2017, p. 99) describe consciousness as follows: '{…} often used synonymously with awareness. There are many ways to define consciousness, and this book follows Chalmers' definition of the 'hard problem' of consciousness: why it is like something to be a self. Here, awareness is considered to be a graded phenomenon, where an insect, for instance, may have some level of awareness (it can detect a hand approaching to swat it), but is unlikely to have the ability of reflection. It is awareness with the ability to reflect that is referred to as (individual) consciousness here. Greater consciousness {…} refers to a consciousness that transcends such individual consciousness.'

quantum physics. They are not shady science[20], they are based on sophisticated mathematics and empirical observations, notably with roots in the Newtonian paradigm. They were not developed with the intention to throw us back to a pre-Newtonian level, nor do they question the legitimacy of Newton's laws for a large portion of reality. Still, taking their conclusions seriously, reality does indeed seem to leave room for direction, meaning and consciousness. Below, some of the ideas pointing to this conclusion will be discussed.

Direction of reality at the individual level

The question of whether reality has a direction on an individual level is answered affirmatively, as described above. We do have a creative input into the coming about of reality by our value-based choices of questions we pose to nature in process 1. Moreover, the effort and focus we invest into establishing a Zeno effect allows us to exert some amount of control over the course of events. Together, actualization process 1 and the Zeno effect provide us with an elementary set of tools to shape reality - at least to some extent - to our values and wishes. They allow our mind to exert some control over our body and consequently to exert some control over the coming about of some portion of material reality around us. Also, they enable us to carry out all sorts of communicative actions with which we can shape a conceptual reality. The raising of an arm for instance can be a communicative act when it is meant to signal some message. We can raise our arm to wave at someone, to place a bid in an auction, to vote for some proposal and for many more reasons. Other physical acts such as speaking and writing can convey even more conceptual content to be received by others. Their reactions to our actions set in motion other process 1's and Zeno effects, leading to the actualization of bigger portions of reality. The point is that our mindful control over our bodies enables us to have an input in material as well as conceptual reality. All in all, at the level of our own individual choices and experiences, reality can be said to have some purpose at least, namely the purpose we ourselves inject into it.

20 Judging by the number of Nobel laureates, such as Michelson, Planck, Einstein, Bohr, Heisenberg, Schrödinger, Dirac, Born, Pauli.

Nature's formative tendency towards complexity

Given that our actions are often not carried out in a vacuum but instead in relation to our environment and other people, they lead to reactions on the material level as well as the experiential or conceptual ('mind') level. Moreover, our actions themselves are often reactions to those of someone or something else, which makes it tempting to understand reality as a vast network of interactions. Since all of those actions, reactions and interactions are 'questions to nature', as we have seen in the above, it can also be said that there is a continuous buzz of Heisenberg cuts (processes 1 and 2) and Zeno effects going on. Quite a number of scientists have come to the conclusion that this overall process of reality formation is not random but has a direction to which each single actualization-event is contributing. The extent to which this direction is merely 'emerging' or actively strived for by reality as if it already knows what its goal is, is a matter of debate. However, there is considerable agreement that as our own behaviors often have a purpose, reality as a whole could have a purpose also. After all, we humans are part of the very reality that gives us the ability to act purposefully. Some of the ideas about the extent to which reality is directional - also referred to as the 'teleological'[21] nature of reality - are described below.

One idea about a possible direction of reality is that it is tending towards ever more 'complexity', in the sense of interrelatedness of its elements. A growing level of complexity means the development of an ever more intricate order in which natural phenomena relate to each other instead of randomly moving around in a chaotic and isolated fashion. This tendency towards complexity is regarded to be a principle that runs up all the way from the basic quanta to ever more complexly interacting phenomena.

First of all, Heisenberg describes how at the basic atomic level, reality has a 'tendency for being' (as discussed in section 3.1). This means that at this level reality's direction is first and foremost towards becoming something: 'to be is to become'. The basic substance of which reality is made according to Heisenberg, Pauli and others is pure potential that is charged with a tendency to take on some quality. Such qualities can be either material, as for instance shape and mass,

21 Derived from the Greek word 'telos' which means 'goal'.

or non-material as for instance electricity, light or heat. Heisenberg and Pauli both labeled this basic potentiality-substance 'energy'. They also acknowledged that the individual events of possibilities becoming something do not just happen in isolation but in relation to other events as well[22]. As Heisenberg puts it:

'It must be observed that the system which is treated by the methods of quantum mechanics is in fact a part of a much bigger system (eventually the whole world); it is interacting with this bigger system;' (Heisenberg, 1958, p.153).

That the basic ingredients of reality should have this inherent tendency to form and to relate to other ingredients, implies that reality is a process (as described in section 3.2). This process-aspect could be understood as merely some by-product, emerging from the interactions of individual events. In such a view, the process would not necessarily be what nature intrinsically tends towards but could just be happening coincidentally. However, quite some scientists (not just quantum physicists as we shall see below), have arrived at a different conclusion. They do see nature as actively striving for relatedness in order to establish ever more complexly bundled forms. Stapp, for instance[23] describes that the elementary microscopic parts of nature not only have a tendency to become something, but also to become more complex (macroscopic) somethings:

'Each actual thing is fundamentally the actualization of an entire enduring complex macroscopic form. Those aspects of nature that are described in terms of the simple microscopic parts govern only the tendencies *for the actualization of such enduring complex forms.* {…} *the actualization of such forms is the entire object of the dynamics'* (Stapp, 2009, p. 168).

Another indication within physics about reality's direction towards more complexity that should be mentioned here comes from Verlinde. Having studied the distribution patterns and dynamics of information on a cosmological scale from the perspective of

22 This view of reality as made of a substance that is inherently 'formative' and relational can be referred to as 'relational realist' (Epperson, 2009, p. 354).

23 Bohm perhaps should have been cited also but for the sake of the accessibility of the main text, only some of the many scientists who mention a formative principle in nature are mentioned and cited. Hence this footnote to point the reader to relevant sections of his seminal book 'Wholeness and the implicate order' (Bohm, 1980, e.g. pp.14 -18; 264).

information theory (see section 3.1 above), Verlinde arrives at the following conclusion about a tendency towards complexity:

'Structure arises because of complexity {…} I think it is inevitable in a system with a great number of degrees of freedom. It always leads to some form of organization.' (Durston & Baggerman, 2017, p. 76).

The suggestion of a reality possessing more or less of a teleological drive is not only found within physics. Other areas of science such as biology and the social sciences have similar debates going on, although admittedly more marginally. Evolutionary biologist Conway Morris for example, argues how nature seems more than just selective in how different organisms evolve (Conway Morris, 2003). The evolution of life on Earth has been progressing for roughly three billion years. This vast window of time has allowed for a great number of different lifeforms to evolve. The ever changing circumstances on our planet have challenged living organisms to find new solutions in order to survive. They deployed adaptive behaviors, shapes and senses to increase their chances of survival and reproduction. However, many solutions developed time and again, independently from each other, in different eras and regions as well as in different species. This is what is called 'convergence' in the evolution of species: the same kind of solution repeatedly develops. Remarkably, these convergences are always by far the best solutions of all possible ones. This may seem obvious as the whole point of those solutions is that they are good. However, Conway Morris cites a host of studies in which the effectiveness of the converging solutions proves to exceed statistical expectation by orders of magnitude. Out of the millions[24] of 'good-enough' solutions nature could in principle have 'actualized' into, it always comes up with a small fraction of solutions that are on the extreme end of the scale of effectiveness. The big question is: how could this be? One explanation could be that nature somehow inherently tends towards a goal that guides its choice of solutions. Or rather: nature 'knows' what it is doing. This conclusion goes one step further than supposing that reality tends towards complexity. It means that nature could be understood as being a conscious process.

24 Conway Morris speaks of a 'hyperspace' number of possibilities.

Wendt, a key figure in political science, investigates the possibility of a teleological aspect in reality and sets out directions for translation to the level of the social sciences (Wendt, 2015). His analysis of a tremendous amount of literature on quantum physics and related fields, as well as that of theories within philosophy, neuroscience and the social sciences[25], leads him to conclude that there is much to say in favor of so-called 'panpsychism'. Wendt describes how quantum physics (as we have seen in section 3.1 above) discarded the strict separation of mind and matter. This view of reality in which mind and matter are essentially two manifestations of one underlying principle is called a 'neutral monist' view. It is easy to see how neutral monism puts the door wide open for panpsychism, a view of reality as being inherently conscious on all of its levels. In this view, even the elementary particles can be said to have some elementary form of consciousness. Although it is hard to imagine what a particle's consciousness must be like, it could serve as an explanation for their tendency towards becoming more complex. Somehow, they seem to know what they are doing, just like the convergence phenomena described by Conway Morris. Wendt recognizes this principle on 'higher' levels of reality also, such as human decision making and international politics (see also: Durston & Baggerman, 2017).

With these ideas about a possible inherent consciousness on all levels of nature, we have arrived at the present state of affairs in the debate about a possible direction in nature. There is definitely some agreement that reality - on every level - has an inherent formative tendency towards becoming ever more complex. Chapter 4 discusses in more detail how these ideas resonate within the field of psychology. The degree to which consciousness can be recognized on other levels of reality than that of us humans, is much more a matter of debate. We will get back to this topic in chapter 5.

Entropy

Our exploration of the direction of reality would be lacking, if we did not discuss a contrary concept that has been shown to be of great importance for the understanding of nature: entropy. Entropy (see e.g. Bolzmann, 1964) is a measure of the number of possible

25 Wendt looked at for instance: Bohm (1980); Wheeler (1990); Chalmers (2010); Hameroff & Penrose (1996); Busemeyer & Bruza (2012), Nagel (2012).

arrangements of a specific system. The more a substance is in a state of entropy, the greater the number of positions its molecules can assume and the less it holds its original form and composition. Thus, water evaporates into steam, a mountain decomposes into sand, a fresh apple becomes 'entropic' if we leave it on our fruit bowl for too long and the material particles of which a teacup consists, take on many more positions when it breaks. If by 'specific system' we mean a person, increasing entropy would translate into a growing number of possible behaviors, bodily processes and experiences. Entropy always tends to increase in isolated systems. In other words: an entropic tendency toward chaos (less order, less complexity) is the ruling principle in systems that insufficiently interact with others. To withstand entropy and remain a stable form requires some energy. At some point, this energy needs to be acquired from outside of the system. Thus, the battery of a mobile phone will eventually need a recharge even if you do not use it, and a person needs to breathe in order to stay alive.

Entropy may be a counter-intuitive and puzzling concept at first. On the level of human everyday reality, entropy means 'chaos' and is opposite to 'order'. The counter-intuitive aspect may lie in our understanding of chaos as a state in which nothing is really possible: in a state of chaos it is hard to get anything done, so it seems void of possibilities in that sense. But the opposite is true. Maximal entropy (chaos) means that anything is possible. This is not to say that any of those possibilities is probable, i.e. very likely to actually happen, but that is not the point. The contrary holds for states with little entropy: here we find order in the sense that our intentions can be converted into actions in a controlled manner. In terms of Stapp's process 1 and 2: it requires only a small effort to establish a sufficient Zeno effect that will ensure we will get the answers we wish from nature. However, ordered states offer less opportunities for anything that is out of the order, as entropic states do. In short: entropic states contain small probabilities for many different events whereas ordered states contain big probabilities for a few specific events.

The concept of entropy indirectly supports conclusions like those of Stapp and others that there is a formative tendency in nature. For if just entropy were the rule, nothing specific would get enough

opportunity to actualize for any amount of time. It would instantly be washed out by the entropic counter force. Because experience points to the opposite - we see a wealth of forms all around us that have some continuity at least - nature seems to somehow have the capacity to withstand the entropic principle and favor order over chaos. The principle of entropy also has immediate implications for our understanding of a formative tendency by which everything in nature interacts and leads to the bundling of energies into more complexity. It means that growth or even stability of specific possibilities is always simultaneously counteracted by the entropic principle. Therefore it seems that a certain amount of energy is by default needed to surpass the entropic force in a system before anything can start to exist for a certain amount of time, let alone to grow. Interaction seems to be the absolute requirement for anything to exist in something other than its basic constituent elements. Living beings have to breathe, metabolize and exchange DNA merely to survive entropic forces. Moreover, they have to constantly renew themselves in order to remain themselves.

3.4 Wrap up

Over a century of scientific development beyond the classical paradigm has yielded a myriad of insights of which the sections above surely describe only a small fraction. That some of their essence can come to our knowledge is by no means self-evident, given that they concern phenomena at the extremes of our human awareness and usually beyond. What does not help either, is that this essence is derived from a level of mathematical reasoning to which only a few of us are privileged. That 'we mortals' can understand some of it - with a reasonable amount of effort - is the merit of scientists such as Heisenberg, Pauli and Bohm. They went to great lengths to translate their knowledge into a comprehensible language, waiting for us to carry it onto the level of everyday life.

Figure 1 below captures some of the essential concepts described in this chapter. It shows how there is a formative tendency in reality that aims for ever more complexity. Simultaneously, there is an opposing entropic tendency that works towards less complexity. The interplay between these two tendencies results in a level of complexity that varies. Neither the formative tendency nor the entropic tendency is constant (e.g. when varying natural circumstances challenge existing

lifeforms and threaten their survival and challenge them to come with new viable solutions) which causes the balance to shift frequently. Overall however, complexity increases through time. During such episodes of increasing complexity we can speak of 'growth'. A shift in the balance of the formative and entropic tendencies can slow down or stagnate growth. Situations like these can be called 'crises' after which a period of 'decay' might follow if the balance shifts in favor of entropy. Another crisis occurs when this balance shifts in favor of the formative tendency, which may lead to a period of 'adaptation' and consecutive restoration of growth.

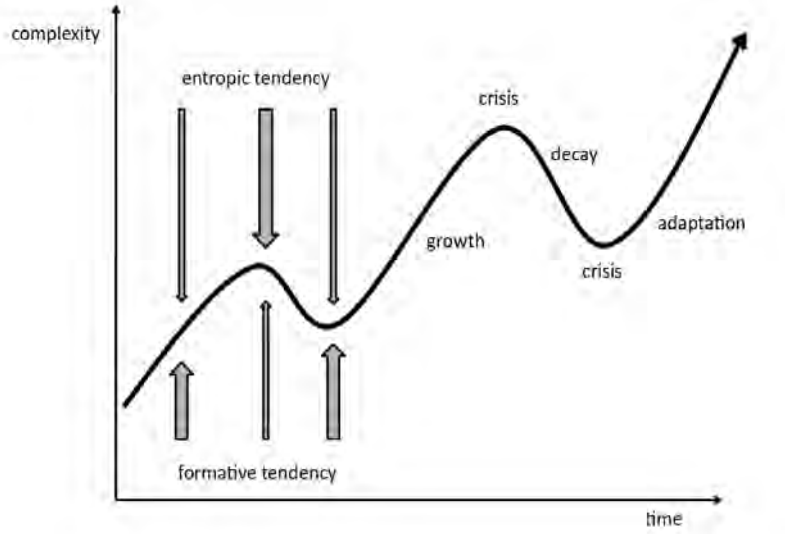

Fig. 1: reality's formative tendency towards complexity

One way of allowing reality's formative tendency to attain more complexity, is by establishing a Zeno effect. On the level of human behavior this means we quickly repeat our question to nature with enough focus and effort so that it replies with the same answers over and again. The Zeno effect is a 'tool' with which we can try to make the things we value happen. It is not depicted in figure 1 but will be in

the sections to come. Chapter 4 elaborates on the interplay of the formative and entropic tendencies and the Zeno effect to show how they might explain our everyday human emotions and behavior from a physics-point of view.

To become

To conclude this account of the evolution of physics from classical to relativity and quantum theory, some imagination of a quantum experience could again be useful to help carry these insights to the level of our everyday experiences. Suppose we could empathically communicate with a quantum as it tries to deploy its formative tendency, what would we come to understand of it? Suppose you were a quantum, how would you feel? I imagine a hunger, a craving perhaps. An unspecified urge to become anything. Or perhaps merely a playful impulse, based on the security that from who I am now, I can expect only growth. There is no way I can get any smaller, no way to get any less specified. Once I have actualized into whatever phenomenon, I will have forgotten I was once a quantum. There was no way for me to record my quantum experience of being merely a wish to become. No senses, no memory, no language. Once I have actualized, I will be part of whatever I have actualized into, perhaps into an experience of a human being. All of a sudden I will take part in that person's consciousness, not knowing that I came from somewhere else. I will be that person's past, in which she herself (who is now me) was something of which she is not aware anymore. Nevertheless, along with me the wish that once defined me has now become part of her also. I contribute to her wishing for something, as do all the other quanta that bundle up to form this person. I realize that nothing has changed, really: to be a person is still a wish to become.

4. Real life: meaning, emotions and mental health

Now that twentieth century physics has reinstalled our mind's role in the unfolding of reality, what do we do with it? To state its importance in scientific theories is one thing, to recognize its presence and dynamics in our daily lives is another. What is the link between the deep math of quantum physics and the experiences we have while living our lives? Supposedly, we ask questions to nature all the time but how does it feel to be doing this? Is 'asking a question to nature' and 'causing waves of probabilities to collapse' what we do when we are in the market trying to figure out what to buy for dinner tonight? How does our active role in the creation of reality come about in real life? How does it feel to be 'actualizing'? Do we risk asking the wrong questions?

This chapter is meant to try and answer some of these questions. It interprets concepts of the post-Newtonian view on reality in terms of everyday human experiences such as leading a meaningful life, emotions and mental health. As a result, connections between physics and real life are suggested that are natural and intuitive, not theoretical and mechanistic. Besides the goal of interpreting some of the post-Newtonian concepts into a more accessible language, this chapter also offers some suggestions for their application to practice. For both purposes, the field of psychology will show to be a particularly suitable 'intersection' as it concerns the level of human experience and behavior which also has a special importance in relativity and quantum theory, as we have seen in chapter 3. Far from being written exclusively for psychologists, the following sections draw from psychology primarily for the purpose of translation. Readers with other backgrounds are certainly encouraged to stay tuned.

4.1 Review

Let us first take some time to review what was said in the previous chapters. The main theme is that of a scientific paradigm reaching the limits of its explanatory power and its applicability. Despite the monumental changes this paradigm has caused in the centuries behind us, despite its influence on almost every aspect of Western society to a

point that it has become almost self-evident to us, Newtonian science cannot account for a growing body of findings in a growing number of scientific fields. It is clear that the world is not merely the predictable 'machine' we have held it for.
First of all reality is a probabilistic place to be living in, a ***possibility***. Atoms turn out to be not quite the material 'a priories' we thought they were. The act of observing and measuring them influences their characteristics. An atom by itself is fundamentally not an objective 'thing' but a possibility of becoming a thing, depending on the interaction with its surroundings (e.g. an observer). This probabilistic nature also applies to various other aspects of reality such as time and space - all aspects that were considered a priories in the Newtonian paradigm.

Reality is also an interactive place to be living in, a ***process*** of Heisenberg cuts. In reality nothing is ever fixed and constant but always fluid. Moreover, this fluidity appears to be not just random but driven by a ***formative tendency*** towards ever more ***complexity*** with occasional hick ups and dips because of ***entropic*** counter forces. The process that is reality runs in a more controlled fashion when it unfolds within a ***Zeno effect***, that is the capacity to observe intensely and repeat observations in quick succession. Because it provides some control over the process the Zeno effect is possibly the connection between mind and matter. There are those who hypothesize a directedness in the process of reality, which would render it '***teleological***' and bestowed with an innate '***consciousness***' in all of its parts. But however far one wants (or dares) to go beyond our familiar way of understanding the world, it seems safe to say that we ourselves have an active role - however big or small - in its coming about.

The bracketing of the Newtonian paradigm has been going on for over a hundred years or so now, starting with atomic science, relativity theory and quantum mechanics. Other fields such as biology, neuroscience, psychology and - even further up the 'ladder' of abstraction – economics and political science are catching up. It is clear that we are in need of an update, and extension of our paradigm. Still the acceptance of the various new scientific findings that call for an extended paradigm is problematic. They are often so 'outside of

the usual' that it is hard to find a common ***language*** in which to discuss them. Without such a language, their application in other fields than physics becomes difficult. The development of a practical language may well be a long process of trial and error. The following sections are meant to be one such trial.

4.2 Three proposals

After having discussed all of the above a logical next step is to try and formulate some of the possible implications. I propose that:

1. the formative tendency of reality that leads to ever more complexity corresponds to the human experience of leading a meaningful, significant life;

2. increasing and decreasing levels of complexity correspond to the human experience of gaining and losing what is meaningful. The basic emotions relate to that experience. They are directed towards gaining, defending and restoring meaning;

3. the Zeno effect that offers a way of controlling the reality process to some extent equals the human capacity of coping with life and create meaning, in other words mental health.

In the sections to come, I will elaborate on each of these three proposed connections and their possible implications for the practice of psychology. I will conclude with clinical cases that illustrate the manifestation of these connections in real life situations.

4.3 First proposal: a formative tendency towards meaning

One of the central arguments for an extension of the Newtonian paradigm is that reality – with us humans in it - is not something fixed and 'a priori' but a formative process in which possibilities interact and 'bundle up' towards more complexity. This assertion comes from various scientific disciplines as we saw in chapter 3. They describe complexity in various terms such as 'order', 'convergence' and 'interrelatedness'. So, although there is some agreement that reality works towards ever more complexity, there is not yet a common agreement on what complexity is. This hinders a good exchange of ideas between different scientific fields in face of the risk of

comparing 'apples and pears'. What we need is an appropriate language in which to speak about the developments in science. Language can be a crucial tool for the development of knowledge and its application but in this case the tool itself is still developing. Therefore my first proposal for practical application of the new concepts directly concerns language.

I propose that on the level of human experience 'complexity' is best captured in the word '*meaning*'. Meaning refers to the directedness or goal drivenness of the formative process, in the sense that this process is not increasing complexity in a random way but in some certain direction. Pursuing complexity merely for the sake of complexity would be pointless random growth, chaotic and harmful even. The point that was made in chapter 3 is that complexity is pursued along some theme or principle. On the level of human experience, this can be interpreted as that there is some 'meaning' in the effort of growing, that human beings prefer to live their lives not in any random way but meaningfully, constructively. They *mean* to attain what is significant to them and protect that from loss or decay. They strive for meaningful lives in which their potential is deployed in a constructive way, interacting with their environment. Exactly what is meaningful is likely to differ from one person to another and for different situations. What may seem chaotic (less meaning, more entropy) for one person can be attractive for another. Especially when a prior form of meaning did not work out well enough, letting in a certain amount of chaos can be revitalizing.

Complexity can be understood as the result of a bundling of possibilities, or in other words: a controlled accumulation of the 'probability wave'. This means that upon (partial) collapse of this wave by a question to nature (a Heisenberg cut), a greater variety of possibilities can become actualized than would have been possible before bundling. For instance: a single atom does not have a temperature to be measured but a group of atoms does. Likewise, a plant's seed by itself cannot grow out to deploy its formative tendency and increase complexity. For that, it needs to form a 'bundle' with the air, water, light and minerals that surround it. Somehow, 'solitary' possibilities or small clusters of possibilities find some common ground for 'deciding' to bundle up and form a bigger, more complex,

collective. For the conception of the word 'meaning' that I propose this implies that it is multi-faceted. More varied bundles of possibilities correspond to richer meaning. This accords with the tremendous array of experiences, memories, intentions, intuitions and feelings that pass during the course of a lifetime, not to mention the alternations of perspective from personal past, present and future and the interactions with other people.

Looking for some corroboration of my proposal in literature from physics and the social sciences, what strikes is that the word 'meaning' is often used in a self-explicatory way but is hardly ever defined. Some sources however, do offer an elaboration of the concept. Stapp for instance, in his work on the relation between quantum physics and consciousness, describes meaning as:

'The idea of meaning entails a sense of direction: a sense of endurance with refinement; a notion of a process that sustains and refines itself. {...} *Endurance and reproducibility are essential: the form must endure long enough to activate and guide the machinery that sustains and refines it.'.* (Stapp, 2009, p. 165).

Stapp clearly describes the directional aspect of reality that makes it meaningful. Also, he places the inherent drive towards more complexity - or 'refinement' as he calls it here - at the center of the definition of meaning. Finally, Stapp emphasizes the aspect of endurance: for things to be meaningful they must own some longevity, they must not be too momentary and ethereal. As we saw in chapter 3, Stapp regards the Zeno effect as a 'tool' that helps us to pin down the ever fluid probability wave into the actualization of what we want (e.g. the raising of our arm). Hence, the Zeno effect is our tool to give reality some endurance and to create some meaning. We will get back to the Zeno effect in section 4.5 below.

Furthermore, Stapp sees meaning as an *inherent* quality of reality and relates it to the notion that reality is 'made' of *fields* of possibilities:

'From this point of view the proposal of Heisenberg and Dirac can be characterized in this way: the quantum choices are meaningful choices, where "meaningful" is defined intrinsically, within the quantum system itself, without reference to any external criterion of meaning, in terms of sustainability. Each

quantum choice pulls itself out of the quantum soup "by its bootstraps"; it justifies itself by the meaning inherent in the sustainability of the form that is actualized. {…} each Heisenberg/Dirac quantum choice is a grasping, as a unified whole, of a certain combination of possibilities that hang together as a local enduring form. The actualization of this form utilizes, and restructures, some of the quantum potentialities, and produces an immediate rearrangement of the possibilities available for the next event. {…} A principal feature of this rearrangement of possibilities is that a choice made in one region instantly affects the possibilities available in far away regions. {…} the bookkeeping system is global: an adjustment of possibilities is immediately made over the entire spacetime manifold. Thus the basic process of choice is fundamentally global, but it creates locally defined meaning'. (Stapp, 2009, pp. 166 -167).

This field-aspect gives reality a holistic character and can help explain such typical quantum phenomena as entanglement (see section 3.1 above). If we are prepared to understand reality as inherently meaningful - contrary to our Newtonian upbringing - then there can be room for an intuitive logic that explains entanglement phenomena: particles can be entangled because their connection 'means' something, they share a meaning that 'motivates' their actions. Moreover, this tells us that meaning can be independent of time and space: it can act instantaneously over any amount of distance.

Looking for an elaboration of the concept of meaning in literature from psychology, the same self-explanatory use of the word meaning is often found here also. Reflections on the 'meaning of meaning' seem hard to find. Somehow, the meaning of the word meaning seems so intuitive that it does not need further explanation. A good exception[26] to this pattern is the work of Overton. He does dwell on the subject, describing the wake of humanistic psychology in the 1960's, which views people as beings that actively construct meaning (in contrast to behavioristic psychology):

26 For one other exception see an article by Dahlberg (2006), that studies how the philosophies of Husserl and Merleau-Ponty treat the concept of meaning ('essences'). I do not elaborate on Dahlberg's article here since it does not, to my knowledge, represent a line of work as extensive of that of Overton. Still, given the scarcity of explicit studies into the 'meaning of meaning' within the social sciences, it seems important to mention Dahlberg's article.

'[citing Bruner (1990, p.1, 3):] *it was…an all-out effort to establish meaning as the central concept of psychology. – not stimuli and responses, not overtly observable behavior, not biological drives and their transformation, but meaning* {…} *the symbolic activities that human beings employed in constructing and in making sense not only of the world, but of themselves.'* (Overton, 2012, p. 34).

Overton emphasizes the symbolic aspect of meaning[27]: behavior, thoughts and emotions are more meaningful as they symbolize more of reality. They are more than just the primary function they may have, they can be symbols or signs of what preceded them and of what will follow. For instance the raising of an arm can be a rather functional act that is necessary to, let us say, chase away an annoying mosquito on a lazy summer evening. However, it also *signifies* some of the inner world of the person involved: it 'means' that she was annoyed by the mosquito (past) and wants it to go away (future). The meaning of the same act of raising an arm can be much richer in other contexts, for instance when it signifies a vote for some important issue in parliament that will influence the lives of many. Its *significance* is much bigger in the second occasion.

Taking the above considerations into account, I arrive at the following definition of the word meaning:

Meaning is the combined and enduring set of possibilities that results from a directional formative tendency in reality towards more complexity. Meaning can be experienced and created by human beings in many different ways of which a sense of significance is always the essence.

Entropy

The word 'meaning' appears to be a useful basis for description of reality's formative tendency towards complexity. What about entropy, the counterpart of complexity? How does that concept translate to human experience? As described in section 3.3, the formative tendency towards more complexity is in constant interplay with a counter-directed entropic tendency. Bundles of possibilities that have formed and built up into more complex ordered wholes are

27 The field of 'semiotics' is dedicated to the sign-aspect of meanings and of meaning-making, but seems hardly to have permeated into the social sciences and contemporary psychology. Overton refers to semiotics and the work of one of its key figures. C.S. Pierce.

sometimes decomposed into less ordered, more entropic sub-sets of their original whole. This dynamic was graphically represented in figure 1.

Entropy is 'a measure of the number of possible arrangements of a specific system': more possible arrangements translate into more entropy. If we replace the word 'system' by `human being' then the prospect of having more possibilities may sound positive, creative even. More possibilities might set a person free from unwanted habits, perhaps even lead to good ideas and meaning. The essence of entropy, however, is randomness instead of directionality. Entropy means the growth of random possibilities and the loss of control over desired ones. In the case of setting a person free from unwanted habits, this would be a coincidental (random) outcome and not an intended one. The same would hold for other possible behaviors that would simultaneously arise. Indeed, entropy would become life-threatening to a person if it leads to random breathing, metabolizing or dividing of cells. The body would not be able to maintain its necessary composition and in fact deteriorate. Looking at the psychological level, entropy might lead to less order in our experiences, even to the point where they become dissociative or psychotic. In other words: too much entropy is bad for you. It is the loss of meaningfully ordered and coherent bundles of possibilities. Entropy is a force in nature that works contrary to the formative tendency.

However, provided that it is handled well, entropy may indirectly lead to more meaning. As we already saw, meaning must be understood not as a *state* but as the ever fluid result of a formative *process*. This process does not necessarily run in a gradual, linear manner. Nature is full of examples of how periods of (entropic) decay eventually result in more meaning. Volcano eruptions for instance, are often devastating but also cause rejuvenation of the soil after the dust has settled. Similarly, on the level of human development, allowing some chaos (entropy) to enter into one's life may help to get rid of a habit or shake up a relationship that has become dull. In such cases, an increase of entropy indeed provides a source of possibilities from which, if we manage to stay sufficiently composed during the process, we can start new developments. What seems to matter, is a sound *balance* between entropy and formative tendency.

4.4 Second proposal: a simple model of the interaction of meaning and emotions

The drive to maintain a sound balance in the process of meaning formation is common to human beings and is strongly linked to our emotions. The principle of reacting emotionally to (the expectation of) gaining and losing what is important is recognized throughout the spectrum of psychology and psychotherapy, running from neuropsychology on the one pole to humanistic psychology on the other. For instance, on the neuropsychological pole Damasio (2010) describes 'primordial emotions' that correspond to homeostatic impulses, directed at restoring physical balance[28]. Functional psychologist Frijda explicitly recognizes an 'action readiness', a readiness towards behavior, in emotions (Frijda, 1986). Research on decision making firmly shows how people are irrationally risk adverse and security seeking (Kahneman & Tversky 1979; Levin et al., 2002). Within cognitive behavioral psychology expected pros and cons of thoughts and behaviors are plotted in a functional analysis to assess their expected effects on target emotional states such as depression (Beck, 2011). On the humanistic pole of the spectrum, Rogers' person centered approach explicitly embraces a 'formative' or 'actualizing' tendency as the basis for our emotional well-being (Rogers, 1951; 1961, Greenberg, 2002). In everyday life, we are all familiar with the 'negative' feelings upon losing something valuable and the 'positive' feelings upon gaining. They are prominently present in our daily lives. This leads to my second proposal:

Increasing and decreasing levels of complexity correspond to the human experience of gaining and losing what is meaningful. The basic emotions relate to that experience. They are directed towards gaining, defending and restoring meaning.

For the quantum-based view of emotions that I propose, the crucial argument is that they possess the same formative tendency as anything else in nature. The quantum nature of reality inherently bestows every phenomenon, whether material or immaterial - insofar as this distinction is to be upheld in a post-Newtonian view of reality - with a formative tendency. Emotions are phenomena within nature just as all

28 Panksepp & Solms, 2011 and Alcaro et al., 2017 combine neuropsychological and psycholanalytical findings to arrrive at a similar conclusion.

other phenomena are. This implies that they too possess a formative tendency. In other words: emotions are directed towards more meaning. In this view, emotions can be understood as a non-verbal, non-rational 'meaning-compass'. They motivate towards behaviors that might increase, defend and restore the formation of meaning. If we want to understand our emotions and use them to our benefit, quantum physics encourages us to acknowledge their inherent formative tendency, investigate their direction and not try to discard, suppress or overcome them too hastily. This applies to all four basic emotions: joy, fear, grief and anger.

Figure 2 is a good starting point for the integration of the concepts discussed above. It displays the interplay of formative tendency and entropy that results in various levels of meaning (see also figure 1 in section 3.4 above):

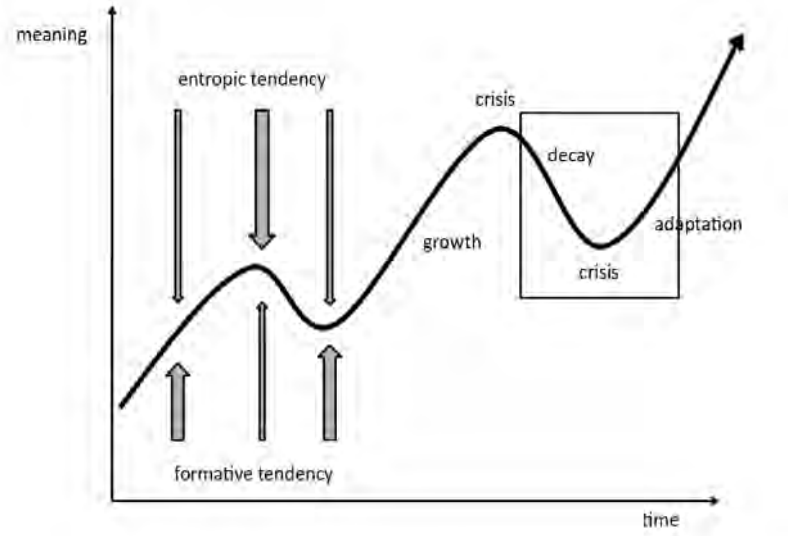

Fig. 2: reality's formative tendency towards meaning.

Figure 2 visualizes how meaning is the net result of the opposing formative and entropic forces. These forces can vary over time and so does the resulting level of meaning. In the long run however, the formative tendency is assumed to surpass the entropic tendency, causing an ever more meaningful reality. I propose a connection between the emotions and a particular direction of the meaning curve, as plotted in figure 3 below, which shows the squared-in segment of the meaning curve of figure 2.

Fig. 3: emotions in relation to the varying course of the formative tendency towards meaning.

Figure 3 is a picture of the relationship which I propose between the four basic human emotions[29] fear, grief, anger and joy and the course of the meaning-curve. Below, I will discuss each single emotion and propose some investigative questions that can contribute to a practical understanding of the emotion's inherent formative tendency. These

29 There is not one common accepted taxonomy of the various emotions. Overall however, emotion-researchers agree that 'primary' or 'basic' emotions' can be distinguished from which other more nuanced emotions are derived. They differ on the number of primary emotions, though, ranging from two emotions such as pleasure and pain or love and fear (e.g. Mowrer's two-factor model (Mowrer, 1951) to eight or more (e.g. Plutchik, 1980). The model I propose uses four emotions: fear, grief/sadness, anger and joy, which is in my own clinical psychotherapeutic experience often a pragmatic set, suitable for further exploration.

questions can generally be useful in the practice of everyday life as well as specifically in the practice of the helping professions such as counseling or psychotherapy.

Fear

A person expecting or experiencing a decline in meaning is likely to experience this as a threat and may feel fear to some extent. This is especially so if that person estimates her chances of overcoming the threat as unfavorable, for instance because the threat is very high, or because she has experienced failure in the past and has little confidence in her own abilities to fight off the threat. Fear essentially motivates someone towards running away, escaping, with the aim of finding a secure environment where meaning can be protected or restored.

Investigating the emotion's innate direction towards (restoration of) meaning, useful questions could be: 'What do you feel is at stake here, when things really go wrong?'; 'What is it that you are holding on to?'; 'What do you need to feel safe?' or 'What withholds you from tackling the threat?'.

Grief

To lose what is meaningful can feel sad and, depending on how meaningful this loss is, there is a need to grieve. The loss may concern the past, for instance when you lose some object that was dear to you because it symbolized a meaningful memory. The loss may also concern the future, in case you are deprived of opportunities and have to face the end of some process you had good expectations of. Either way, grief can be understood as the emotion that corresponds to the experience of a permanent breach with some process of meaning formation. It motivates towards letting go of the prior situation and towards accepting that it belongs to the past. Grief can thus be a helpful process that facilitates the redirection of focus that is needed to attend to new situations. Grief also motivates towards finding the comfort of other people who may experience this as an appeal to help out. Thus, grief can be understood as a preparation for starting over with a new process of meaning formation. It aims at gaining new resources (focus, help of others) which may help to increase the chances of starting over.

Investigative questions that can help stimulate and focus the process that grief refers to, are for instance: 'You really seem to feel like you have lost much, can you tell me what it is?'; 'What were you engaged in from which you now feel cut off?'; or 'What is it that you now feel you have to let go?; and 'How can I help?', 'What do you need?'.

Anger

When someone's process of meaning formation is frustrated, anger can help to deploy the energy that is necessary to bring new focus into the formative tendency of one's acts. In this view, the essence of anger is to gather and use enough determination to change a situation into a different, intended direction. Subsequently, one may either feel satisfaction or regret depending on success and the amount of 'collateral' damage one has caused by acting angrily.

Useful questions for someone struggling with anger can inquire into what it is she wants to change: 'You really need a change, don't you?'; 'You feel like you want to make her change the way she treats you, don't you?', or 'What is so important about this that it makes you angry?'; and 'What is it you are trying to make possible?' are simple ways of investigating the direction of someone's anger.

Joy

Creating more meaning can lead to joy. When we succeed in achieving what we intend, or simply 'go with the flow' in a direction that is meaningful, we may feel happy and joyful. In relationships with someone who is important to us, we may experience this as love for the other person or ultimately for life itself. Of course, joy feels good and makes us want to stay where we are and continue what we are doing. Joy motivates us towards prolonging the process of meaning formation in which we are involved.

To enhance a better understanding of a joyful feeling, a good question could be for example: 'What is it that you feel you have brought together so well?'; or 'What does your feeling tell you that has now become possible?'.

All in all, the prototypical question that seems most fit for investigating and stimulating an emotion's inherent formative tendency towards more meaning is:

'If you follow up on this emotion, what does that lead you to?'.

The exact formulation of this question should be tuned to the themes with which a person is struggling as well as with how serious or grave those themes are. Someone experiencing intense fear is not likely to be in the mood for investigative questions. The same goes for any other intense emotion. The intrinsic motivational force of intense emotions is so strong that the first priority of the person experiencing them is usually to try and act upon them. The ones in their immediate vicinity (whether professionals such as therapists or not) usually do wise to react accordingly, which is often to try and restore a more calm and safe situation.

Discussion

The simple model of the interaction of meaning and emotions proposed above is primarily an attempt to translate essential features of quantum physics to the domain of our everyday experiences. The model is tentative and would certainly need to be followed up by more investigation and deliberation. Still, the simplicity of the model and its 'face validity' do seem to justify the conclusion that quantum physics bears importance to the experiences of our everyday lives. Quantum physics, more than Newtonian science could, seems to encourage us to trust 'mind-aspects' of reality such as our feelings as a possible source of mindful behavior in the world around us. The Cartesian mind-matter split we have grown accustomed to in the centuries behind us is more likely to favor logical, rational reasoning based on material facts, to the exclusion of non-factual experiences such as emotions. The quantum-based view of emotions offers a scientific argument to reinstate their importance for the judgments we make about reality. This is by no means meant to say that we should blindly follow up on our emotions and not use our ratio. What seems to matter is a sound balance between the two of them. Section 4.5 below will look into the dynamics of this balance by combining the above with the Zeno effect.

Another footnote to be made here is that the proposed simple model does not mean to suggest that there is a necessary order in which the emotions 'should' follow upon each other. Nor does it mean to suggest that the interpretation of emotions is always this simple. What the model intends to express is a link between the emotions and the specific direction of sections of the curving course of meaning formation. This link is a two-way connection: a specific emotion hints at a specific course of the meaning curve and vice versa. These interpretations are often far from obvious in real life situations. To trace the main theme of our emotions amidst all of the complexities of our lives, histories and relations can be extremely difficult. This can be witnessed in psychotherapy, a process that is often largely dedicated to uncovering deep emotions, what causes them, and what they imply. More often than not, this is an intense process that extends over many months and sometimes several years.

It is interesting to mention at this point that the quantum-based model of the interaction of meaning and emotions which I propose closely corresponds to the humanistic approach to the emotions. Humanistic variants of psychology view emotions as a sort of 'meaning compass': internal experiences, varying in intensity, that point out and prepare for adaptive behaviors. Emotions can be addressed and used in therapy in a direct way to help a client develop more adaptive kinds of behavior and feel better. This view is elaborated in Greenberg's 'emotionally focused therapy' (EFT) (Greenberg & Paivio, 1997; Greenberg, 2002; Greenberg et al., 2002), a contemporary and influential humanistic form of therapy. EFT explicitly regards emotions as action-oriented and adaptive motivational schemes. Emotions inform us (and often the people around us as well) about our possible directions, as for instance in the case of depressed feelings described below:

'Acknowledging pain or dreaded feelings is then the first step in a problem-solving process in which identifying such feelings is akin to problem definition. The person identifies in an experientially valid fashion that the problem is that "I feel rotten, powerless or unlovable" or that "My heart is broken - I don't wish to carry on." You cannot leave a place until you have arrived at that place, and so it is with dreaded feelings. It is the experiencing of the distressing feeling that makes it

unequivocally clear what the problem is and thus is a key ingredient in new ways of coping with that feeling.' (Greenberg & Paivio, 1997, p. 99).

The direct and confident approach to emotions I propose is in line with the humanistic approach but differs from that of contemporary mainstream cognitive behavioral therapy (CBT)[30] (e.g. Beck, 2011). As discussed in section 2.2 above, the original materialistic assumption of the separation of mind and matter resonates in this form of therapy. It essentially regards the stubborn emotions for which clients seek therapy as 'disorders'. For instance, a frequently occurring emotional complex of sadness, fatigue, irritability and lack of interest is labeled as 'depressive disorder'. The CBT approach to depression essentially views these emotions not as pointing towards solutions, but as the symptoms of the client's problem. Therefore, CBT usually aims at overcoming or taming these emotions (Samoilov & Goldfried, 2000). This is achieved by practicing opposite thoughts and behaviors (often complemented with psychotropic drugs) usually within a standard treatment protocol. CBT addresses the problematic patterns of emotions in an indirect way, unlike humanistic approaches. A prototypical intervention of a CBT therapy will sound like:

'We have talked about how thought {X} contributes to your problems. Try thinking thought {Y} instead, as it will contribute to solving them.';

or:
'In the coming week, seek exposure to situation {X} which causes a positive emotion. This will help counter the depressed feelings that bother you so much'.

The view on emotions which I propose is not meant to deny any of CBT's effectivity which has been proven time and again. Instead, the two approaches could be seen as complementary, especially when therapy leads to a more balanced integration of emotions, thoughts and behavior (Whelton, 2004). Such integration can for instance be stimulated when an exploratory humanistic approach to emotions is used in the first stages of therapy, followed by a more practically

30 See also section 2.2 above. Cognitive behavioral therapy refers to the category of psychotherapies that is rooted in the ideas of Skinner in the 1950's and Beck and Ellis in the 1970's. A more recent and eclectic application that takes into account other forms of psychotherapy also, is schema-focused therapy (Young, 1999)..

focused CBT approach that helps perpetuate the client's newly discovered direction.

4.5 Third proposal: Zeno and mental health

Ideally, the interplay of formative and entropic tendencies is balanced in such a way that the formative tendency has the upper hand and meaning is formed. Optimal balance is reached with a controlled influx of entropy that supplies new energy to the formative process[31]. Balance can arise in a 'passive' way, when the two opposing tendencies happen to be at the right level for a period of time. A more 'active' cause of equilibrium is also possible. For instance, as we have seen, the emotions motivate towards adaptive behaviors that help to create and maintain meaning. The more effectively they do so, the more they contribute to mental health (to be certain: the same can be said about healthy rational reasoning). Thus, fear can be understood as the emotion that motivates us to escape to a safer, quieter, more manageable situation where it is easier for us to focus and establish a new formative process. A place where we may hope to recuperate, regain strength and find new determination to start over. Another way to formulate this, is to say that in this new quieter situation we find new opportunities to establish a Zeno effect that allows us to realize (actualize) what we feel is important. Other emotions motivate towards different behaviors that support a Zeno effect in different ways.

With the addition of the Zeno effect, the course of the meaning-curve in figure 2 now has one more possible cause besides an accidental (un-)balance between formative and entropic forces. In principle, 'more Zeno' leads to a better handling of the entropic force and hence to more meaning. Since it is unlikely that a person can stay focused all the time everywhere, there are likely to be fluctuations in the Zeno effect she manages to uphold. These fluctuations have an effect on the level of meaning that results from her efforts, which is likely to vary along with them. The Zeno effect is not just the result of conscious efforts but also of all of the other processes in the system

31 For an interesting corroboration of this from a neuroscience-perspective, see Carhart-Harris et al. (2014). In this study, subjects were injected with psychedelic drugs to increase brain entropy in a controlled way. Using neuroimaging techniques, the brain's functioning could be monitored which showed that the conscious brain operates just below the critical level of entropy. Either higher or lower levels of entropy caused the brain's function to diminish.

that make up a person such as her metabolism, physical strength or her cognitive abilities, to name just a few. Furthermore, the interactive aspect of reality suggests that the Zeno effect can be influenced by relationships one has with one's surroundings. A group of people can usually achieve more than one person alone, although of course the tuning of the individual efforts to reach a harmonious cooperation costs some effort also.

From this follows my third proposal:

the Zeno effect that offers a way of controlling the reality process to some extent equals the human capacity of coping with life and create meaning, in other words: mental health.

A look at how mental health is defined by major professional associations in the field of psychology and psychiatry seems to confirm this view. The American Psychological Association for example, defines mental health as:

'the way your thoughts, feelings, and behaviors affect your life. Good mental health leads to positive self-image and in turn, satisfying relationships with friends and others. Having good mental health helps you make good decisions and deal with life's challenges at home, work, or school."[32].

The American Psychiatric Association defines mental health as:

'Mental health involves effective functioning in daily activities resulting in productive activities (work, school, care giving), healthy relationships and the ability to adapt to change and cope with adversity'[33].

These definitions contain all of the above concepts, such as relationships (interaction), productive functioning (meaning formation), adaptation, challenge and adversity (entropy). Even the Zeno effect seems to resonate in the definitions - be it in different wording, as the word itself is not likely to have already entered

32 American Psychological Association (2018): http//www.apa.org/helpcenter/change.aspx.
33 American Psychiatry Association (2018): http//www.psychiatry.org/patients-families/what-is-mental-illness.

psychological definitions - specifically where they speak of thoughts and feelings (mind-aspects) affecting one's life on various levels.
Below, what happens in terms of the Zeno effect during a phase of growth is shown graphically.

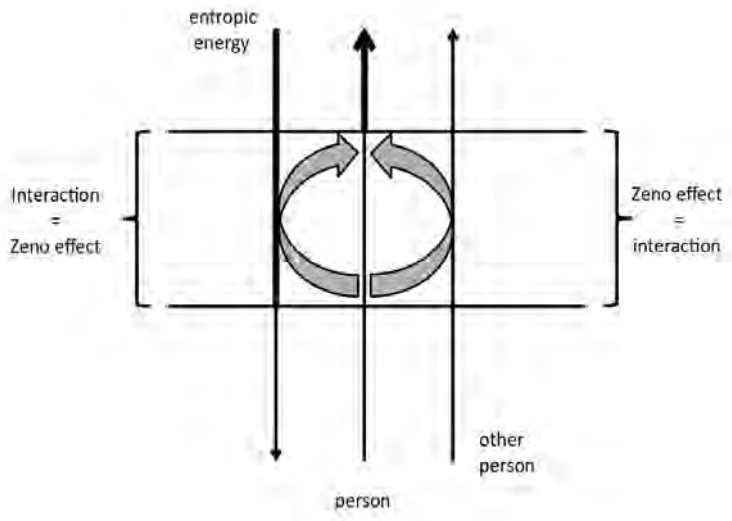

Fig. 4: Growth due to sufficient Zeno effect.

Above, figure 4 describes a situation in which the Zeno effect established by a person equals the interaction of that person with her surroundings. The two horizontal lines depict a bandwidth in which the Zeno effect fully covers the interactions (curved arrows) of incoming entropic energy (left, downward arrow), the person herself (middle, upward arrow), and the interaction with others (right upward arrow). In this case, the person is well in control of what she is doing. Her interactions with the outside world run within the 'span of control' of her Zeno effect. The result is growth of meaning, which is represented by the thickening of the middle arrow upon leaving the interaction area. Note that the entropy arrow becomes thinner upon leaving the Zeno bandwidth, representing how this person has transformed some of the entropic energy into meaning. This

corresponds to the varying width of the arrows in figure 2, from which the varying level of meaning is the net result.

In the following section similar graphs describe phases of decay and adaptation. The examples depicted in these graphs come from cases in clinical practice.

4.6 Cases from clinical practice

As we have seen in figure 2, when entropy gets the upper hand a period of decay follows. This is what happens for instance when fatigue or illness makes it hard to uphold sufficient focus (Zeno effect) and the body's ability to regulate interactions with its surroundings diminishes. Other causes of decay can be an insufficient interaction with others (isolation) or an amount of entropy that is simply overwhelming regardless of how strong a Zeno effect one can uphold. After a period of decay has led to a state of less meaning and more (random) possibilities, the formative tendency may find new opportunities for stabilization and renewed growth, as we have seen in the discussion of the simple model of the interaction of meaning and emotions in section 4.4 above. This is where a phase of adaptation starts. Below, some examples[34] from clinical practice are described in terms of the (un-)balance between Zeno effect, entropy, formative tendency and interaction.

Case 1

In the first example, we see how a client's cognitive problems put a limit to the Zeno effect he manages to uphold, making it sub-optimal for handling the often hectic situations of his daily life. This is represented in figure 5 below by the smaller Zeno bandwidth between the dotted lines. In effect, entropic interactions take place outside of this bandwidth. In other words: things that affect this client happen outside of his span of control and that leads to decay instead of more meaning. In the excerpt of a therapy session with this client, we will see how he wants to reduce the amount of interaction so that it matches his Zeno bandwidth. That would help him to stabilize and make new meaning possible.

34 Cases are modified so that they do not describe real clients but do describe (compilations of) actual themes derived from psychotherapeutical practice. The clients described are fictitious.

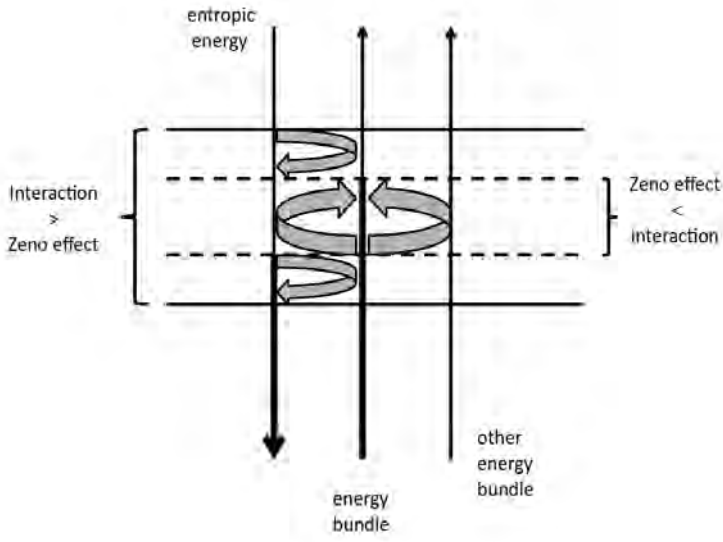

Fig. 5: Decay due to lack of Zeno effect.

Case: man with depressive disorder and minor cognitive problems that slightly slow down his judgment of new situations. After lifelong attempts to meet external expectations (parents, school, 'society', relationship), this client is now struggling with fatigue and anxiety on various life-domains. In this excerpt from a therapy session, a subtle advance towards better understanding of his anxiety can be seen, as well as a subtle advance towards more focus (Zeno).

Client: *'I know that a part of me is a bit slow. That is the part that prefers to take everything easy, hang out with friends and do nothing all day. But that is not possible, is it?'*

Therapist: *'No? What would happen?'*

Client: *'I would end up doing nothing at all!'*

Therapist: *'Would that be a problem?'*

Client: *'I couldn't have a job - one has to have a job!? In society these days, one can't not have a job!'*

Therapist: *'What would you do if you followed how you feel now?'*

Client: *'I would like to slow down, but I am afraid that I would lose myself in doing nothing. I don't know how to slow down and still be confident. I have always resisted against this side of me. Did my best to behave sensibly and keep it up. Be a good person and a good husband to my wife, to stay the man she once fell for. But the way it feels now, I would rather do nothing at all. Ever.'*

Therapist: *'How does that make you feel?'*

Client: *'I am so tired. I can't hold up. That is só frightening! If only I knew how to slow down a bit…'*

In this interaction between the client and the therapist, we can see the client struggling with conflicting feelings of fatigue (depression), fear of dropping out and longing for a quieter life. He fears that giving in to his lifelong desire for a slower pace will set off a deeply entropic phase in which he will lose what he achieved and holds dear. It is hard for him to recognize the formative tendency of his depressed feelings, let alone to take them serious and act upon them. Certainly, the client's fear has a formative tendency also: he has a point when he is afraid of losing his job and even his relationship. However, that is not the point of his depressed feelings which are the reason for him to seek help in psychotherapy. The point of the depression seems to be a formative impulse towards a lifestyle that facilitates a more sustainable level of effort. In other words: a level at which he can hold up a big enough Zeno effect to manage his interactions with his environment. Given his minor cognitive impairment, this level is bound to be lower (slower, less complex, less cognitively taxing, perhaps more intuitive and socially oriented) than what he used to aim for. Not feeling at liberty to attend to this message from his own feelings, he wore himself out until he could no longer function and is now diagnosed with a depressive disorder. Trusting the formative tendency in this 'disorder', the therapist can be seen to help focus on this, uncovering bits of the essence of the fatigue. The client does most of the work, but is helped by the therapist in welcoming and supporting the

feelings he did not dare to acknowledge until now. Within this short interaction, some progress is made towards a more realistic level of functioning, for instance where the client expresses his need to 'slow down'. The challenge for this therapy of course is to balance the tendencies of these emotions and find a solution that prevents the client from an uncontrolled 'entropic drop out'.

Case 2

Another clinical example of an unbalance in the interplay of formative and entropic forces is seen in figure 6 below, where a traumatized client tells about her experiences. In this case, it is the combination of an overwhelming amount of entropy (thick downward arrow) and a reduced Zeno bandwidth (narrow area between dotted lines) that causes the client's decay (narrowing upward arrow upon leaving interaction bandwidth). She is struggling with her anger that does not yet lead to a broadening of her Zeno bandwidth yet. In other words: she is afraid of her own anger and is looking for a more productive way to use it.

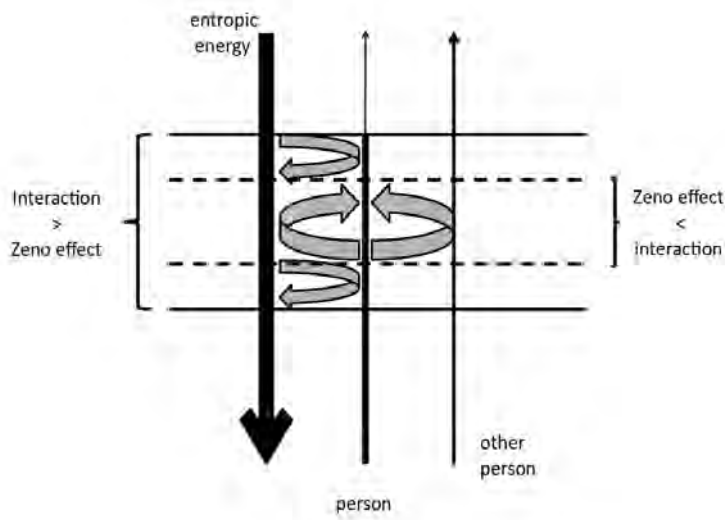

Fig. 6: Decay due to trauma (= excess of entropy).

Case: woman with post-traumatic stress disorder, traumatized by sudden violent attack on her life. In this example, a subtle advance from fatigue and fear towards anger can be noticed.

Client: *'I had been struggling for years: the divorce, losing my job, the bank repossessing my house. But I was managing, and proud. My kids need me, I have to be available for them. So I had difficult times, but I was managing, I am used to that. Until I was nearly murdered in the street. Just like that, out of nowhere. I have not seen the attacker, I have no memories of it. I was clubbed from behind. The police say the attacker mistook me for someone else. So I was not even supposed to be the victim. They know who did it, he was sentenced in absentia.'*

Therapist: *'What happened next?'*

Client: *"Since then, I can't manage. My body is still aching. I don't know what to do with my life. I have nightmares, feel depressed, lost my interest in anything and I am very very tired. I just want to rest and be relieved of duties. I would not mind if I died.*'

Therapist: *'You can't go on?'*

Client: *'I am staying for my kids, but if an occasion comes along where I can step out without pain and it doesn't look like suicide… maybe I will.'*

Therapist: *'How does that feel?'*

Client: *'You know, I am so afraid to go on. And I hate everything that has to do with the attacker. He is still somewhere out there. I know where he comes from, his neighborhood. How those people think and what they do is a crying shame! And nobody stops them! It makes me furious! I am scared of how furious that makes me. I can't do anything with that anger. It is not like me and I don't know what to do. I wish I knew what to do with my anger.'*

Again, the therapist is primarily trying to facilitate the client who does most of the work. The client's span of control is reduced by her physical need for recovery and the pain she still suffers. Also, as in the first clinical case description, this client is struggling with contrary emotions, each of which seems to make sense. On the one hand there are feelings of fatigue and the fear of losing control and make things

even worse. On the other hand there is anger that, although still in vain, tries to find a productive path back to a meaningful process. The role of the therapist is to help recognize, uncover and reinforce the formative tendency of the client's anger in a balanced (safe) way that allows her to gain control and widen the Zeno bandwidth. This would meet the formative (or rather: defensive) message contained within her fear and allow her to dare take further steps.

Case 3

The third and last clinical case comes from an advanced stage of therapy. We can see a young refugee dealing with the double challenge of overcoming traumatic experiences in her country of origin and adapting to her new situation in safety. In this case, the safety of her present situation has reduced the incoming amount of entropy. The client tells about being afraid and tired but this is compensated by the support of the community she is becoming a member of. This new balance that is developing in her life, is pictured in the graph by an equal bandwidth of Zeno and interaction. The support she receives from her new community is represented by a thick upward 'other person' arrow. The client is able to use some of the entropic energy in her life for her own process towards new meaning. This corresponds to the thickening of the upward person-arrow upon leaving the Zeno/ interaction bandwidth and the thinner downward entropy-arrow.

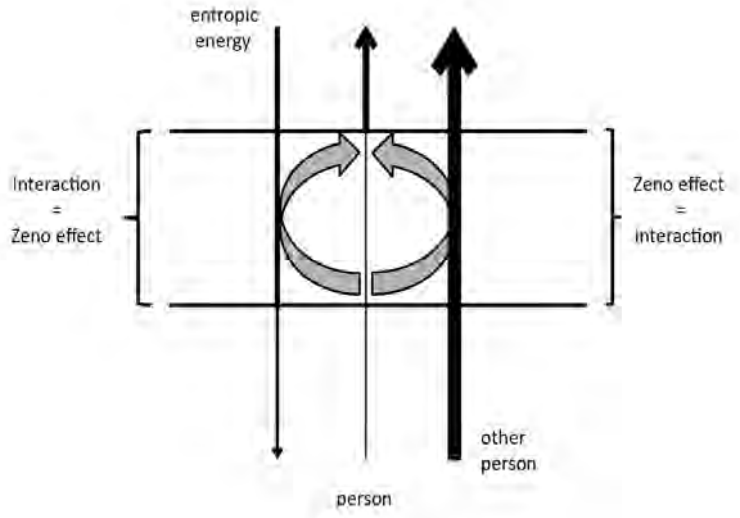

Fig. 7: Adaptation, renewed growth with help of strong others.

Case: refugee with post-traumatic stress disorder starting to find her way in new, safe situation.

Client: *'I dream I am being chased by men with guns and machetes. I run into the forest, I jump from rock to rock, they are coming after me. Then I wake up.'*

Therapist: *'You wake up. They did not capture you, you've made it.'*

Client: *'Sometimes they do capture me. And then I wake up.'*

Therapist: *'You wake up in your bed, and you are safe.'*

Client: *'I get so tired of waking up scared, of not sleeping.'*

Therapist: *'So you escape, but it makes you very tired?*

Client: *'Yes. And scared.'*

Therapist: *'It makes you very tired and scared. And you wake up in bed alone, far from home in another country. And you managed to escape.'*

Client {short silence, bright expression}: *'When is Kingsday? I bought an orange hat and a flag, I want to join in on the celebrations! I tried to look it up on Google but couldn't find it.'*

In several previous sessions, the client has already talked about how she is enjoying the safety of her new situation. The therapist can be seen to empathically receive the feelings of fear and fatigue but also to emphasize what the client implicitly tells him about the safety to which she wakes up after dreaming about her trauma. Congruently, the client eventually changes to the subject of how she is enjoying her new situation and how she is planning to blend in to her new community. Her feelings of joy seem to indicate how her process of meaning formation is gaining momentum.

All in all, these examples seem to substantiate my proposal that mental health corresponds to the ability to establish and maintain a Zeno effect, enabling a balanced interaction with the environment and optimal meaning formation.

4.7 Implications for psychology

The above sections present some ideas for a more 'everyday' translation of post-Newtonian physics to the level of human emotions and behavior. Section 4.3 proposes a view in which human beings are actively engaged in a process of creating a meaningful reality, driven by a tendency that is present on all other levels of reality also. In sections 4.4 and 4.5 this view is worked out into two proposals for practical ways of investigating the formative aspects of emotions. Although the above sections are meant to be read as proposals, they may suggest to go further than that, for instance because of the use of words like 'simple model' and 'application'. Insofar as this is the case, I may have been carried away just a bit in my attempt to illustrate what I propose for the sake of making it 'interpretable'. I did not mean to make it 'credible' or 'convincing' per sé. However to carry on on these lines of reasoning to some extent does contribute - so I hope - to the goal of finding translations to the everyday level, which is the primary goal of these sections (the appendix to this book holds a more

detailed discussion of the status of the above sections being proposals vs. arguments).

Looking for some confirmation of these proposals in mainstream strands of psychology a mixed picture arises. The views of reality (and us humans in it) vary considerably across the spectrum of psychological theories. This is reflected in the various goals they formulate for psychotherapy (L'Abate, 2012a). Cognitive behavioral therapy (CBT) for instance is based on the principles of behavioral learning theory (see also section 2.2). It aims for more adaptive ways of thinking and behaving in order to overcome or tame difficult feelings such as depression and anxiety. Psychoanalytic therapies[35] regard as their main goal to restore personal balance by working through various conscious and sub-conscious emotional and cognitive processes. Neither of these two approaches to psychotherapy states an explicit view on the role of human beings in reality as a whole. They mainly focus on the dynamics within the individual herself[36].

Approaches that do seem to acknowledge some of the core ideas of the post-Newtonian view on reality are the so-called 'humanistic' variants within psychology. They embrace a view of the person as (inter-)actively creating a meaningful reality (L'Abate, 2012a; Wampold, 2010). This view is then translated into a vision on how therapy can help in optimizing that process, or in getting it back on track. Humanistic therapies regard the whole person as the focus of therapy. This differs from therapies rooted in the classical worldview (such as CBT) that focus on 'disorders': specific parts of the person that are assumed to be malfunctioning. Depending on the client's specific need and preference, each of these approaches has its merits. Clients looking for practical and predictable ways of changing some of their dysfunctional behaviors, may prefer a disorder-based therapy such as CBT. Clients primarily interested in investigating deeper levels of their personality and working their way to mental health from there may feel better within humanistic forms of psychotherapy.

35 Psychoanalysis refers to the category of psychotherapies springing from the original ideas of Breuer, Freud and Jung during the first decades of the 20th century. Bowlby's attachment theory (1958) can be seen as a further development within this theory and a more recent and eclectic variant is Bateman & Fonagy's (2004) mentalisation based treatment.

36 Although recently they have allowed more room for relational, humanistic influences (Overton, 2012).

My proposal for a meaning-based humanistic model of the interaction of meaning and emotions finds support in a leading variant of humanistic psychology: the 'person centered approach' (PCA). The PCA was developed by Rogers in the 1950's (Rogers,1961) and grew out to be a mainstream form of contemporary psychotherapy with modern spin-offs such as emotionally focused therapy (Greenberg, 2002) and research on post-traumatic growth (Tedeschi & Calhoun, 2004; Cho & Park, 2013; Vanhooren et al., 2017). Just as post-Newtonian physics does, the PCA specifically emphasizes the *process*-aspect of human life and literally defines the *actualization* of one's potential as the *direction* of this process. Rogers labeled this process the 'actualizing tendency', which he described as:

'In client-centered therapy, the person is free to choose any directions, but actually selects positive and constructive pathways. I can only explain this in terms of a directional tendency inherent in the human organism - a tendency to grow, to develop, to realize its full potential.' (Rogers, 1980, p.127).

Rogers regarded this as the human equivalent of a formative tendency in nature as a whole[37]:

'I hypothesize that there is a formative directional tendency in the universe, which can be traced and observed in stellar space, in crystals, in microorganisms, in organic life, in human beings. This is an evolutionary tendency toward greater order, greater complexity, greater interrelatedness. In humankind it develops from a single cell origin to complex organic functioning, to knowing and sensing below the level of consciousness, to conscious awareness of the organism and the external world, to a transcendent awareness of the harmony and unity of the cosmic system including mankind.' (Rogers, 1980, p.133).

The main focus of a PCA therapist is to tune in to the client's process of actualizing and meaning formation[38]. An important condition for this to happen is a safe and welcoming climate within the therapeutic

37 By way of external validation, Rogers referred to ideas of medical biologist and Nobel Prize laureate Szent-Györgyi, who also hypothesized a formative tendency which he labeled 'syntropy'. Szent-Györgyi elaborated on prior ideas about this concept by Schrödinger who spoke of 'negative entropy' in his 1944 book 'What is life' .

38 The same holds for variations of the PCA that were developed later on, such as focusing (Gendlin, 1981) and emotionally focused therapy (Greenberg, 2002). See for discussions of Rogers' use of the concept of a formative tendency: Bozarth & Brodley (1991), Cornelius-White & Kriz (2008) and Holt (2014).

relationship. For this, Rogers formulated three necessary aspects of the therapist's basic attitude towards the client: a sense of empathy towards the client's experiences and perspective; unconditional positive regard for the client as a person and for whatever issue she brings in; congruence, which refers to the therapist being an authentic person who is interacting with the client in a real way instead of primarily from a therapy protocol. To what exactly the process during these kinds of therapies leads, is unknown beforehand, nor should it be formulated as a goal. It is crucial that the therapist receives whatever meaning the client is conveying and reacts in a way that maximally helps the client to make more sense out of this. Insofar as these therapies rely on a specific method, it is in the first place to create a safe, welcoming and supportive climate for the client's personal change.

More support for a meaning-based humanistic kind of therapy that follows from a post-Newtonian view of reality comes from a recent body of research into so called 'common factors'. Generic factors that are present across different types of therapies turn out to be what makes psychotherapy work, not the specific techniques of those respective therapies (Duncan et al., 2010). The strongest of all common factors turns out to be the client herself. Therapies that rely on the client's own process toward self-healing are the most effective (Bohart &Tallman, 2010). This confirms the importance for psychotherapies to embrace the notion of a formative tendency towards meaning. More than anything else, it is the client who determines whether therapy is successful, not the therapeutic method:

"In short, it is the client, more so than the therapist or the technique, who makes therapy work. The client's abilities to use whatever is offered surpass any differences that might exist in techniques or approaches. Clients use and tailor what each approach provides to address their problems." (Bohart & Tallman, 2010, p. 94).

Clients do emphasize that an effective psychotherapy requires a number of supportive conditions:

"(a) feeling understood, accepted, and being heard; (b) having a safe space to explore feelings, thoughts, behaviors and experiences; (c) support for dealing with

crises; (d) support for trying out new behaviors; and (e) advice." (Bohart & Tallman, 2010, p. 93).

Based on this research the authors propose[39] that overall psychotherapy integrates these person centered conditions and evolves from a predominantly disorder-based approach into a strength-based approach.

One other form of humanistic psychotherapy that offers some affirmation for my proposal is logotherapy, developed by Viktor Frankl (Frankl, 1946). In Frankl's view, the meaning of one's life is pivotal for personal functioning. Frankl had learned from his own experiences as a prisoner in several concentration camps, how powerful and innate the human striving towards meaning is. More than any other instinct, a sense of purpose was what kept him and his fellow inmates alive. Frankl elaborates this principle in his method of psychotherapy, which he called logotherapy. He derived this term from the word 'logos', the Greek word for meaning. Frankl explicitly tells us that logos is not just something we personally strive for, but is present in all of nature. Therefore, in situations where we lost sight of what meaning life is offering us, it can be helpful to reverse our thinking and ask ourselves what meaning we have to offer life. What unfinished 'tasks' do we have, not just for ourselves but for the greater good? Is it the care for our loved ones? Is it work that has to be completed? The answer to this question will be different for each of us, but can greatly help in finding a new sense of purpose, significance.

Regardless of their specific technical differences, the therapies described above approach emotions in investigative ways in order to understand their direction, their meaning. Doing so, they correspond to the post-Newtonian view of reality that this book proposes: reality consists of possibilities with a formative tendency that is directed towards meaning. Since emotions are part of reality just as much as anything else, they are bundles of possibilities directed towards meaning also.

39 This view is explicitly accepted by the American Psychological Association, as expressed in their statement on therapy effectiveness (APA, 2012).

5. What's next?

In short, this book is about how our current understanding of reality, rooted in various assumptions of seventeenth century philosophers such as Descartes, falls short. Early twentieth century physics showed that these assumptions have a limited applicability: they do not apply to the very small parts of reality, nor to the very fast. In these areas of reality, non-causal relationships that are independent of time and space are possible and reality is susceptible to the influence of the observer. This implies that the basic assumption of mind being separated from matter does not hold up. The new picture of reality that appears is probabilistic, relational and directional: reality is made out of possibilities that interact and bundle up because of their innate formative tendency towards ever more complexity. Why reality should do so, is still a matter of debate. However, there is much to say for an elementary consciousness that accounts for a reality that 'knows what it is doing'.

These findings may seem counter-intuitive at first which reflects how self-evident the seventeenth century worldview has become. We are hardly aware that the way we automatically understand our world is a result of assumptions that were so convincing that they seemed true. This may explain why the post-Newtonian insights should take so long to permeate into our awareness and daily lives. They are just too deviant from what we are used to. Besides that, there is the practical problem of how to express them in language when that same language is already used to define Newtonian concepts also. The result is a stalemate situation: physicists have progressed far beyond Newton but for most others reality still equals 'Newtonian reality'.

This book is meant to contribute to a broader understanding and practical use of the post-Newtonian ideas from physics. It does so by way of three proposals for translation of these ideas to real-life situations. The first proposal is that nature's formative tendency towards complexity is in fact nature's drive towards 'meaning'. The second and third proposal elaborate on this. In- and decreasing levels of meaning resonate in the four basic human emotions and vice versa: the emotions motivate towards behaviors that increase the chances of maintaining and restoring the process of meaning formation. Mental

health can be regarded as a person's span of control (Zeno effect) over this process. These proposals are further elaborated by the discussion of three clinical cases derived from psychotherapy. All this may serve to help the reader relate on a more intuitive level to otherwise strange and inconceivable concepts from modern physics.

Coming to a conclusion of this book, a look ahead seems appropriate. Below are some ideas that spring from combining physics and daily human experiences, as this book does. Perhaps I should rather say speculations, since so much is 'terra incognita' when venturing beyond the familiar boundaries of the Newtonian paradigm. One idea concerns a possible fusion of the concepts of entropy, formative tendency and Zeno effect into one concept: consciousness. Next, a possible relation between meaning and gravity is considered. Finally, some implications to the social sciences are discussed.

Shoemakers should stick to their lasts, as they say. But with the bracketing of the Newtonian paradigm, the 'lasts' of scientists are changing while they are working on them. As a psychotherapist, I cannot claim to have any authority to suggest new ideas for areas of science as remote as physics. The 'last' of a psychotherapist is to ask questions, not to think of how reality could be described in deep math. However, asking questions can sometimes lead to precious new insights. In that sense, psychotherapy shares an important aspect with quantum physics which emphasizes the role of questions also. This suggests perhaps some overlap between my profession and physics from which I gratefully derive some encouragement for my curiosity. Because 'sloppy questions lead to sloppy answers' I should be cautious with the questions I choose. Having taken into account what the experts say as cautiously as I can, I hope that the reader will grant me some leeway in asking questions that go beyond the beaten path. Below are some of them.

One question that will not be answered in this book is what an appropriate name (if any) for the post-Newtonian ideas could be. A relative description that defines them by referring to their predecessor, such as 'post-Newtonian', 'post-Cartesian', 'modern' or even 'post-modern' does not seem to do justice to their own merits, nor to their authenticity. The same objections could be made to the term

'extraparadigmatic' which is implicitly temporary. 'Phenomenological' seems more appropriate as it refers to the experiential nature of reality. It is however a term that is already linked to a strand of philosophy and could therefore be confusing. What else? How about 'relational' paradigm, or rather 'interactional', 'transactional'? Time will tell whether a common denominator will emerge. Until then, post-Newtonian seems to suffice as well as any.

5.1 Is entropy relative?

In the previous chapter I proposed a simple and applicable model for meaning, emotions and Zeno effect. This model uses two opposing concepts that are recognized within physics: a formative tendency towards complexity and an entropic tendency towards randomness. These two tendencies are supposed to be in continuous interplay (as pictured in figures 1 and 2), but over time the formative tendency is more likely to prevail, which leads to ever more complexity. As we saw, quantum physics suggests we have a role in this process ourselves by 'asking our questions to nature' (the 'Heisenberg-cut'). These questions are more effective within the 'span of control' of a Zeno effect. Within a Zeno effect, we rapidly repeat our questions which arrests Schrödinger's equation and prevents reality from evolving into a 'smear of possibilities'. The more we succeed in establishing a Zeno effect, the better we are able to withstand the entropic counter forces. all around us and the more successful we are in achieving what we think is important. In applying the Zeno effect to the level of us humans, we followed Stapp's explanation of this concept (see section 3.2). However, as Stapp emphasizes, the Zeno effect is common to all other levels of nature as well. It is not exclusively a human ability. Without it, a molecule could not stay composed, a plant would not be able to grow, nor would an animal be able to move about. The same can be said for any other coherent bundle of possibilities on any other level of reality. This means that 'Zenoing' is going on all around us whether we look at a group of atoms forming a molecule or stars forming galaxies.

Now, consider a situation of a group of molecules, let us say a tiny plankton swimming in the ocean. The ability of these molecules to cooperate as a group and interact with their environment allows them to be a plankton for some span of time. Together, these molecules are

forming a more complexly interrelated portion of nature than they could in their individual states. In their individual states, they would be more entropic. By combining into a plankton, their entropy has become smaller which is another way of saying that as a coherent complex group they have become more meaningful. They form a little chunk of meaning.

Next, consider the situation in which a whale comes and swallows the plankton. From the viewpoint of the plankton this is definitely a major trauma and a serious entropic event. It probably causes the end of its lifespan as a plankton. The plankton's efforts to protect itself and swim away will likely not suffice to escape from this attack. Its span of control over the course of events within its portion of reality is just not big enough. In other words: its Zeno effect is too small compared to that of the whale. Subsequently, the whale's metabolism causes the plankton to decay into its constituting molecules. The total number of possible arrangements of these individual molecules - their degree of randomness - increases substantially compared to when they still formed a plankton. In other words: their entropy has increased and their meaning has decreased. Contrarily, meaning *in*creases from the viewpoint of the whale that ate the plankton. The whale has successfully incorporated an external little chunk of meaning and increased the meaning of its own formative process. The death of the plankton is the life of the whale.

As we saw in section 3.3, entropy is defined as the number of possible arrangements of a specific system and is assumed to increase in systems that are isolated. However, as the example of the whale and the plankton illustrates, there is not one absolute frame of reference. Frames of reference are always relative frames, just as Einstein's theory tells us. All things are moving relatively to each other. This seems to justify the question whether entropy is a relative concept also: depending on one's point of reference a process is either entropic or formative. Moreover, relativity refers to the interrelatedness that is all around in nature. How realistic is the assumption that a system can be 'isolated' so that entropy can increase, if nature is so thoroughly relative? Isolation would imply that the system could have an absolute, atomistic nature, that it could be separated from all the rest of reality. But is there actually the

possibility of isolation, for any stretch of time, anywhere? Much seems to depend on what the observer chooses to be the boundaries of the system of which she is measuring the degree of entropy. In other words, does she define the plankton as the system of interest or the wider plankton-whale system? Or perhaps the whole food-chain? Again, reality seems to be in the eye of the beholder, where entropy is concerned.

Now imagine the whale living a long and meaningful life, partly due to its gigantic size that practically rules out all natural enemies besides human beings. Most likely, the whale will eventually succumb to no other trauma than its own old age. In the end, the whale too will have insufficient Zeno effect left to keep its vital formative processes running and withstand the formative endeavors of its surroundings. From the whale's point of reference, this will be entropic: it will ultimately decay into bits and pieces. Some of those pieces will have some longevity, as for instance its bones. This is the same as saying that the group of molecules that combines into a whale-bone has a big enough Zeno effect to stay composed some longer (incidentally up to hundreds of millions of years, as in fossils). So, although the Zeno effect of the original whole animal did not hold up, at a lower level of meaning, parts of the original whole succeed in 'standing their ground' and maintain a Zeno effect over their particular meaningful portion of reality. The meaning these parts manage to preserve is of course rudimentary compared to the meaning of the original whale.

Combining the above lines of questioning, one may wonder whether entropy is essentially a relative shortage of Zeno effect, causing Schrödinger's equation to take over. In fact, it seems to lead to the question whether entropy is an autonomous principle within nature at all. If entropic decay is in fact the *result* of some system's lack of Zeno effect relative to some other system's bigger Zeno effect, then what seems to be the essential principle is the Zeno effect, not entropy. Likewise, the formative tendency of a system may not be a principle by itself but only the result of that system's relatively big Zeno effect. Again, Zeno seems to be the essential principle. Together, this seems to implicate that the process of meaning formation, described above as the 'interplay of the formative and entropic tendencies', merely emerges as a result of varying relative magnitudes of Zeno effect.

One last question dwells some more on the choice of the boundaries of the system of interest. The boundaries of a system of which we intend to measure the entropy seem to depend on our view of reality: is it a materialistic view or do we acknowledge mind-aspects of reality also? What if we included mind-aspects into our choice of system and then looked at its entropy? Would that make entropy a relative concept in yet another sense? Earlier (sections 3.2 and 4.4), we saw how transmutations between the material and mind-realms of reality are frequent. So, sticking to the example of the whale: if we intend to measure the entropy of the whale, should we merely consider its body or also its mind? Another question could be whether there are systems in which entropy increases on the level of their material aspects but decreases on the level of their mind-aspects, and vice versa? In other words: the whale may die in the end, but could it be that during its lifetime it has created meaning that may live on after its physical body has died? If meaning is something that is all around and inherent to reality (see section 4.3 above), is there a way of expressing it as a measure of entropy (where the expectation would be that more meaning corresponds to a lower measure of entropy)?

5.2 Is reality panpsychist?

The argument can be carried still further. As we saw in the previous chapters, the Zeno-effect can be understood as the span of control that allows us to create what we feel is meaningful. It allows us to be 'knowing what we are doing'. The Zeno effect is not exclusively a human privilege. It is going on at all levels of nature although of course its size is likely to vary along with the size of the particular system that maintains a Zeno effect. If any level of reality can maintain a Zeno effect at least to some extent, then somehow all of nature seems to be knowing what it is doing or at least to be trying so. In this respect the Zeno effect seems to resemble the concept of panpsychism, the idea that there is a form of consciousness in all aspects of reality. In section 3.3 we saw for example how nature seems to come up with the perfect evolutionary solution every time, as if it is working towards some goal it already knows. Hence, the Zeno effect might add to the plausibility of panpsychism: a consciousness within all parts of reality, not just within us humans. This leads to the question whether consciousness might be the only necessary concept to explain nature's drive towards meaning? Is nature engaged in a

process of meaning-formation on all of its levels, just because it wants to?

A notorious graphic display of this question is Wheeler's U, or Wheeler's eye[40], depicted in figure 8 below.

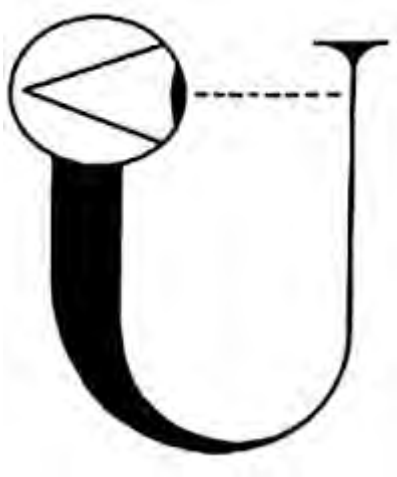

Fig. 8: Wheeler's U: the universe looking at itself and thereby partaking in its own creation.

It shows how nature, portrayed in a U shape (the U refers to 'universe'), is looking at itself. It is observing itself and as quantum physics teaches us, to observe is to partake in the coming about of reality. Thus, nature consciously creates itself.

5.3 Are meaning and gravity related?

Any bundle of possibilities is subject to entropic force, as we have seen. Recently, physicist Verlinde presented his theory on gravity (Verlinde, 2010; 2016) that elaborates this principle. Verlinde posits that gravity is a force that emerges from entropy - a force in which entropy manifests itself - when two bodies of matter shift relative to each other. Verlinde prefers using the concept of 'information' instead

40 Referring to the influential and honored 20th century theoretical physicist Wheeler, also famous for introducing terms such as 'black hole', 'wormhole' and 'quantum foam'. Wheeler's most relevant idea in the discussion above is summarized in his expression 'it from bit', by which he means that all of nature is essentially information, possibility (Wheeler, 1990).

of matter, as seems usual in physics. Although there are many different definitions of the word information, what seems to be the common denominator is that information is what distinguishes one thing from another. That is what happens when among all the possibilities that exist in a state of entropy, a specific sequence (such as matter) stands out and remains for a certain amount of time. Therefore a distinctive body of matter can be expressed in terms of information, merely because it is distinctive from everything else. Relative displacement of two bodies of matter leads to changes in the information by which each body, through their mutual relationship, is distinguished, and therefore to a relative entropic force. Verlinde too seems to acknowledge the importance of relativity in the concept of entropy:

'We identified a cause, a mechanism, for gravity. It is driven by differences in entropy, in whatever way defined, and a consequence of the statistical averaged random dynamics at the microscopic level. The reason why gravity has to keep track of energies as well as entropy differences, is now clear. It has to, because this is what causes motion!' (Verlinde, 2010, p. 22).

Earlier, in section 3.1 above, we saw how Heisenberg and Pauli discussed similar ideas about the basic underlying essence of reality, which they called energy:

The elementary particles in modern physics carry a mass in the same limited sense in which they have other properties. Since mass and energy are, according to the theory of relativity, essentially the same concepts, we may say that all elementary particles consist of energy. This could be interpreted as defining energy as the primary substance of the world. {…} *Energy is in fact that which moves; it may be called the primary cause of all change, and energy can be transformed into matter or heat or light."* (Heisenberg, 1958, p.67).

Combining these insights, a picture arises of a 'fluid' reality consisting of possibilities (also referred to as energy, information) that can actualize into anything material and immaterial, *including mind-aspects*. Moreover, if everything material and immaterial is basically made of energy and carries a mass, this seems to lead to the conclusion that mind could carry a mass just as matter does. This leads to the question of whether mind-aspects such as emotions, thoughts and meaning in

fact have a mass that could theoretically be measured. In other words: does an emotion have a weight, does meaning have a mass that could be measured? And: do relative changes of meaning within a person and between persons translate to differences in mass that could be measured? Surely, Verlinde's theory concerns energies on galactic scales compared to which the mass of a human being is less than trivial. On the other hand, to my knowledge physics has not looked at this question yet and there is no measure for the amount of meaning or entropy of mind-aspects on either of these scales. Verlinde does include entangled states of matter into his equations (Verlinde, 2016), which seems like a step closer to measuring meaning. As discussed in section 4.3 above, meaning and entanglement seem to share the quality of being fields of possibilities. Still, to suppose a connection between entanglement, meaning and gravity is speculative. Verlinde's theory applies to cosmic structures that not even remotely include the realm of daily human life. The question itself however, is intriguing and in no way trivial given the reinstatement by quantum physics of mind as a genuine aspect of reality. If somehow an estimate for the 'amount of meaning' within a broader mind/matter system could be developed as well as a way of measuring it, that could certainly have an impact on the social sciences.

5.4 Possible implications for the helping professions

Chapter 4 discussed some implications for the helping professions, mostly counseling and psychotherapy. The general theme of these implications is that the humanistic approach within psychology seems to fit the ideas of relativity and quantum theory best. The person centered approach and recent insights into the effectiveness of strength-based approaches were given as examples. Insofar as this discussion suggested that psychologists had not yet looked into the opportunities of quantum physics, this should be nuanced here. As early as the 1930s Jung, one of the architects of psychoanalysis, combined the core concepts from quantum physics with his own theory of the unconscious, in close cooperation with Pauli, one of the architects of quantum physics (Meier, 2001). With the decline of psychoanalysis as a major strand of psychotherapy, Jung's ideas have been somewhat marginalized also. In retrospect however, Jung may have simply been too far ahead of his predominantly Newtonian fellow psychologists for them to appreciate the logic of his ideas. This

section discusses how the idea of a collective unconscious is receiving new attention in recent applications. Some elaboration on Jung and Pauli's original ideas may serve to appreciate what these new applications offer.

From his experiences as a therapist, Jung had already concluded that the unconscious parts of our minds are in fact not just individual in the way Freud uses this concept. Instead, he thought of our unconscious as connected to a vast source of energy, encompassing and connecting everything, much like the holistic fields of interrelated possibilities that Pauli, Bohm and Stapp describe (see section 3.1. above). Jung named this concept the Unus Mundus, Latin for 'one world' (Jung, 1973; Mansfield & Spiegelman, 1989; Mansfield, 1995; Martin et al., 2013; Carminati et al., 2017). He further tells us that usually we are not consciously aware of being part of the Unus Mundus. Its complexity and dimensionality is too difficult for us to understand on a conscious level, if we are aware of our being part of it at all. We can however perceive hints and projections of it when content from the collective unconscious permeates into our conscious awareness. This happens for instance in dreams, during psychoanalysis and by the appearance of archetypes. With the latter concept, Jung refers to recurring patterns of experience that hold the same essence, independent of time and place and of who experiences an archetype. Examples of archetypes are numerical arrangements; standard dream plots, allegories and symbols like mandalas. Archetypes represent essential themes in nature and human existence such as creation and destruction, motherhood, heroism, love or masculinity/femininity. The particular form and complexity of archetypes is variable, but their essence stays the same, since they refer to content from the Unus Mundus. The objective within a Jungian psychoanalysis is to uncover this essence so that its significance for the client's life and development can be investigated and interpreted. This in turn can help the client gain more control over her life and improve her mental health.

Jung's ideas were judged as too speculative in classical Newtonian science, but in terms of quantum physics, they seem to make sense. Since quantum physics leaves room for mind-aspects of reality and non-causal processes, more phenomena become viable for scientific

inquiry. This is why Jung and Pauli could engage in a fruitful cooperation, each contributing from their respective professional backgrounds. Their ideas converged in the principle of 'synchronicity' which is closely linked to entanglement, the quantum phenomenon where two particles are connected independently of time and space. In synchronicity, non-causality and meaning play a key role, which is why Jung and Pauli considered it to be a bridge between quantum physics and (Jungian-)psychology. They discussed how synchronous phenomena are found not only on the quantum level but on the aggregate level of human experience also. Jung (Jung, 1973) describes documented examples of synchronicity in such phenomena as:

- dreams that foresee future events happening to the dreamer or to others who are important to her;
- coinciding or subsequent events sharing similar highly symbolic characteristics, like a group of black birds appearing at the consecutive deaths of two loved ones;
- ideas developing at the same time in different parts of the world;
- near-death experiences during which a spectacular increase of awareness takes place;
- dreams about events that actually happen somewhere else at the same time.

Since cause in its classical sense is not recognized in these kinds of synchronous events, what seems to bind them is their meaning. Synchronous phenomena concern aspects of reality that share a common significance. Therefore, Jung defined synchronicity as 'meaningful coincidence':

'If - and it seems plausible - the meaningful coincidence or 'cross-connection' of events cannot be explained causally, then the connecting principle must lie in the equal significance of parallel events; in other words, their tertium comparationis is meaning. We are so accustomed to regard meaning as a psychic process or content that it never enters our heads to suppose that it could also exist outside the psyche.' (Jung, 1973, p. 66).

In chapter 4 we saw how a meaning-based humanistic approach to psychotherapy functions primarily by some general guidelines for the therapist. These guidelines concern mostly the installment of a safe

and welcoming climate within a therapy. There is no specific prior goal as to what 'should' be accomplished by the client, nor is there a premeditated protocol. To be certain, during the course of therapy, more specific goals usually do arise that suit the specific situation of the client. The outcome of a humanistic therapy is highly individual and tailored to what is meaningful for a particular client. In this respect, Jung's approach resembles humanistic therapies: neither their course nor their outcome can be predicted beforehand or replicated afterwards. Within Newtonian science, an approach like this is almost certainly marginalized (which is indeed what happened to Jungian psychoanalysis). The Newtonian emphasis on objectivity of method and content of therapies and on the predictability of any treatment is strong. This applies both to practitioners and the supporting financial system (insurance companies, community budgets) that wants to spend its money responsibly and accountably (e.g. Elliott, 2002). However, along with the increasing awareness of the limitations of the Newtonian paradigm and new evidence for the opportunities of a meaning-based quantum reality, modern variants of Jung's ideas on collective consciousness are emerging. Two of them are discussed below.

The first example is Hellinger's 'family constellations' method (Hellinger et al., 1998). This method focuses on the same objective as Jungian psychoanalysis, namely to bring into our awareness important themes that are rooted in a collective form of consciousness. Hellinger emphasizes how a person is an individual entity on the surface in everyday life, but in fact part of a family history that connects her with past and present family members in a fundamental way[41]. By opening up to this collective history, important themes such as conflicting loyalties and unsolved trauma can surface into the person's conscious awareness. The improved awareness and understanding of these issues can help solve actual problems and restore the person's process of meaning formation. Remarkably, the method for opening up to the collective unconscious content is to gather a group of people (either acquainted or not to the person concerned) and have them represent the key persons or key themes in the client's family history, up to several generations ago. Representation is typically carried out on the

41 Hellinger shares this view with a key figure in systemic psychotherapy, Böszörményi-Nagy (Böszörményi-Nagy & Spark, 1984).

basis of only a small amount of information about the represented family member and sometimes on the basis of no prior information at all. However, the outcome is often striking. The representing group members have a strong sense of how to act and the person who's family themes are represented has often a strong sense of significance with the outcomes.

An example of how the principle of a collective consciousness can be applied to personal, organizational and societal innovation is Scharmer's Theory U (Scharmer, 2009). Theory U offers a method that facilitates the tapping in to a collective unconscious that can be used as a source for new developments. In fact, the ideas at the basis of Theory U are closely affiliated to Jungian and subsequent theories such as Bohm's theory of a 'Holomovement' (Bohm, 1980) which resembles much of Jung's Unus Mundus. As the constellations method primarily focuses on the collective unconscious to make more sense of the past, Theory U focuses on what the collective unconscious can learn us about the future. This is done primarily by focusing on a question that is significant to a person's or a group's future[42] and then deeply listen ('sensing') to others and oneself in a thoroughly non-judgmental way, somewhat like the person-centered approach described in chapter 4. The increased awareness of deeper levels of meaning resembles descending into the 'U', making the bend through the connecting unconscious layer of reality and then taking the information from there back up into the everyday-level along the other leg of the U. The information that is brought up can be refined further in subsequent 'prototyping' sessions that basically resemble the constellation method described above. Scharmer embeds his ideas and methods in an active approach that uses the internet to organize worldwide sessions. The collective engagements in these sessions of thousands of participants across the globe is a way to enhance the awareness of energies coming from the collective unconscious. Theory U is explicitly used in this way to help break typical gridlocks that result from Newtonian thinking. Scharmer describes how on a personal as well as a societal level, systems and patterns have developed that nobody really wants, but remain in place because our Newtonian atomistic systems offer no incentive for alternative

42 Note the resemblance to the principle of 'asking a question to nature' in the Heisenberg-cuts discussed in chapter 3.

collective action. Environmental and social issues typically require collective behavioral change that do not naturally spring from the program of Newtonian based economies. Atomism and individualism have certainly helped to put personal freedom on the map but do not seem to be the answer to issues like pollution and climate change which require collective meaning-based actions next to individual market-driven ones.

5.5 It's about us

Evidently, there is no scientific basis in the classical sense for many of the ideas and approaches discussed in this chapter. This does not seem to be withholding them from gaining momentum, however. They are applied to a growing number of different situations and issues of personal, organizational and societal nature[43]. By no means, this is meant to say that the Newtonian values of objectivity, reliability and validity of our endeavors should be set aside. Just as relativity and quantum theory do not deny the legitimacy of Newtonian science for large portions of reality, we should not discard its merits for our everyday lives either. That would be like throwing away the proverbial baby with the bathwater. However, as all of the above in this book may illustrate, we do seem to be going through a shift of paradigm to the advantage of ideas that concern portions of reality outside of the classical Newtonian assumptions. It remains to be seen whether these presently still extraparadigmatic ideas will form into a new coherent paradigm, or whether the whole notion of 'one dominant paradigm' will turn out to be a classical construct itself. Perhaps reality will turn out to be too fluid and personal to be captured in one encompassing new paradigm. Nevertheless, it seems clear that there are reasons to reinstall our own mind into our worldview. Perhaps we are experiencing what Stapp describes to be the biggest challenge for science in a post-Newtonian era:

'science {…} is fundamentally a part of man's unending quest for knowledge about the universe and his place within it. This knowledge can, in due course,

43 This is my impression from what I gather in the field. I have not been able to find numbers from third party sources to substantiate this. See for some basic info on the application of these methods:
http://www.constellationflow.com/constellation_talk (constellations method) and
https://www.presencing.org/#/aboutus/presencing-institute/what-we-do (Theory U).

become vastly more important than the technologies it spawns. For new technologies can only expand our already immense physical capabilities, whereas new knowledge can influence, on a worldwide scale, the thoughts men think, and, specifically, can shape values and aspirations that determine the entire direction of the human endeavor. In terms of net impact on human life the most important impending development in science will be, I believe, ideological, not technological. It will be a profound revision of science's conception of man himself: the emergence of a wholly new scientific image of man and his place in the universe.' (Stapp, 2009, p. 172).

Still, a stubborn vice versa question remains: if mind is reinstalled as having a legitimate role in the coming about of reality, then what about the values and merits of Newtonian science? How will we relate to them? After all, we would not want to do away with acquired assets such as equal legal rights for everyone, democracy, the separation of powers. The question seems to focus not on how much of classical thinking should be done away with, but how much of it should be used within realms of reality for which it was not developed. All of its assumptions have been shown to fall short for a good understanding of the very small and the very fast and, quite frankly, also for a good understanding of what it means to be a conscious human being. So in these realms of reality, what could be a rightful place for the classical values? Perhaps a lesson can be learned from the humanistic and Jungian types of approaches discussed above. As we saw, these methods do not formulate premeditated protocols and outcomes which makes them rather unpredictable and individual and thus particularly not-Newtonian. However, they do formulate *process*-directives that give their methods reliability and validity, which seems to do right to these values shared with the classical paradigm. Process-directives allow them, so to say, to ask decent questions to nature, not sloppy ones. A person centered therapist for example is focused on maintaining an empathic, authentic and respectful attitude to welcome the meaning her clients are attempting to convey. This attitude is required for installing and upholding the necessary process-conditions for these therapies to work.

A second way of translating classical values into a humanistic approach is to allow for an empirical component in their evaluation and further development. Although mind-aspects such as the client-therapist relationship can probably not be fully analyzed and

quantified in a classical way, the outcomes of humanistic therapies in terms of the client's own evaluations of her mental health can. This suggests one other role for classical science within a humanistic approach, namely to empirically monitor its outcomes[44]. This can provide healthy practical feedback about the effectiveness of treatments that are otherwise hard to evaluate. Without such evaluation, these approaches would indeed become susceptible to randomness, illusory outcomes and abuse of public means.

All in all, the post-Newtonian views of reality seem to appeal to our willingness and ability to make conscious choices in our lives. With a profoundly relative frame of reference and with an active role of our own minds, it's up to us to try and ask good questions to nature, so that we make conscious choices and safeguard the quality of the world we live in. To that, this book is meant to be a contribution.

44 A good example of a fusion of classical and humanistic methods within the field of mental healthcare is'routine outcome monitoring' (ROM), where a client's evaluations are measured, reported and discussed periodically to enhance therapy effectiveness (e.g. Lambert, 2010).

Acknowledgements and accountability

Curiosity killed the cat and satisfaction brought it back. This saying is hardly ever interpreted literally but from my own experience I can say that it should, sometimes. This book is my account of how curiosity led me unsuspectingly into a project that, since I started it in the summer of 2010, has been so personally involving, exhilarating and all-encompassing that it took much of my attention and effort not to drown in it. To get back out before too late. The sensation of discovering new aspects of reality is, to me, one of the most exciting things I know. Especially when they do not fit smoothly into our common understanding. This is what curiosity was invented for long ago, and I got to apply plenty of it. But it comes with risks, most notably the risk of losing one's true objectives and motivation. They can easily get blurred by all kinds of entropic influences of which one's ego, intellectual lacunas and miscommunications are only some. I consider myself lucky to be slow by nature. I am not particularly intelligent, nor empathic, brave or quick in learning. I like to stick to a method once I have one that works, which makes me rather lazy too. But I am also rather patient. I dare say that my limited talents have been a blessing in this project, forcing me to be persistent and preventing me from going too fast and burning up. Curious cats can get themselves into big trouble. Perhaps my patience has a literal quality to it as well. My haemophilia has forced me in the patient perspective for quite some time, spending lots of time in hospital beds when I was young. For one thing, this made me feel well at home in the extraparadigmatic position to which this book is an invitation. This is not to say I wish for anyone to have a long stay in a hospital bed but, on a more abstract level, I do wish anyone the 'Husserlian epoché' for which such a stay can be a more than suitable circumstance.

A word on the 'getting out in time' which I hinted at above: I did invest in finding a decent, trustworthy publisher for this project (one like Amsterdam University Press that published book #1) but found my strengths to fall short in the end, after about 9 years of providing the necessary 'holding space'. Finding a publisher typically involves many more months of waiting, focusing and a time consuming series of rejections. I did contact several publishers but for various reasons,

this did not materialize in them publishing this book. The correspondence with one of them was as exhilarating as most of the rest of the project though, which is why it is included in the appendix to this book. Anyway, I decided to 'step out' more or less by publishing the book myself. To be certain, this does feel like I've failed to some extent and I realize this could make the whole endeavour look like an extensive hobby (which it is also, I guess) and direct it towards the pseudo science section of the bookshelf. So be it, I leave the reader to judge for herself. I know I have conducted my investigation as conscientiously as I could. I observed scientific standards of reference and accountability, organized peer-reviews and connected with actual scientists along the way. For as far as I can judge, the book can pass quality testing. Perhaps the 'extraparadigmatic' nature of the book's message is not so contrary to the idea that it is not being published in an 'intraparadigmatic' way. Adding to this, this book can be downloaded (for free) on my personal website www.tonbaggerman.nl. I am now planning to create some form of web-based platform later on (if I find new courage) of which the name will either be www.cepr.nl or www.itsaboutus.nl. This website will host a download-version of the book as well.

For my not drowning and for much of the inspiration that led to this book I am deeply thankful to many. I should mention all of them but I cannot. A good memory is one of the talents I am lacking and I apologize to anyone I don't mention below – please, don't take it personally? So here goes a warm thank you to:

Carry Rosenblatt Limpens, my companion in life, who inspired and helped me in countless ways during the course of this project;

Anneke van den Broek, Ries Buckers and Hans de Waard, fellow psychologists, for their patient listening and commenting on my thoughts and drafts, and most of all for taking them seriously;

Roel van Dongen, Laurent Gielen and Bouwe Molenbuur for their valuable input, varying from ideas on connections with the arts, graphics and strategy to providing refuge and stovewood;

Toine Susijn of Dekker & Van de Vegt Books Nijmegen for his advice on publishing matters;

Dr. Henry Stapp, of the Lawrence Berkeley National Laboratory in Berkeley CA, for his patience in explaining to me over and again the importance of us observers in the coming about of reality. The title of this book is a direct quotation of what he said during one of the dialogues we had;

Dr. Alexander Wendt, professor of The Ohio State University for his review and suggestions at various points during the course of the project;

Dr. Sarah Durston, professor of the University of Utrecht, for her company during an important part of the project, leading to one book already;

Dr. Jeffrey Zeig of Zeig, Tucker & Theisen Publishers and Andrew Carey of Triarchy Press who kindly considered and reviewed the manuscript and, although they decided not to publish, gave me valuable feedback and encouragement to carry on;

Thomas McFarlane who so altruistically invested what must have been tons of time and effort into www.integralscience.org, a website offering some guidance through the vast amount of relevant literature;

Paul Kalkbrenner, Sven Väth and Stephan Bodzin for energizing me with their music during the many nightly hours of writing;

My colleagues at GGz Breburg, Yvonne Montfoort, Han Nix, Tonny van der Steen, Maite Timmermans and Rietje Schellekens for inquiring time and again into the progress (if any) of my project and for their encouragements.

I feel lucky for living in an era and country with outstanding hemophilia care that allowed me to get old enough to start and complete this journey. So thank you everybody;

Finally and non-dualistically, I want to express my gratitude to the canal, bike strip and nature in the area between Tilburg and Oirschot.

During the many hours of biking there, they provided me with fresh air, a healthy amount of entropy and the opportunity to let my mind wander off – which I am sometimes inclined to think of as Mother Nature's own EMDR (a hypothesis that begs for another book project, I fear).

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Index

Appendix

Below is the main body of my email correspondence with Andrew Carey of Triarchy Press, concerning the content of the manuscript and various meta-aspects, one of which of course is whether Triarchy Press could publish the book or not. Because the discussion below seems to contribute explicitly to the goal of this book - the translation of concepts from modern physics to the everyday level - Andrew and I thought it would be helpful to include these emails as an appendix. It may also serve to illustrate the difficulties that arise while striving to attain this goal. I have left out some of the text (marked as {...}), mostly concerning personal or commercial considerations not suitable for publication.

From: Andrew Carey
To: Ton Baggerman
Date: Sept 12 2018 14:30
Subject: Re: book proposal

Dear Ton,
I would like to look at your manuscript. It seems to me that it sits somewhere between a 'straight' psychotherapy title we will be publishing early next year (following on from The Wisdom of Not-Knowing) and various recent and forthcoming books by Nora Bateson, the International Bateson Institute and Jesper Hoffmeyer.

It seems like important work.

However, I need to say that {…} we have a small audience and {…} we do not have a marketing machine. We rely on our authors to do all the marketing work and often they cannot and then there is disappointment and dismal decay. We cannot do your book justice either. However, if you insist on wanting us to publish it and send me the manuscript, I will read it and tell you whether we can publish it. I expect we can; you are a good writer and this is a wonderful subject. If I can love your book, then we would publish it. (It might take me until Christmas to read it.)

I hope my reply is not too Newtonian.

With many thanks for thinking of Triarchy and with best wishes,
Andrew

= = = = = = =

From: Ton Baggerman
To: Andrew Carey
Date: Sept 12 2018 15:19
Subject: Re: book proposal

Dear Andrew,
Thank you for your speedy reply. Lately I have been feeling like the Donna in that old 10CC song, '...waiting for the phone to ring...', so here's is my speedy reply to yours.
But seriously, there is something in the air about this whole topic of paradigm development that keeps me alert and hooked on the project. Which is also why I thought of Triarchy Press.

Whether your reply is too Newtonian or not depends on your assumption about why I might feel disappointed. The Newtonian reason would be if my inner 'homo economicus', striving for maximalisation of financial profit in a Newtonian way, would not be satisfied with low sales. I can tell you, my homo economicus has thoroughly revised his conception of 'profit'. In a sense, he went through his own paradigm shift already. I am not in this project for financial reasons at all. My objective is to find a decent publisher, relevant to the topic, who will endorse my endeavour. That would give me the 'bridgehead' to do much of the rest myself. I have a relevant network that received the prior book enthusiastically, so I do expect some exposure of the book's message, which is of course the reason why sales figures are important to me as a writer, ultimately.

For as far as I can judge, I agree on the relation with Bateson and Hoffmeyer that you suspect. The topic of my manuscript transcends various scientific sub-disciplines and is all about 'meaning' as an innate (not emergent or imposed) element of reality. A 'not knowing' stance within psychotherapy follows logically from this. But I must confess I

don't know their work yet - I will look at it now that you have pointed them out to me.

If this is an answer to your question and you could agree on this perspective, I would like to carry on by sending you the manuscript. If it takes until Christmas before you could decide on publishing or not, we shall have to see (you might get carried away, who knows ;-)). In the time between sending you the proposal and now, I have looked at {…} publishers. But to start a new procedure at {...} would take me roughly until Christmas also, so there seems to be no reason to prefer that option.

Hoping to hear from you again,
Best,
Ton

P.S. The 'not knowing' stance is a key feature of Bateman & Fonagy's 'Mentalisation Based Treatment', used mostly for treatment of personality disorders.

= = = = = = =

From: Andrew Carey
To: Ton Baggerman
Date: Sept 12 2018 17:57
Subject: Re: book proposal

Very good Ton. Please go ahead and send me the manuscript and I will try to do better than Christmas. {…} I look forward to reading what you have written.

Best wishes,
Andrew

= = = = = = =

From: Andrew Carey
To: Ton Baggerman
Date: Sept 27 2018 15:16

Subject: Re: book proposal

Dear Ton,
Sorry for the long pause. I did receive your manuscript safely. Thank you. I have read it and enjoyed it very much. As I think you know, I have been a psychotherapist and I am currently caught in a synchronous arrival of manuscripts about this topic. One that I have just read covers very much the same ground as the first half of your book, before going on to make correlations between quantum theory and homoeopathy, synchronicity, the placebo effect and the philosophy of non-duality. Another that arrived a few months ago argues from the same principles in a long discussion of religion and ethics. I am very tempted by this way of thinking and very struck by these manuscripts arriving together. So my inner newageist is strongly pulled, whilst my inner science boy goes into strong reaction.

Below I set out (quite strongly) some of the reactions and responses that I experienced whilst reading your manuscript. I have no way of gauging how others will react though I could, with your permission, show the manuscript to two or three trusted external reviewers. Please let me know if you would like/be happy for me to do that.

Anyway, I hope that reading my reactions will give you some feedback on the book. Perhaps you will think - 'oh I could explain this better' or 'oh, he has not understand that at all' or 'oh, I see, he is stupid'. In any case I would love to start a move towards a small but coherent publishing programme in this field. But I feel that I must first be convinced by what we are publishing before I can try to sell it to the world. So, here goes. Please forgive me when I sound dismissive or contemptuous - that is my inner science boy. (However, he may be helpful in indicating how other science boys out there may react.)

I am uncomfortable with the title. It seems to me a misleading condensation of your main thesis, which is actually that it's not so much about us as about the inter-relationship between 'something' and 'everything else', which will include us. Insofar as you say that "reality is consciously observing and co-creating itself", then it's really not about us very much at all. It's about everything, isn't it?

I find the first half admirably clear. It sets out the science in a way that I come closer to understanding than ever before.
When you talk about the move away from 'spiritual dependency', I wonder if you do not rather mean the move away from a dependency on 'magic' or 'magical thinking'.

A major question I have is 'why should behaviour observed in the infinitesimally small and extremely fast, be applicable to the social science?' Perhaps social sciences are more like bridges and aeroplanes than like quanta? You make an easy transition from saying that, on a quantum scale, we change things when we observe them and things exist as potential, to saying that "reality... is fundamentally made of possibilities". But you do not offer me evidence to suggest that the bridge or the aeroplane or the tree change when I observe them or that they exist as twin sets of possibilities, so that the bridge may also be/become an elephant. So I am not convinced that this fascinating material on quanta is applicable to the chair I am sitting on.

Of course, you do explain about Schrodinger's cat, but you don't help me by explaining how a molecular-level process is suddenly valid at the level of a cat. Equally, you say that Heisenberg cuts occur at all levels of reality but only have examples at a microscopic or at a cosmic level. I have no experience of a Heisenberg cut in daily life and I do not read any in your manuscript.

In Section 3.3 you say that Bohm and Pauli's questions do not "question the legitimacy of Newton's laws for a large portion of reality" but you or they invite us to accept that Newton's laws are not quite in operation when it comes to raising my right arm. Exactly where are Newton's laws suspended?

In Section 1.4 you quote Rogers talking about the reintegration of feeling, instead of dichotomising intellect and feeling. I do not understand how this tendency to exclude feelings in some recent Western cultures and in the scientific approach is connected with the suggestion that we should take a quantum approach to things (including psychotherapy). Surely quanta and emotions/feelings are not the same thing or even particularly connected?

I think the material on a teleological aspect to reality and evolution is fascinating and helpful. But I am very cautious when you slip from observing a tendency for systems to become more complex to saying that "some particles seem to know what they are doing". That seems like a massive jump. There may be a way to explain the jump but, as it stands, it seems like a random assertion. If I accept that "there is a formative tendency in reality" does that mean that there is a formative tendency in frogs? In a single frog? In a wooden frog? I don't know why.

You propose that the tendency towards complexity corresponds to the "formative tendency towards meaning". Then you say "emotions are directed towards more meaning". This seems to take a correlation (a is like b), jump to an equality (a = b) and then do a classical logical step (a does x, a=b, therefore b does x). But you didn't show that a=b, you only proposed that a is like b.

I really like your relation of the main emotions to meaning. I find it very helpful.
Your diagrams and models of the interplay of formative and entropic forces in our daily-life behaviour point to a very sophisticated proposal to set alongside other 'clockwork' proposals for why we behave in the way we do: object relations, parts theory, elaborations of Berne's PAC model, systems based on somatics, rhythm and habit. They all seem helpful and all seem, by definition, to be analogies or metaphors or ways of crystallising something that is not reducible to graphs and charts and boxes.

An overarching example of my reservation would be your referencing Jung's work on synchronicity. This 'scientific' attempt to link quantum physics with our finding of meaning in an event seems always to hang on a fluid definition of meaning. Is it something we 'read into' a situation or something that we 'draw out of' a situation? In his work, Jung seems to measure whether something is 'meaningful' by assessing whether he thinks it is meaningful. But this seems merely to restate the well-known experience that, if we are primed to look for meaning in clouds then we are more likely to find meaning in clouds. So that my own response to Jung's, and your, assertions on this subject is that if the meaningful coincidence cannot be explained causally then it

probably is the result of our abiding determination to look for meaning where none actually abides (for example, in crows, chicken bones, tea leaves, etc.)

This is not to contest family constellations or Theory U, both of which, in my experience, work. But I am not convinced that a cause and effect explanation (they work because of x), where x is something that happens at a molecular level or close to the speed of light and is precisely not a cause-and-effect process, is helpful. We might as well say that they work because of love. Which is almost certainly true in some sense.

I look forward with great interest to your response. And congratulations on getting this far with such important work.

Best wishes,
Andrew

= = = = = =

From: Ton Baggerman
To: Andrew Carey
Date:Sept 27 2018 16:27
Subject: Re: book proposal

Dear Andrew,
Thank you for your comments. I am not quite sure whether this means, in principle, a 'yes' to publishing the book, but I think it is(?)
That would mean this is one of the best birthday presents I have ever received (I just turned 52 today). So thank you for that?
Could you please confirm, just to calm down my nerves?

I have been containing the energy of this project for about 9 years in total, which makes it hard to read your comments calmly, so I will react at a later moment. My first impulse is though, that more context by way of a combination with the material you mention, would certainly give these ideas more of a body. Actually my first impulse was that I should probably come over to Charmouth so that we can

talk this through properly. Anyway, I look forward to reading your comments later on. But first I'm off to my birthday dinner.
More later,
best,
Ton

= = = = = =

From: Andrew Carey
To: Ton Baggerman
Date: Sept 27 2018 18:26
Subject: Re: book proposal

Happy birthday Ton. Very happy birthday.

The answer is, in principle, 'maybe but not yet'. The crucial phrase is "I must first be convinced by what we are publishing before I can try to sell it to the world."
So my questions and comments tell you where I am not convinced. I think they are big issues. I do not know if you can 'solve' the problem and make changes and additions that will convince me. [I say 'me' but I mean the sceptics whom I represent.]
I would like to publish the book if I can believe in it.
There. It is not a very good birthday present. It is not a 'yes'. But it is not a 'no'.

have a good evening,
Andrew

= = = = = =

From: Ton Baggerman
To: Andrew Carey
Date:Sept 28 2018 14:26
Subject: Re: book proposal

Hello Andrew,
Thank you anyway, your thorough comments are very valuable. I have tried to answer them and this could help refine the manuscript. Some

of the answers I have formulated could be useful complements to the text.
I must say I am not sure about the use of this reply. It seems rather unlikely that a short explanation such as the one I have attached to this email, could clear away the skeptic objections and doubts, when a whole book has apparently not succeeded in doing so. I doubted whether to try at all, but being hooked to the topic I just had to. And as always, it turns out to be very exciting to talk about this subject. I enjoyed the attempt and hope you will have some use for it.

Please let me know what you think of it?
In principle, I am fine with your idea of asking some other skeptic science boys to take a look. {...}
The risk of course is, that this is going to take many months before a decision on publishing can be made. I am running out of gas, I don't know if I can do that, I need to know this would lead to some solid product before I can decide to invest such an amount of time and 'containment effort'. I hope you understand.

Best,
Ton

Reply to Andrew Carey's questions about manuscript 'It's about us' (28 Sept 2018)

1. *"I am uncomfortable with the title. It seems to me a misleading condensation of your main thesis, which is actually that it's not so much about us as about the inter-relationship between 'something' and 'everything else', which will include us. Insofar as you say that "reality is consciously observing and co-creating itself", then it's really not about us very much at all. It's about everything, isn't it?"*

=> the title has a bit of a history, which I planned to explain in the preface. In Dec. 2015 I visited Henry Stapp for two interview sessions at his house in Berkeley. He offered to pick me up at the BART (San Francisco tube system) station in his 'silvergrey Mercedes' and drive me back there afterwards. During the last ride he casually and actually very warmly and confidentially summarized the total of about 6 hours of intensive talking into the three words that I chose for a title: 'You have to see: It's about us.'

Besides this somewhat personal reason, I really do think the title covers the message. If you accept the limitations of the classical axioms and follow up on that by acknowledging that there is no clear and absolute boundary between the mind and the material world, then this gives us the possibility of actively influencing reality in a profound (not just material) way. This also gives us responsibility to do our utmost in matters like sustainability and social crises. Whereas in the mechanistic/Newtonian program, reality is basically assumed to be void of free will and active choices. The mechanistic counterpart of the title would be 'We may think it's about us, but that is us being delusional', or 'If you think it's about you, you've seen too many movies that cause the chemicals in your brain to produce these thoughts'.

In your words: *'it is about the inter-relationship between 'something' and 'everything else', which will include us',* which is exactly why it is about us also. In the classical paradigm, the 'us' is excluded, which means it is not about us at all when it comes to an active input into the coming about of reality.

Perhaps the most accurate title would be 'It's also about us, and that is a lot more than we used to think it was'.

Finally, the title fits Wheeler's U, as depicted in chapter 5. Together, they could form the title page.

2. *"I find the first half admirably clear. It sets out the science in a way that I come closer to understanding than ever before."*

=> Thank you, that is a good thing. I suppose it has a certain amount of clarity because I have painstakingly written this with my own inner Newtonian skeptic harassing me incessantly from somewhere behind my left shoulder. Chapter 3 and parts of chapter 4 are written partly out of defensive considerations ('this will be ridiculed if I don't find a way to substantiate it'… 'worse: they won't even ridicule it, it will be ignored')

3. *"When you talk about the move away from 'spiritual dependency', I wonder if you do not rather mean the move away from a dependency on 'magic' or 'magical thinking'."*

=> You are probably right, this may be my non-native English speaking background causing my choice of words. I also meant to include the religious kind of dependency, which would not be described by the term 'magical', would it?

4. *"A major question I have is 'why should behaviour observed in the infinitesimally small and extremely fast, be applicable to the social science?' Perhaps social sciences are more like bridges and aeroplanes than like quanta? You make an easy transition from saying that, on a quantum scale, we change things when we observe them and things exist as potential, to saying that "reality... is fundamentally made of possibilities". But you do not offer me evidence to suggest that the bridge or the aeroplane or the tree change when I observe them or that they exist as twin sets of possibilities, so that the bridge may also be/become an elephant. So I am not convinced that this fascinating material on quanta is applicable to the chair I am sitting on."*

=> An answer strarting from a Newton point of view: the 'absolute' chair you now sit on, has become a different chair on the level of its exact atomic organisation (e.g. atoms vibrate and exchange electrons and decay into a more entropic state), long before you have finished reading this sentence. The same goes for you as a living body. Nevertheless, your experience is still that of the same chair (is it, really?), which gives you as an observer a crucial role in why the chair is still 'the same' while in fact it isn't. A related argument is Swaab's 'we are our brain': that our thoughts are mere by- products of material processes. These material descriptions of reality are tempting because of the seeming robustness of the concept of 'matter' (a solid bridge, a chair, a brain) but when the question is asked what matter actually is, they are in fact groping in the dark. This is why Planck's discovery (and ultimately Heisenberg's interpretation of its consequences) was so unsettling to the ruling paradigm that had become self-evident. Planck has rendered matter a matter of statistics: a probability wave of combined elements (quanta) that are in fact not solid at all on the individual level, but mere tendencies for being. These tendencies can combine into the experience of matter if an observer becomes part of the probability wave and causes it to collapse. That the experience of matter usually comes with a very high likelihood, changes nothing about the nature of the 'substance' of which matter is 'made',namely possibilities.

The point of the quantum paradigm is that reality is not objectively, absolutely existing outside of us. There is our *experience* of the world outside of us, hence my suggestion to call the next paradigm (if any) 'phenomenological'. This experience is our reality and thus we simultaneously make our own experienced reality and are made by our surroundings that influence what we experience. Either way, the experience is what counts. This point is what caused the sessions with Henry Stapp to take so much time. Somehow I kept losing his point that it is not an absolute reality around us that I experience, but that the experience itself is reality. The classical fissure between experience and (absolute, 'out there'-) reality is put aside in quantum physics.

This does not mean that certain experiences should not have a very very high likelihood of occurring time and again, for many of us alike, which gives them a feel of absoluteness. The cat in the box is going to be dead or alive whether you look or not. But this merely means that the effect of you looking or not is very very small, not absent. Likewise, the bridge that you experience could one day seem like an elephant, if that is your experience (you would likely be found very drunk or psychotic but that is not the point). The whole constellation of you, the situation, and all of the other possibilities that make up a probability wave at one moment, 'collapse' into the experience of an elephant.

Your question makes sense from a classical frame of reference but not from a quantum frame. It is not the chair-reality which you experience but it is your chair-experience which is reality.

Therefore, you don't have the same experience every time you sit on the same chair.

Finally, there is the argument that although the relevance of a quantum paradigm for the social sciences could be questionable, so is that of the Newtonian paradigm. Nota bene, it is the paradigm that has ruled out the very existence of our minds as a part of reality, whereas our mind is so prominently present in our conscious awareness. This awareness cannot be explained by the axioms and concepts of the Newtonian paradigm, which is all about the 'dead' portions of reality. In fact, the Newtonian paradigm derives its

existence by pragmatically suspending the explanation of the experience of mind, in Descartes' original set of assumptions.

So, the vice versa question of yours could just as well be asked: why should the Newtonian picture of reality be applicable to the social sciences (as it has been for over a century)? My preliminary conclusion by now, is that this question is harder to answer than the same one for the quantum view on reality. The Newtonian paradigm has a bigger problem than the quantum paradigm when it comes to application to the social sciences. Laws of (dead) nature do apply to 'material' phenomena but can hardly be expected to apply to such subtleties as emotions, meaning, the stuff that goes on in relationships. These subtleties are perhaps much better described by a paradigm that was designed for subtleties (of the very small parts of reality) and explicitly includes the mind-aspect into its worldview.

5a. *"Of course, you do explain about Schrodinger's cat, but you don't help me by explaining how a molecular-level process is suddenly valid at the level of a cat."*

=> see above

5b. *"Equally, you say that Heisenberg cuts occur at all levels of reality but only have examples at a microscopic or at a cosmic level. I have no experience of a Heisenberg cut in daily life and I do not read any in your manuscript."*

=> I would say that you do have that experience, but you are not used to think of them as Heisenberg events. Section 3.2 describes the process of Heisenberg cuts at the level of human experiences such as raising an arm.

Perhaps I don't understand your question. Perhaps my description of Stapp/Von Neumann's process 1 and 2 is not clear enough.

6. *"In Section 3.3 you say that Bohm and Pauli's questions do not "question the legitimacy of Newton's laws for a large portion of reality" but you or they invite us to accept that Newton's laws are not quite in operation when it comes to raising my right arm. Exactly where are Newton's laws suspended?"*

=> Newton's laws are not suspended. They apply to the mechanical operations and forces during the movement of the arm. The

'objections' to Newton are the other way round: Newtonian science cannot account for a 'mind' aspect of, for instance, the movement of the arm. The Newtonian axioms limit/reduce any intentionality or free will as the mechanical consequences of material causes (e.g. the chemicals that make up your brain). But since Planck/Heisenberg pointed out that there is no such thing as absolute matter (atoms are not things, they are tendencies for being (experiences of) things), a purely material explanation of reality is problematic and, thus, a purely material explanation of mind/free will is problematic also. We need to include mind into our picture of reality, for instance in the reality of us experiencing the raising of an arm.

7. *"In Section 1.4 you quote Rogers talking about the reintegration of feeling, instead of dichotomising intellect and feeling. I do not understand how this tendency to exclude feelings in some recent Western cultures and in the scientific approach is connected with the suggestion that we should take a quantum approach to things (including psychotherapy). Surely quanta and emotions/feelings are not the same thing or even particularly connected?"*

=> This excerpt of an article by Rogers was meant to illustrate the dominance of the Newtonian paradigm in the social sciences and also the limits of the Newtonian scientific program, leading to an over-emphasizing of rational/factual/measurable information, at the cost of aspects of reality we are all aware of but that cannot be accounted for in the Newtonian paradigm. The excerpt is not meant to say that emotions are quantum (whatever that may be) per sé.

8. *"I think the material on a teleological aspect to reality and evolution is fascinating and helpful. But I am very cautious when you slip from observing a tendency for systems to become more complex to saying that "some particles seem to know what they are doing". That seems like a massive jump. There may be a way to explain the jump but, as it stands, it seems like a random assertion. If I accept that "there is a formative tendency in reality" does that mean that there is a formative tendency in frogs? In a single frog? In a wooden frog? I don't know why."*

=> I agree about the jump. I hope I have expressed my own caution on this topic well enough in the text. I describe how there seems to be some consensus among physicists that there is a tendency opposite to

the entropic tendency, towards more complexity. The most basic argument for this, is that if there was not such a tendency, nothing coherent would exist (even though 'coherent' is a matter of experience, not an absolute given). This tendency was also recognized by Rogers and lead to a form of psychotherapy that turned out to be very useful, even today. Then there are some who go further and suspect that the push towards complexity is not (just) random (as in Darwinian). This could be called a conscious or mind-aspect of reality as a whole, a reality that somehow seems to 'know what it is doing'. I have chosen to explore these arguments some more and see to what language and concepts they could lead. Mostly out of curiosity. Alex Wendt describes these ideas in much more detail, I have focused on only some of them. I think that the acknowledgment of this being a 'leap' can well go along with a cautious exploration of what it might be that we are leaping to.

9. *"You propose that the tendency towards complexity corresponds to the "formative tendency towards meaning". Then you say "emotions are directed towards more meaning". This seems to take a correlation (a is like b), jump to an equality (a = b) and then do a classical logical step (a does x, a=b, therefore b does x). But you didn't show that a=b, you only proposed that a is like b."*

=> The lame answer would be: yes, this is a proposal and open to debate. It has face validity but not much more as of yet.

The better answer is: if you accept a mind-aspect of reality, then mind-aspects and material aspects become much more fluidly connected instead of (classically) separated. If we suppose a formative tendency in material reality (as some decent physicists seem to do), then the same could go for mind-reality, all the more when you realize there is no clear boundary between the two realities (in other words, there are not two separate realities of matter and mind, as becomes clear in the discussion of experiences above). If we understand material reality as 'made of' possibilities with a tendency towards complexity, then the same could go for mind-reality.

=> I have pondered on choosing the words 'resonates in' instead of 'corresponds to'. I am not quite sure about this choice.

10. *"I really like your relation of the main emotions to meaning. I find it very helpful."*

=> wonderful! I'm curious about what is helpful for you.

11. *"Your diagrams and models of the interplay of formative and entropic forces in our daily-life behaviour point to a very sophisticated proposal to set alongside other 'clockwork' proposals for why we behave in the way we do: object relations, parts theory, elaborations of Berne's PAC model, systems based on somatics, rhythm and habit. They all seem helpful and all seem, by definition, to be analogies or metaphors or ways of crystallising something that is not reducible to graphs and charts and boxes."*

=> I agree. I hope I have expressed enough caution here.

12. *"An overarching example of my reservation would be your referencing Jung's work on synchronicity. This 'scientific' attempt to link quantum physics with our finding of meaning in an event seems always to hang on a fluid definition of meaning. Is it something we 'read into' a situation or something that we 'draw out of' a situation? In his work, Jung seems to measure whether something is 'meaningful' by assessing whether he thinks it is meaningful. But this seems merely to restate the well-known experience that, if we are primed to look for meaning in clouds then we are more likely to find meaning in clouds. So that my own response to Jung's, and your, assertions on this subject is that if the meaningful coincidence cannot be explained causally then it probably is the result of our abiding determination to look for meaning where none actually abides (for example, in crows, chicken bones, tea leaves, etc.)"*

=> I think it is something we read into a situation as well as draw out of it simultaneously, since there is no clear fissure between the observer ('us') and the situation. In other words, your question makes a lot of sense within a dualist framework, but not in the neutral monist framework (terminology by Alex Wendt).

=> for an understanding of meaning, the field-aspect emphasized by Pauli and Bohm is very helpful: a change in the probability distribution at one place (e.g. by an observation or by some other action) can instantly change the probability distributions at all other places in the field (in extremo the universe as a whole, depending on boundaries of the field we define as our subject). A minor change at

one place can thus cause the whole picture to change, instantaneously, synchronously (as in entanglement). My proposal (and that of Jung, as I understand it, and that of Stapp, who is as far as I know not affiniated with Jung's work) is that we humans experience these field-shifts as shifts in meaning. As in the experience that some minor detail can suddenly change everything. Or some seemingly trivial observation can suddenly make all the pieces of a puzzle come together.

I have tried to express caution to not naively interpret emotions, intuitions, as 'meaningful' and 'true'. Both in chapter 4 and 5 I have mentioned the importance of method in our ways of going about in a new paradigm that does include mind-aspects. This is no plea for easy interpretations, wishful thinking and sjamanism. There is no reason to throw the merits of decent scientific methods overboard. At the same time, there is every reason to explore the possibilities of the field-aspect of reality when decent science suggests this aspect exists. If not for plain curiosity, then for more urgent reasons.

13. *"This is not to contest family constellations or Theory U, both of which, in my experience, work. But I am not convinced that a cause and effect explanation (they work because of x), where x is something that happens at a molecular level or close to the speed of light and is precisely not a cause-and-effect process, is helpful. We might as well say that they work because of love. Which is almost certainly true in some sense."*

=> they work because of meaning (see field-aspect above) and an utter expression of meaning is love, I think.

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From: Andrew Carey
To: Ton Baggerman
Date: Sept 29 2018 09:15
Subject: Re: book proposal

Hello Ton,
I have received your very considered reply and am ruminating. I have also shared your manuscript with two editorial advisers whom I

greatly respect. Your manuscript will not be shared by them with anyone else.

Once we have all read and discussed it, I will be in touch again.
{…} I know you would like a quick answer but this may take some time (but we are well ahead of my Christmas deadline!).

Best wishes,
Andrew

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From: Ton Baggerman
To: Andrew Carey
Date:Sept 29 2018 11:49
Subject: Re: book proposal

Dear Andrew,
You're giving me no choice, thanks for that. We are in the middle selling our house so there is enough diversion.

Talk to you soon,
Best
Ton

= = = = = =
From: Ton Baggerman
To: Andrew Carey
Date: Nov 28 2018 08:45
Subject: Re: book proposal

Dear Andrew,
Good morning, how are you?
I was wondering if there is any news about the reviews yet. We've sold and moved house and I've planned to pick up working on the book project within a few weeks. So if there is any progress, please let me know?

Best,
Ton

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From: Andrew Carey
To: Ton Baggerman
Date: Nov 28 2018 10:57
Subject: Re: book proposal

Hello Ton,
My first job today was to start to reread your manuscript and the reviews. I hope to have an answer for you this week.

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From: Andrew Carey
To: Ton Baggerman
Date: Nov 29 2018 18:29
Subject: Re: book proposal

Dear Ton,
I have spend these two days re-reading your manuscript and the comments that I have received and the detailed and generous answers that you sent me to my original questions.

To be disappointingly blunt at the outset, I am very sorry to say that I have decided not to publish the book.

This decision has involved me in a great deal of internal debate and conflict. I think that (as I said before) the way you have distilled the knowledge we have in the first half of the manuscript is clear and powerful. I have also just finished reading Jude Currivan's book and I find, for example, that your account of the implications of post-Newtonian thinking for us all is considerably more understandable and persuasive than hers or any other that I have read. It allows me to see the possibility of transformative ways of thinking about the world and our place in it. And it allows me to make sense of some of the

experiences I have moving and being and working in nature, for example.

That said, even as a former psychotherapist, I am not persuaded or excited by those sections of the manuscript where you extend your understanding into psychotherapy. The framework of Zeno bandwidth and entropic interactions feels somehow 'clockwork' in its approach and does not add in any way to my understanding of the three case study clients that you describe. I am certain that this largely represents my own failure to grasp what you are saying, but I have had a similarly cautious response from another therapist who has read your manuscript and my conclusion has to be that many others will also not be persuaded by the case you make here.

Significantly, I cannot see beyond my own not-understanding to find a way that I could help you, as your editor, to make your case. If I thought 'put it like this and it would be much clearer' then I would try to work with you. But I am not able to make that imaginative leap.

Furthermore, I am still unconvinced about some of the points that I raised with you originally. You make the point, for example, that Schrödinger is reluctant to translate findings from the quantum level to the everyday level and I am not persuaded that he was wrong. Equally, I agree that it is perfectly possible that I am experiencing Heisenberg cuts at every moment of the day and several times between my choosing to depress a key on my computer keyboard and my actually doing so - but not realising that I am doing this. Nevertheless, if I try to think and behave *as if* this were true, I do not find that it makes any practical difference. It certainly doesn't affect the way in which I think about my engagement with anger or depression in daily life. [By contrast, the realisation that I am participating in the co-creation of life at every moment, rather than being some detached, individuated observer, has a profound effect on the way I feel when I lean against a tree in my garden or examine the bees in their hive in another corner of the garden or pick a fig or a raspberry.]

A final and important reservation that I have relates to meaning. When you propose that on the human level 'complexity' is best

captured in the word 'meaning', I am still not persuaded. I find the term 'complexity' rather helpful and uncluttered, whereas the word 'meaning' is so laden (as you say) with generations of significance and of not having been properly thought through, that I become less clear when you start to use it.

It is possible that we could clarify some of the issues around 'meaning' and Zeno effects, but my failure to grasp the psychotherapy section (which seems so central to the manuscript and so crucial to your argument) means I have, as I said at the outset, decided not to go ahead.

I do not know whether to be disappointed at my own lack of imagination and insight, but I am sorry not to be able to undertake what would, I am sure, have been a rewarding editorial journey with you.
Thank you again for thinking to approach Triarchy with your manuscript and I very much hope that you will find the energy to approach other publishers.

With best wishes,
Andrew

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From: Ton Baggerman
To: Andrew Carey
Date: Nov 29 2018 18:59
Subject: Re: book proposal

Thanks Andrew,
I will look into your reaction in more detail later and let you know mine.

Best,
Ton

= = = = = =

From: Ton Baggerman
To: Andrew Carey
Date: Dec 3 2018 17:12
Subject: Re: book proposal

Dear Andrew,
Thanks again for your considered reaction. I appreciate your effort, although of course, I had hoped for a more favorable one. I will now 'have to' work on this project for who knows how much longer...

Can I ask you some questions about what you wrote me, in order for me to better understand what you mean and use that for my further attempts to get this book published? Below are some of the thoughts I have in reaction to yours. They are mostly my interpretations of what you wrote. Please tell me if these interpretations make some sense? I did not mean to make this reply sound as a defense for my case. If it does sound so, I hope you can read it as an indication of where I could use some more clarity about your comments.

When Sarah Durston and I did our research for book #1, one of the things we realised from the outset was that language will be the crucial element for the translation, acceptance and application of the ideas from modern physics on the level of everyday life. It was the reason for our careful approach and modest ambition as far as the acceptance of our own book was concerned. Given the goal of translating into common language such strange concepts as entanglement, probability waves and Zeno, we thought it crucial that we should not aim for too much in too little time. Before you know, you're placed in the subsection of new-ageists or 'quantum-this-quantum-that writers'. Also, to write a credible book with a decent scientific justification, about the possibility/urgency of extending the ruling paradigm within other sections of science than just physics, requires that readers with various backgrounds, from physics and psychotherapy for instance, will take it seriously. The risk is that the physicist will discard it as clumsy, naive, outdated etc, whereas the psychotherapist will not be interested in fundamental physics and question the relevance of these insights for her profession. Moreover, many of the intended readers for a book like this, we imagined, were trained in the Newtonian paradigm and often invested in careers based on this framework,

which they are not likely to relativate on first occasion just because we say so. Also, we were very aware of our own blind spots and unconscious axioms, which made it all the more important (and fun, frankly) to stay investigative into the reactions of the audience we hoped to get (which we did, in fact).

I fear that a mixture of these risks has actualized, so to speak, in the present manuscript. More concretely: I interpret some of your comments as that the manuscript leads you to expect it will 'convince', 'excite' or 'persuade' you about new insights into psychotherapy. Surely, I do elaborate on what some of the post-Newtonian ideas (mainly: tendency towards complexity, entropy, Zeno) could add to psychotherapy, which may suggest that my goal is to persuade the reader of some concrete adaptation of her psychotherapeutic view or practice. But the goal of this elaboration is primarily to illustrate that these post Newtonian ideas are *in principle* accessible and applicable to the level of everyday life in terms of meaning, emotions, mental health. Actually, I have tried to be very conservative in exploring and describing what the possible implications for psychotherapy could be. I want to make sure not to get involved in discussions about psychotherapy because improving psychotherapy is not the aim of this book. Although, as I mention, psychotherapists may find some useful ideas in it, I guess. Mostly, what I do mean to do is to compare two main therapy methods, one 'Newtonian' (CBT) and one humanistic (the PCA) in order to accentuate the differences that result from their underlying paradigms. The PCA turns out to be rather in line with some of the post-Newtonian ideas I describe, especially the notion of a formative tendency in reality. If anywhere, this is where I am trying to be somewhat persuasive about psychotherapy, in advocating (also as a way of synthesis) a person centered approach and relativating the all-out enthousiasm about 'evidence based' (read: Newtonian evidence) CBT that has been going for a couple of decades now. Because I think that the book's argumentation profits from practical examples, I added practical material in the form of case-descriptions. I selected and described these cases in a cautious way so that they would fit the modest/restrained persuasive intentions for psychotherapy per se on my behalf.

Anyway, what I think I read in your reaction is that this design did not quite succeed and maybe this means I will have to find a simpler way of argumentation.

Linked to the above seems to be your impression that the psychotherapy section, and especially the section on Zeno bandwidth as discussed along the three case descriptions, is the core argument of the book. I did not mean this to be the core argument. The core argument is in chapter 3: if we accept a more fluid boundary between material and non-material reality - as there seems reason to do so - then our experiences become accepted as a part of reality also, which they cannot be in the Newtonian paradigm. And if they are indeed part of the equation, then a further elaboration of the relationships between (quantum) physics and psychology/psychotherapy is a logical next step.

Along with that: could you be more specific about what you think is 'clockwork' about this section? Also: if it is clockwork, what are your objections about that?

Concerning your remarks about Schrödinger: I think he did rightfully emphasize we should be very careful not to extrapolate principles from the microscopic to the macroscopic level too easily. The cat will be either dead or alive regardless of us looking or not. Nevertheless, later exploration of the Zeno effect did offer a way out of the dilemma of how the macro could somehow relate to the micro, offering a deeper understanding of this relationship than the usual Newtonian materialist worldview ever could. I propose a connection between Zeno and span of control or balance between entropy and formative tendency in everyday life. This principle seems to link to a modern definition of mental health, so could offer a way of translation to a more everyday kind of language.

One last question: you did not comment on chapter 5, why?

There is probably a lot more that could be said and exchanged about this. It is a pity that our communication is tied in a sort of all-or-nothing format of whether or not you will publish. In that sense, I

agree with you that now we won't have what could have been a rewarding editorial process, with more exchanges like this one.
Let me know if you would like to reconsider, you're still welcome ;-))...

Best,
Ton.

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From: Andrew Carey
To: Ton Baggerman
Date: Dec 20 2018 12:10
Subject: Re: book proposal

Dear Ton,
I'm sorry it has taken me so long to reply to your questions and response - there has been the usual Christmas mayhem here. Do you have mayhem in Dutch? Perhaps it is a maalstroom?

Thank you for writing again and for wanting to engage with this and for looking for clarity. It is important and I doubt that I can give you the clarity you would like.

First, I quite agree with you about the need for care with the language you use and with the translation of these ideas from the realm of physics. I think you have been careful but I am still very uncertain about some of the 'translations' you make from the world of the very small and the very fast to the world of my everyday. I see the translations but, as I said in my original response, I am not convinced.

And, while I accept that you are not trying to 'improve' psychotherapy, it seems to me, reading the manuscript, that you are very sure about the implications for psychotherapy in the cases from clinical practice, where the Zeno/interaction bandwidth, for example, is not about 'in principle' but very much about 'in practice'. You talk in the manuscript about offering "a simple and applicable model", so that I am surprised to find you here saying that you are only writing about implications "in principle". I read the case studies as actual examples of the entropy arrow entering and leaving the Zeno

bandwidth, for example. I understand that these are not metaphors but representations of 'reality'. If that is not so, then I think it would be important to make that very much clearer in the text.

In terms of the CBT|PCA debate, I am, of course, already completely 'on your side'. I despair of the clockwork approach of CBT and evidence-based therapy and yet I do not find the use of PCA as an example of post-Newtonian principles in action to be helpful to my cause. It almost seems that you are adducing a different kind of evidence to show that the PCA is reliable and trustworthy -- and this new evidence (quantum) is not convincing because (see below) I do not recognise quantum behaviour in my everyday reality . Of course, others might respond differently, but I suspect that the evidence-based brigade will be the ones who are most reluctant to abandon cause and effect, Newton and evidence. So that there is some need to 'persuade' unless you are just going to preach to those who are already converted to your ideas.

I accept that Chapter 3 contains the core argument and I like that chapter very much. However, I think that Chapter 3 does not bring the theory into the 'real world' (what I called the 'world of my everyday' above). You need to make the theory real and psychotherapy is a good place to start. You could also start with another form of contemporary magic (homoeopathy, astrology or whatever), but it would still be important to ground the principles in some kind of practice. Which, in my seeing, is what you try to do in Chapter 4.

Whilst we are in Chapter 3, you (again rightly) say that "our experiences become accepted as a part of reality also, which they cannot be in the Newtonian paradigm". Here I naturally accept that our experiences are a part of reality and think that almost anyone but the most hardened old cogitans-crustacean would also accept that. We do not need quantum theory to convince us of that. We need it to convince us that the Unus Mundus is at work in the kitchen and the factory and when we are cycling to a party.

The 'clockwork' that I am referring to is in your elaborate and very skilful attempt to 'account for' the effectiveness of the PCA by

explaining how quantum principles offer a mechanism (Zeno/interaction bandwidth, etc) that allows the PCA to 'work'. It seems to me that you are falling back onto Newtonian cause-and-effect in your efforts to explain why Newtonian cause-and-effect is not the only way to see and understand things.

Coming to Chapter 5, I am very interested in the wider implications and applications of all this for synchronicity, family constellations, the use of the I Ching and so on. This is what draws me strongly to the work you are doing. But I am left with the same reservations here as I was in Chapter 4. I have not understood how or why it is that quantum principles can be clearly seen and applied in some areas of the everyday, while in others (my chair may always have the possibility to become a Christmas pudding but, in my experience, it never does) they are either not applicable or invisible. So I imagine that quantum theory could (and very possibly will) provide a way for us to understand how the inexplicable and unallowable can be explained and allowed. But it does not yet provide me with a way to understand this. I absolutely accept that this is probably the result of my own lack of understanding and imagination, and/or because of my attachment to Newtonian thinking. But I have to trust that my own shortcomings may well be echoed in other readers.

I hope this is a little helpful, though I suspect it will be mainly frustrating because it shows that I am failing to grasp your point and intention.

Best wishes,
Andrew

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From: Ton Baggerman
To: Andrew Carey
Date: Dec 20 2018 19:06
Subject: Re: book proposal

Hello Andrew,

Thank you so much, this is the extra explanation I was hoping you would have time/opportunity for. Maalstroom would translate into vortex or rapid or chaos, I think, perhaps also in mayhem. I myself would translate mayhem into "ophef" (upheaval?) or "gekte" in Dutch. We do have Xmas mayhem here although luckily I have escaped much of that in the past few years. At some point I refused to be affected any longer which turned out pretty comfortable.

Your reply comes just when I have decided to change plans. I had a bad night, not just because of the mayhem in the aftermath of moving house. I realized how big a proportion of this book-project has been consumed by waiting. Waiting on important others for very good reasons. But in fact mostly for the reason of legitimizing what I have to say. {…} All this, while my inspiration for starting the project was the experience in the last year my psychotherapy training, that the 52nd approach to psychological problems seemed even better than the 51st but so did the 23rd. My question to myself was: what happens when I suppose that all of these years of theories have boiled down to some understanding inside of me and I write that down? The manuscript I sent you is in essence the product of that.

But, as I said, only after many more years (about 9) of waiting for more validation and approval before I dared to conclude it was legitimate and would not be held for one more new-agey ideas out there. But I already know it isn't so for whose approval am I waiting? Do I really need the "good enough" seal of a book, published by a publisher to "prove" that this is interesting material that could make some sense? Prove to whom? At the start of this project I asked myself the question why I should try to publish at all, and could think of no better answer than "because it is fun". And that is what it should be. Waiting is not fun, or at least it is not anymore. It is time to act and publish, and get on with my life.
So what I will do is publish it myself, both in print and on a website (downloadable), spend Spring on social media to draw attention and do as I did with book #1: ask interesting others for a reaction, contribution, vision. That seems like a lot more fun and an equally appropriate way to deal with this topic. Readers (if any) can decide for themselves whether they think it is legitimate or not. They might like chapter 3 but not 5, and can let me know they just like chapter 3. For

me, there is no academic nor other career at stake, I just want to make a contribution and have "fun" doing so (I sound like an American now, don't I?).

Considering your great feedback: in the previous parts of this project I had some encouraging reviews and reactions on the psychotherapy part, as well as on the "micro to macro" question. Also, the peer-reviews I got as well as my own practical experiences with this frame of thought, both in supervisions and therapies, encourage me to think it could be useful. So opinions seem to differ, which reflects once again why this is a relevant topic. {...} I am very grateful though for your comments on chapter 4. I can certainly use them to make it better (if not more convincing ;-)). To be more specific: I have been struggling to decide on how far I should go describing ideas about applicability, while in fact this book is not about applying. But I must describe some of the possible applicability, if I want to help readers to consider the possible relevance. However, this should not result in me describing therapy cases as if I am "sure" of the quantum aspects in them (although in fact I am pretty sure of the formative tendency but that is just repeating what Carl Rogers already said long ago).

So, coming to a conclusion, I also have one last question to you (you see: here I am waiting for an important other again ;-)). {...} Would you approve if I included an appendix with our correspondence, either with or without your name / Triarchy? If not an appendix to the book, then a place on the discussions section of the website-to-come? I can imagine you'd rather not have your name on it, but I do think our conversation would be very helpful and interesting to the eventual reader? I believe that the points you make and my reply to them are a wonderful illustration of what the topic of translation physics to everyday life is all about!

So much for now. Thanks again for your time and effort.
Best, and keep up the XMas work!
Ton

= = = = = =

From: Andrew Carey
To: Ton Baggerman
Date: Dec 20 2018 20:03
Subject: Re: book proposal

Dear Ton,
That's a great response.

First, I am sorry to have been part of the waiting (I know you are not complaining about me but I recognise that I have contributed).

Second, I would be absolutely delighted if you wanted to include all or part of our conversation as an appendix and I stand by everything I have said, so I would be very glad to be named.

Third, I congratulate you on your decision to publish and promote the book and I unreservedly wish you good luck with that process. Nothing would give me more pleasure than for the book to become famous for the transformation in thinking that it helped to bring about.

Fourth, please let me know when the book is published...

Yours,
Andrew

= = = = = =

From: Ton Baggerman
To: Andrew Carey
Date: Dec 20 2018 20:08
Subject: Re: book proposal

Wonderful! I will do that.
Thanks for the instant reply ;-)
Talk to you soon.

Ton

P.s. since you're interested in Dutch, "Baggerman" translates into "Dredgeman" which I am inclined to interpret metaphorically for this project.

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From: Andrew Carey
To: Ton Baggerman
Date: Dec 20 2018 21:02
Subject: Re: book proposal

Yes, I had checked actually and knew about your dredging origins.
I agree on your metaphorical interpretation and also acknowledge the enormous historical importance of your role in the Low Countries where (I also believe) the dreadful CBT is even more deeply installed than in the UK and needs dredging out.

Andrew Carey, Triarchy Press