GALILEO COMMISSION REPORT

Beyond a Materialist Worldview

Towards an Expanded Science

Harald Walach
on behalf of the Scientific and Medical Network

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THIS REPORT IS DEDICATED TO THE MEMORY OF

Mary Midgley

(1919-2018)

"This whole reductive programme – this mindless materialism, this belief in something called 'matter' as the answer to all questions – is not really science at all. It is, and always has been, just an image, a myth, a vision, an enormous act of faith. As Karl Popper said, it is 'promissory materialism', an offer of future explanations based on boundless confidence in physical methods of enquiry. It is a quite general belief in 'matter', which is conceived in a new way as able to answer all possible questions. And that belief has flowed much more from the past glories of science than from any suitability for the job in hand. In reality, not all questions are physical questions or can be usefully fitted to physical answers."

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Preface

Dr Peter Fenwick, President of the Scientific and Medical Network

When I went up to Cambridge in 1954 to read Natural Sciences as my preliminary to a medical degree, I had the good fortune to have Lord Adrian as Master of my College, (Trinity). Lord Adrian won the Nobel Prize in 1932 for his work on the electrophysiology of the brain and the connection between neurones. Sir Andrew Huxley, my tutor, had also won a Nobel Prize in 1952 for defining the characteristics of the neural membrane, and how neural impulses were transmitted along the fibre.

So we all had a sound grounding in learning how to use the current scientific theories, firstly to define problems and secondly in our analysis of the data. But there was no mention of consciousness. Neither did our course, Natural Sciences, have any lectures on the history of science or how it arose at the time of the enlightenment. That was part of the course on the History and Philosophy of Science, not provided for budding scientists, let alone budding doctors, perhaps on the unspoken grounds that it was in fact Unnatural, or at least Unnecessary Science in a crowded course.

Of course as we came to our clinical work and learned about Freud, Charcot and other philosophers of mind, consciousness could no longer be avoided as a topic. But just as hysteria had been thought of as due to the wandering of the womb in women, consciousness was seen as arising from and created by the brain. This view was clearly unsatisfactory, and it also led to some very unsatisfactory methods of psychiatric treatment.

This was the time of William Sargent and his book *Battle for the Mind*, proposing, amongst other things, the use of sedation for anxiety states so that two or three days of unconsciousness would allow the brain to 're-boot'. It was also the time of leucotomy, when isolating large chunks of brain became fashionable as a treatment for schizophrenia and 'bad behaviour' - it had been found to tame and quieten monkeys. Schizophrenia was also treated by rendering patients almost comatose with insulin therapy, and by inducing grand mal seizures with ECT (Electro-Convulsive Therapy). Mind was regarded as simply a brain mechanism, its disorders to be treated mechanically. Not a glorious period for psychiatry.

With the advent of the Maharishi, meditation and Eastern philosophy it was becoming clear that the limitations of western science and its insistence on a brain-based creation of consciousness were no longer tenable. By this time I had discovered the work of Ouspensky, Gurdjieff, and learned meditation in the tradition of the Shankaracharya Swami Shantanand Saraswati. The introduction to the West of transcendental meditation by the Maharishi meant that there was now a pool of meditation subjects who could be investigated, and it soon became apparent that meditation could produce very wide mental states which had some reflection in changes of brain physiology, but was much wider than that. Parapsychology was also coming of age, with studies on telepathy, remote viewing and psychokinesis. Ian Stevenson even produced good scientific data by suggesting that past lives might have some basis in reality and could not always be explained on the basis of false memory.

As quantum mechanics became more widely understood, the classical view of physics no longer held for the very small and the very large, and with the recognition that every particle in the universe is influenced by every other particle, the then position of physics with its isolated effects required modification.

It became apparent that there were two camps, the materialists, who defined consciousness as arising from the brain and did not look beyond this. Theirs was a clockwork universe with joy, love, ecstasy, friendship, just being the action of neurones within the brain. Daniel Dennett, who holds this view strongly, once said to me at a conference, "When we understand the function of the neurones completely, there will be nothing left to explain about consciousness." This hard materialistic view became mainstream in many branches of medicine and science. At this level of science there was no mention of consciousness. Any suggestion that consciousness might be a different substance, indeed some would go so far as to say, the basic substance, rather

than material, would automatically be attacked by materialists, so negating that stream of thought.

As Church attendances fall, and people become more reluctant to accept articles of faith uncritically, a new religion is arising, the religion of materialism. But materialism, like any religion, has its own strongly held faith and its reluctance to admit any evidence which does not fit in with its belief structure. Its mechanistic view of the world and of human kind has led to an impoverished society where mechanical-driven models of human behaviour – beings with no consciousness, no soul - degrade our societies and the planet.

This pervasive scientific view has led to university departments refusing to employ scientists who think outside the materialistic box. When I became interested in near-death experiences and their very wide-reaching conscious state, I was confronted by materialists who suggested this state was just another brain malfunction. When it was shown that these arose at the time when, following cardiac arrest, brain function was absent, the materialist explanation was that even if no activity is seen on the surface of the brain – flat EEG – there were secret workings within the brain which would explain it all. This has to be nonsense because a conscious state of that magnitude would involve huge areas of correctly functioning brain, for which there was no scientific evidence. The only explanation was that consciousness and the brain are not always intermixed in the way we thought they were. This is an exciting line of thought to follow, but is ridiculed by the materialist scientific paradigm.

There are many other examples, all of which point to the limitations imposed on thinking by the Church of Materialism. This is not to say that materialism is always limiting; in much of science the materialistic world view is adequate. But when it comes to human mind, the concept of soul and our understanding of the wider mental states that occur, to quote Sherrington; "*It puts its finger to its lips and is silent.*"

How widespread and how strong is the Church of Materialism? I have found that most materialistic scientists, when asked if they are conscious or simply a machine, deny that they are simply machines. Try out this question on your materialistic colleagues. Are they automatons? At least one of my colleagues had the decency to say, not at the weekends, but definitely during the week. Those who have worked most closely with the brain and understand it came to the same conclusion: mind and brain are different. Wilder Penfield, the great Canadian neurosurgeon who pioneered surgery for epilepsy, said: "*For myself, after a professional lifetime spent in trying to discover how the brain accounts for the mind, it comes as a surprise now to discover, during this final examination of the evidence, that the dualist hypothesis [separation of mind and brain] seems the more reasonable of the two possible explanations. . . . Mind comes into action and goes out of action with the highest brain-mechanism, it is true. But the mind has energy. The form of that energy is different from that of neuronal potentials that travel the axone pathways. There I must leave it.*"

Having a science which is limited only to material things ignores a whole spectrum of human experience. It is destructive because it does not take into account the fundamental nature of the human, conscious being. The desperate attempts of materialists to limit consciousness to the brain is nicely summed up by Bernard Kastrup, a computer scientist:

"Here we have consciousness trying to trick consciousness into believing that it doesn't exist.... The motivation behind eliminative materialism is clear: if we deny the very existence of consciousness, presto, we no longer need to explain it!"

*Bernardo K*astrup. *Brief Peeks Beyond*. Winchester, UK: iffBooks; 2015:60-61.

The Galileo Report challenges the materialistic position head-on, and sets out to examine the evidence against it, and the belief structures of our current scientific community. As Galen Strawson, academic philosopher at the University of Texas said:

"This particular denial (of the existence of consciousness) is the strangest thing that has ever happened in the whole history of human thought."

The completion and circulation of this report is both timely and important. I wish it every success in helping to demonstrate the illogicality of our materialistic culture, and helping materialists to see themselves as just another Church.

***Dr Peter Fenwick** is Consultant Neuropsychiatrist Emeritus to the Epilepsy Unit at the Maudsley Hospital, which he ran for twenty years. From 2000 to 2009 he spent several months a year working in the field of magnetoencephalography in a neuroscience research laboratory in Japan. Dr Fenwick has a long standing interest in brain function and the problem of consciousness and has published a large number of research papers related to altered states of consciousness, and abnormalities of consciousness and behaviour, NDEs and end of life experiences. He has researched into meditation and continues to be interested in the relationship between meditative states, cognition, non-duality and brain function. He is President of the Scientific and Medical Network.*

INTRODUCTION

AN INVITATION TO LOOK THROUGH THE TELESCOPE

David Lorimer, Chair of the Galileo Commission. Programme Director, Scientific and Medical Network

The Galileo Commission (galileocommission.org) is a project of the Scientific and Medical Network (www.scimednet.org). The Commission is represented by a distinguished group of over 90 scientific advisers affiliated to 30 universities worldwide, many of whom have been active during our consultation process leading up the publication of this Galileo Commission Report, written by Professor Harald Walach.

The purpose of the Report is to open public discourse and to find ways to expand the presuppositions of science so that science (a) is not constrained by an outdated view of the nature of reality and consciousness; and (b) is better able to accommodate and explore significant human experiences and questions that it is currently unable to accommodate for philosophical reasons. We anticipate that expanding science will involve some new basic assumptions (an expanded ontology); additional ways of knowing and new rules of evidence (an expanded epistemology); as well as new methodologies flowing from these.

Within an expanded science, existing 'hard' science would still be valid in the contexts where it was generated. Many areas of research could still be profitably undertaken within existing materialist assumptions. But if science could be based on an expanded set of assumptions, and if they came to form the dominant philosophy of science, then that would open up new avenues and new possibilities. In other words, expanding science and its scope would transform our worldview.

In a letter to Kepler, Galileo wrote: 'Here at Padua is the principal professor of philosophy, whom I have repeatedly and urgently requested to look at the moon and the planets through my glass, which he pertinaciously refuses to do' (Burtt 1924, 66). Galileo continued that this professor laboured before the Grand Duke with logical arguments based on the authority of Aristotle. He added that Aristotle himself as an empiricist would surely have changed his mind on the basis of new evidence and observations.

This refusal to look through Galileo's telescope has striking parallels today. In the seventeenth century, the authority of Scripture and Aristotle were at stake; today the authority of scientific materialism is at stake as an adequate account of reality and life. For example, many scientists are unwilling to 'look through the telescope' at the evidence for consciousness beyond the brain because they have an unshakeable belief that consciousness is generated *in and by* the brain. However, William James pointed out long ago that there were three possible approaches to the relationship between brain and consciousness: that the brain produces consciousness; that it permits consciousness; and that it transmits consciousness with a 'filtering' function. He added that all normal research seems to support the first theory, that the brain produces consciousness, but that even the psychical research of his day provided evidence that this view was untenable.

An increasing number of sophisticated scientists and scholars familiar with historical and contemporary evidence are coming round to this view (*e.g. Irreducible Mind* edited by Kelly and Kelly in 2007; and *Beyond Physicalism* edited by Kelly, Crabtree and Marshall 2015). In answer to the objection that we do not know how the brain might transmit consciousness, one can respond that orthodox neuroscience does not know how the brain produces consciousness either; correlation does not amount to causation. The view that the brain produces consciousness is in fact a postulate or presupposition rather than a scientific finding.

Today's world is dominated by science and its underlying assumptions. Yet these are seldom articulated even though they generate not only a methodology but also a particular worldview, an ideology generally known as 'scientism'. The Commission fully supports scientific methodology that is underpinned by a set of evolving rules, socially negotiated among scientists, but it is highly critical of scientism – of assumptions maintained by refusing to 'look through the telescope'. We invite open-minded readers to do so.

FOREWORD

SCIENCE NEEDS TO BE MORE SCIENTIFIC

Dr Iain McGilchrist

My unease about the presuppositions hidden in science was crystallised when I read Collingwood's *Essay on Metaphysics* while at school. This presented a radical critique of the then fashionable logical positivism advanced by AJ Ayer and the Vienna Circle, and prefigured the much better known book by Thomas Kuhn, *The Structure of Scientific Revolutions*, published in 1962. Kuhn alerted us to the 'paradigm' as a lens through which we apprehend reality, the problem being that, while such paradigms are indispensable, we tend to be oblivious to the inevitably distorting effect of the lens. The lens defines not only what we will accept, but what we can see; anything not adapted to it is either unseen, or, if our attention is drawn to it, dismissed.

Scientific revolutions result in a reframing of previous knowledge in a new way. There will always be considerable resistance to revising a paradigm, especially if it has proved successful in many respects. But its success in those respects may blind us to its failure in others. That is always the danger.

The arguments contained in this summary Galileo Commission Report have been ignored by the science establishment, not because of their lack of merit, but because they would require a revision of the current, cherished, materialist, paradigm. I believe the main reason for this is fear.

Nowadays science is an industry, practised factory-fashion, with huge empires, awards and egos at stake, and dependent on vastly expensive machinery. No young scientist now dares step out of line if he or she wants a career, and the more established ones have everything to lose by doing so. As a result, true science is practised less and less. It takes huge moral commitment and courage to think less narrowly; yet without thinking differently no great discoveries are made. Most of the great discoveries of science of the past were made by independent individuals working with only basic equipment and often alone (many were clergy).

They were true scientists, because they asked the important big questions and kept their minds open. This is harder nowadays. And broadcasters and journalists are afraid of appearing foolish by giving any credence to anything other than scientism, since that is what the establishment enforces (they are also now locked into huge, inflexible bureaucratic systems of their own). Meanwhile the humanities have lost their nerve, for a host of reasons, and just want to ape what they see as 'science', though what they ape is, in fact, scientism: the belief that all human questions can be answered by the application of a framework of reductive materialism.

The Galileo Commission Report makes the important distinction between scientism and science, and takes an inclusive, rather than exclusive, view. We all need healthy science. Without it, I believe, we are all lost – at least if any argument is to have purchase; and it is not as if the current science paradigm, deeply mistaken as I believe it to be, has met with no success. Much as Newtonian mechanics is incomplete, it is very helpful in very many situations. The problem is in taking at all times the narrow view. For example, it is not that, taking the narrow view, agribusiness does not work: it's that in the broader view it is disastrous, because we don't see what it is that we cannot see.

Organisms are not in the least like mechanisms, but mechanism is a perfectly useful way of looking at tiny details in a complex picture. The problem is thinking that the same thinking will help you understand the whole, which it can't. What we want, in the words of the better US title of Rupert Sheldrake's "The Science Delusion", is "Science Set Free". Science needs to be liberated, not besieged.

How do you come to see what it is that your narrow vision, by definition, excludes you from seeing? Some people, perhaps most, cannot be helped: they will never look down the telescope. But there will always be some who will, and they need our encouragement. What makes the current science establishment particularly uncomfortable is any breath of inconsistency – a sure sign of moribundity, since it is only from inconsistencies that science advances – which has the perverse effect of discouraging any shifts in the paradigm.

The science establishment makes unscientific assumptions, an inconsistency ignored by the mainstream who assume that they make no assumptions. To take one example, there is no single shred of evidence that matter gives rise to consciousness, and some reason from contemporary physics to believe that consciousness is prior to matter. And, of course, the demand that science accept only what can be empirically demonstrated is itself not an empirically grounded or demonstrable demand. We need to ask the difficult, truly scientific questions, allowing people to see what they may be missing simply by being too narrow in their assumptions.

In brief, this Report does not argue that there is something wrong with science, but that what passes for science nowadays is not scientific enough; and that as a result we are missing great potential discoveries, and stultifying the human mind.

Dr Iain McGilchrist *is a former Fellow of All Souls College, Oxford, an associate Fellow of Green Templeton College, Oxford, a Fellow of the Royal College of Psychiatrists, a Consultant Emeritus of the Bethlem and Maudsley Hospital, London, a former research Fellow in Neuroimaging at Johns Hopkins University Medical School, Baltimore, and a former Fellow of the Institute of Advanced Studies in Stellenbosch. His books include Against Criticism, The Master and his Emissary: The Divided Brain and the Making of the Western World; The Divided Brain and the Search for Meaning; Why We Are So Unhappy, and Ways of Attending.*

Summary of Argument

1. No human intellectual activity, including science, can escape the fact that it has to make assumptions that cannot be proven using its own methodology (i.e. absolute presuppositions).

2. The prevalent underlying assumptions, or world model, of the majority of modern scientists are narrowly naturalist in metaphysics, materialist in ontology and reductionist-empiricist in methodology.

3. This results in the belief that consciousness is nothing but a consequence of complex arrangement of matter, or an emergent phenomenon of brain activity.

4. This belief is neither proven, nor warranted.

5. In fact, there are well documented empirical phenomena that contradict this belief. Among them are
   a. Veridical reports of near death experiences (NDEs) with complex intuitions, perceptions, cognitions and emotions during well documented absence of brain activity.
   b. Veridical reports of non-local perception that were confirmed independently during such near-death-states of absent brain activity.
   c. The large data-base of parapsychology and anomalous cognition research shows in a series of meta-analyses that such non-local perceptions are indeed possible.
   d. The large data-base of children who remember previous lives, some of whom have corresponding deformities.

6. An increasing number of open-minded scientists are already researching these frontier areas using existing scientific methods, and are reaching empirically grounded conclusions that challenge the mainstream majority view.

7. They therefore argue that we need a model of consciousness that is non-reductive and allows consciousness its own ontological status.

8. A minimum-consensus model is a dual aspect or complementarity model, in which matter and mind, consciousness and its physical substrate, are two aspects of reality that are irreducible and simultaneously occurring perspectives of an underlying reality to which we otherwise have no direct access.

9. If that is granted, we can immediately see that consciousness can have its own direct access to reality, not only through sense perception, as in classical empiricism, but also through inner perception or radical introspection.

10. As a result, there may be a different and valid access route to reality, through consciousness, in addition to the classical one science is offering.

11. This might include direct access, under certain conditions, to deeper structures of reality, which may provide important insights into ethics, meaning, and values.

12. Indeed, insights from NDEs and other transformative experiences suggest that we are all embedded within a larger field of consciousness, with profound implications for ethics in an interconnected world.

13. Integrating an enlarged view of consciousness into science will also yield a new methodology that will have to be developed: the methodology of radical introspection or inner experience.

14. In view of the widespread perception that a narrow materialist world view is often uncritically passed on to young scientists by mainstream authorities as an adequate explanation of reality and as a pre-conditon for a successful scientific career, we call for an open exploration of this topic and we encourage the scientific community to become more critically self-reflective of the absolute presuppositions on which their activities are based and to consider expanding their scope.

Beyond a Materialist Worldview

TOWARDS AN EXPANDED SCIENCE

1 PURPOSE, MOTIVATION, BACKGROUND

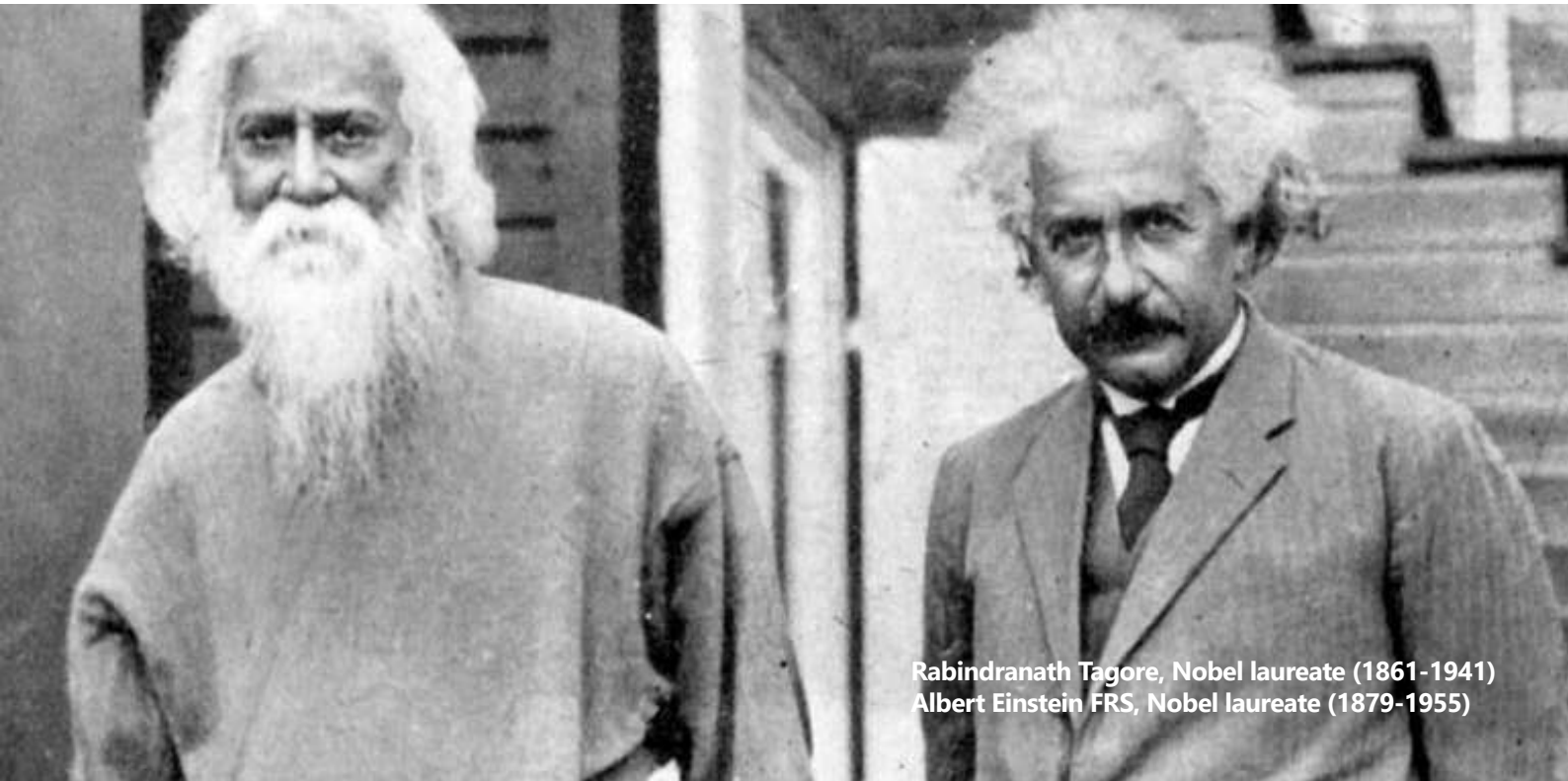
This report is motivated by a double interest: we are passionate about science. Science is the only peaceful, collaborative enterprise of humanity that has benefited most people and has created a worldwide culture of collaboration, investigation, invention and seeking after truth. It has had a grand history and will have an even grander future.

We are concerned about its future. Science is currently under attack, on the one side from well informed detractors trying to advance particular interests, be they economic, political or religious. On the other side the attack is waged indirectly, through a public disenchantment with the reliability of scientific findings, sometimes even from within the scientific community.

Our diagnosis is that science, and Western societies, perhaps even our planet at large, are in crisis. This has to do, among others, with a certain mode of doing science, or rather, with widespread background assumptions that are rarely, if ever, discussed openly. Nevertheless, they inform the way that science is conducted, what is considered worthwhile studying, what is left out of the picture, what is considered "scientific" and what is deemed unworthy of scientific activity because it is "unscientific". These background assumptions are predicated on a materialist philosophy. This assumes that material entities are the only "real" and causally active agents in the universe. Consequently, according these assumptions, consciousness is secondary, arising within complex organisations of organisms and consciousness must be reductively fitted within such a framework. Those background assumptions are mostly unconsciously held, inform the way that science is done, how decisions about funding and publications are made, how careers of young researchers are structured and eventually, how the public, filtered through the assumptions journalists hold, perceive science.

Our motive is to contribute to a liberation of science from needless shackles and freeing the public image and discourse about science of illicit limitations and restrictive conceptions. This, we hope, will contribute to an expanded science that helps us deal with the impending problems, from worldwide social injustice to the depletion of the planet to climate change and the threat of global economic breakdown.

Our current way of doing science with those background assumptions has created some of the problems we are facing. Nicholas Maxwell has aptly pointed out that these problems are mainly due to science defining itself as knowledge inquiry instead of "wisdom inquiry" (Maxwell, 1984, 1998, 2004, 2017), which leads to uninspired, separated strands of thinking and cultures of research. This translates into compartmentalisation within society, such that economic growth and "scientific



Rabindranath Tagore, Nobel laureate (1861-1941)
Albert Einstein FRS, Nobel laureate (1879-1955)

progress", for instance in farming (Lorimer, 2003), is decoupled from knowledge about biology, ecology and climatology. The results are global warming, loss of biological diversity, gross social inequality and poverty, destruction of natural habitats of plants, animals and humans, and a way of life that has become a source of stress, dissatisfaction and a drain on meaning for many in the Western countries. This, again, we fear, has reverberations into the public perception of gains and losses due to science and can tilt the balance of public opinion and benevolence dangerously and quickly against science,.

Our quarrel is neither with science as a human enterprise nor with its findings, but solely with the current implicit background philosophy. It is rather *more and better* science we wish to see, with a wider perspective and a broader philosophy. Our plea is for an *improvement* of science and a complaint that science is actually not really scientific enough, if we take the adjective "scientific" to describe the basic virtues of science: being *curious* about the riddles of the universe, being *open* to potential answers, even unexpected ones, being *methodical* in approaching the problems by using *adequate* procedures, and not letting theoretical and dogmatic concerns battle against experience. As William James has put it: "*Science means, first of all a certain dispassionate method. To suppose that it means a certain set of results that one should pin one's faith upon and hug forever is sadly to mistake its genius, and degrades the scientific body to the status of a sect.*" (W. James, 1896, p. 884)

This text is meant to spell out what we see as the problems and their reasons, and lay out a roadmap to such a broadened conception of science.

We are not naïve: background assumptions are a result of a complex interplay between scientific findings, historical and political developments, economic and ideological interests and hence a result of "culture" (Collingwood, 1998, orig. 1940). Changing background assumptions means changing a culture. This cannot be achieved by a book, not even by multiple books. But a book can inspire a different practice and changed practice will change culture. So our aim is to contribute to a discussion about the scope, the remit, the methods and the limitations of a science predicated on materialist background assumptions.[1]

Our argument is that we need a broadened remit of science and scholarly endeavour, even in the humanities, that surpasses the currently prevalent implicit materialist worldview within science or the post-modern relativism prevalent in the humanities. We need a broadened approach that takes seriously phenomena, experiences and concepts that have to do with consciousness in a very broad sense: non-local experiences that are sometimes classified under the umbrella term anomalous cognition, experiences of consciousness during apparent loss of physiological functioning of the body, experiences of expanded consciousness that are sometimes called mystical or spiritual experiences, and practices that are derived from such experiences. Some of these practices, such as meditation and mindfulness, have started to make inroads into the scientific community over the last decades (Docket, Dudley-Grant, & Bankart, 2003; Kabat-Zinn, 1990; Kuyken et al., 2016; M. Williams, Teasdale, Segal, & Kabat-Zinn, 2007). Others, such as phenomenological inquiry alongside neuroscientific studies, have silently developed in their own niches, such as introspective or contemplative neuroscience.

Others, such as research into anomalous cognition, are actively ostracised, as many instances of reviewer comments, editorial or funding practices can document (e.g. Delorme, Pierce, Michel, & Radin, 2016, as discussed in; Radin, 2018). Still others, such as spiritual experiences, have problems being considered and taken seriously, because the referent of such experiences, often a reality experienced as "transcendent" or "different" is incompatible with the worldview derived from science's implicit background assumptions, and because many active in science do not have first hand experience themselves. This has largely to do with a widespread opinion that consciousness and all its experiences are "nothing but" neurological, i.e. material events, and hence those experiences do not hold any specific and additional value of knowledge and information for us in addition to what we can know through the observational and experimental methods of science. Technically speaking: in a view that reduces consciousness to a by-product of neuronal activity, consciousness itself, without connection to current or previous sense experience or conceptual aspects of knowledge, such as in thinking, can have no separate access to reality, can add nothing to our knowledge, and its musings have no truth value.

[1] We are aware that there are various strands and subdisciplines in science that have long transcended the limitations pointed out here, such as "positive psychology" in psychology, systems biology in biology, action research and other qualitative methods in social science. We are addressing the mainstream scientific attitude as is frequently encountered in the public presentaition and perception of science, by funding bodies, peer reviewers, by self-proclaimed public advocates of science where very often, in public discourse, the adjective "scientific" is used to denote a mindset and background philosophy that were are trying to disentangle here.

This leads to a science that neglects large areas of what is relevant for us humans in this world. As a consequence, our science excludes important aspects of the world from its activity, and produces knowledge of sometimes questionable relevance. This needs to change. The key terms which we have chosen to mark this lack of relevance of current practices and assumptions of science are "spirituality" or "post-materialist". Spirituality is a complex term, employed by different people in different manners of speaking. Definitions, Aristotle observed, can only come as and when a full understanding of an issue has been reached. This is not the case with the concept of spirituality. Hence our definition is a working definition meant to enable discussion and better understanding. We would like to define it here, cursorily, in the following way (Walach, 2015, 2017c):

By "spirituality" we mean a stance derived from personal experience that takes into consideration aims which reach out beyond the immediate goals of an individual or a collective group of individuals. Often this stance is described as informed by or directed towards a "transcendent" reality. Many people hear "god" or a reference to some deity, when the term "transcendent" is used. While this might ultimately be the case, we think that science has to be silent as to either the existence or non-existence of such an ultimate reality. This is, after all, the result of the historical process which has led to the implicit understanding that secularism is the common ground for science and our Western societies (Dupré, 2004; Harrison, 2017; Taylor, 2007). Hence we would be loath to reintroduce some pre-scientific concept of a god or deity. But we do think that it is the task of science to take experiences of individuals through the ages seriously, and to not stretch or cut them on the Procrustean bed of scientific background assumptions about what may or may not be the ultimate reality.

The term "transcendent" denotes the fact that sometimes experiences refer to a reality that is non-material and hence transcends the immediately visible, palpable and understandable environment. We have a good example of transcendent concepts in science in the highly abstract world of higher mathematics used by physics, especially quantum physics, in order to describe the theoretical structure of basic material entities and their interactions with each other and the surroundings (Lakatos, 1979; Waismann, 1996). Another example is the informational content of theories that seem to underlie all current theories (Currivan, 2017; Hamberger & Pietschmann, 2015; Zeilinger, 1999). Those mathematical and informational concepts refer to a deep structure of reality which we cannot imagine or "see", nor can we locate it in our everyday experience. In the same sense, spiritual experiences can point to a transcendent referent that cannot be found by ordinary sense experience at the surface structure of our world but only inferred, in the same sense as the curvature of space around massive objects cannot be experienced but is a derivative of general relativity and can only be seen indirectly by measuring predicted deviations of light, for instance, or other electromagnetic radiation.

Such a transcendent referent can be a specific meaning, a certain goal, a deep structure of one's life or of reality as such. Spiritual traditions then often *interpret* these experiences and its referents and use terminology such as "Tao", "Buddha-Nature", "Brahma", "Atman", "God", "Christ", "Spirit", "Mother", "Nature", "Absoute", "True Reality", to name but a few. This business of *interpreting* spiritual experiences belongs to the field of theology and religious studies or spiritual traditions, and is not the remit of science. But the fact that people *have* such experiences spontaneously, how they influence their lives, possibly how they can be made accessible to a wider community, to what extent they facilitate living, insight, understanding, gaining knowledge and wisdom, all these questions are meaningful and we think should be part and parcel of the scientific remit. Such experiences might also point the way to a systematic research programme using controlled, contemplative introspection to improve understanding of the deep structure of reality that is currently only visible in creative scientific theories, but might have a wider scope. It might, for instance be an inroad to accessing moral or ethical principles experientially.

That such experiences happen quite frequently, independently of religious upbringing or creed, has been demonstrated empirically through interviews (Forman, 1999, 1998). We found that about 60% of a random sample of 890 German psychotherapists have had a spiritual experience at least once, and many report to have had such an experience quite often (Hofmann & Walach, 2011). The same psychotherapists complained that neither their university training nor their postgraduate training contained any information or preparation to deal with such matters with their clients who also frequently bring up such topics.

We have diagnosed a taboo surrounding spirituality (Walach, 2015, 2017c; Walach & Reich, 2005): science was one of the major factors driving the political enlightenment movements which, among others, opposed doctrinal paternalism of

the churches and fought for freedom of thinking and speech. Hence religion, religious concepts and institutions were considered anti-scientific by many scientists in the 19th and 20th century. While the detailed history is much more complicated and convoluted (Buckley, 1987; Burtt, 1932; Dupré, 2004; Taylor, 2007), we can see a double movement at play: scientific findings and enlightenment have made widespread practices, beliefs and consequences of oppressive theology superfluous, vacuous and irrelevant for daily life. For instance, the fear of a vindictive deity, itself the consequence of a very doubtful type of theology (Douglas-Klotz, 1999; Schwarz, 2003; Vermès, 2003), hardly helps to guarantee morality any longer, and justly so. Only people with very bad theological training, and some scientists with no theological knowledge at all, see the texts of the book of Genesis as factual reports of how the world was created and insist on a literal reading of biblical texts. This was already being questioned by Abelard in the 12th century and this literary criticism has informed responsible theology ever since. Serious theological scholars know them to be parables and chiffres that carry symbolic meaning about how ultimate reality relates to the phenomenal world. In addition, the loss of power and influence on the part of the churches has arguably led to a relative lack of engagement of theology with the scientific findings of our modern days. In addition, a widespread consumerism and economic materialism has reinforced the implicit materialist world-view seemingly inherent in science, and thus culture and science are reinforcing each other (Elgin, 2009).

These movements together have led to a thorough separation of the world of science and the world of religion, at least in the Western world. But it seems that this historical development has also led some scientists, perhaps the more influential ones in particular, to equate science with a particular materialist background philosophy underpinning their science. There seems to be an implicit assumption that being a good scientist necessarily equates with becoming a materialist, an atheist, or at least an agnostic (E. J. Larson & Witham, 1998). Perhaps the fear of science regressing or the idea that progress means leaving behind religion as a phase of historical development in favour of science, which was at the base of Auguste Comte's positivist philosophy of history (Principe, 2011, 2016), is the reason for this development. This Comtean idea of history, whereby history proceeds in three steps from a state of animistic fear of mythology, through the suspicion stage of religion to the full state of enlightened knowledge in an era of science, is at most a bad foundation myth for the growth of science, and at worst an ideological detraction, which already T.H. Huxley clearly spotted and made fun of (Huxley, 1892). A lack of knowledge of history is often the reason for bad practice, in politics and in science as well, but does not excuse such practices.

At any rate, one can observe a new religion on the rise, the religion of science, or "scientism" (Aeschliman, 1998, orig. 1983; Hacker, 2016; Husserl, 1970, orig. 1909; W. James, 1896; Loughlin, Lewith, & Falkenberg, 2013; Principe, 2016; Sorell, 1991; R. N. Williams & Robinson, 2016). This thrives on the assumption that science has replaced religion and has all the answers, if not now, certainly in the near future, to all the questions we might have. It has created a new myth of the striving of science towards freedom of research, speech and thinking against a backwards oriented religion, and has in fact enthroned itself as the new religion of science: "*… the strong scientism of the modern day is not merely a religion, but is in fact a kind of fundamentalism*." (Principe, 2016, p. 51) And so scientism has become the "*new orthodoxy*" (R. N. Williams & Robinson, 2016).

It is only within such a scientistic framing of science that consciousness and spirituality have no place and that a taboo around those topics is created. And this is exactly the kind of attitude towards science that we dispute and argue against. This we do in order to free science from the fetters of dogmatism of *any* kind. For the *essence of science is free inquiry, instigated by curiosity about our world, secured by methodological reflexivity and rational discourse*. This essence of science is not a set of implicitly active background assumptions about what is, and is not, "science". We argue for such a free, enriched and broadened scientific outlook that has been voiced before by a large number of scientists, who themselves all operate on different background assumptions and whose work is an example and testimony to the fact that good science can in fact be done differently and be predicated on a different and enlarged set of background philosophy (Cardeña & 100 Colleagues, 2014). "*Spirituality*" is a catch term and short-hand notation to signify this. Moreover, it is critical to note that we are not ghost writers of any religious group or sect, or of any anti-scientific movement. We are building upon previous efforts (Harman, 1969), motivated by the vision of a broadened, more relevant and more encompassing science that is in the service of humanity at large, and not just of particular groups.

2 SOME PROBLEMS CREATED DIRECTLY OR INDIRECTLY BY THE CURRENT CONCEPT OF SCIENCE

Exclusion of Important Experiences and Crystallisation of Contingent Views of the World

The most obvious problem is the fact that this scientistic concept excludes a lot of phenomena that are obviously relevant in the world and for us humans. Some, such as spiritual experiences, have already been mentioned. But also meaning, values, all types of inner, conscious experiences are either neglected or marginalised. They feature in psychology as ways of individual meaning-making and the relationships individuals have to the world. But as such they are considered individual constructions, not potentially objective properties of the world. This results from the stipulation that the final entities of the world are material in nature. And meaning and values are not part of the material constitution of our world. If they are constructions, values cannot have any objective reality, and moral absolutes are fictitious.

Consequently, it is difficult to gain access to the world of morals and values via the route of science. Psychological science can describe how people create or negotiate values, and what role they play, under what circumstances they are powerful or discarded. But current scientific methodology cannot secure whether moral absolutes exist or values are true features of our world or only secondary to our social negotiation. Rather, it seems, the definition of ethics and values is delegated to the realm of political and social consensus seeking: we accept as value and as ethically binding, what a majority has agreed upon. Whether this is factually correct and practically robust enough is something we will be examining in due course.

However, the phenomenology and the implications of some experiences, such as anomalous cognition and spiritual experiences of one-ness with nature and with others, also call into question the assumption of separation that is at the root of experimental methodology in science, or, more technically speaking, they question the clean Cartesian and the Heisenberg cuts we make in science. The Cartesian cut is the separation

Sir Isaac Newton (1642-1727)

between conscious events that are considered to exist in the brain and thus "inside" us and material events "out there" that are separated from our mental events through distance and time. The Heisenberg cut is the separation an experimenter, scientist or any active agent makes between what he considers important and the "object of study" and the rest of the world, including him- or herself. Thereby the underlying unity of our world is broken (Atmanspacher, 1996, 1997; Primas, 1993, 1994).

In that sense, any perception, any thought, any concept breaks up the underlying unity of our world and compartmentalises it. This is not necessarily bad. In fact, it is unavoidable. It becomes a problem, though, if its constructive and contingent nature is forgotten and a certain way of looking at the world is taken as the only possible one. Van Fraassen calls this stance that of the "naturalistic natives" who cannot see or imagine that their stance makes important assumptions and incorporates specific preconditions (van Fraassen, 2016). This is where a scientistically misinformed type of science *creates* a certain worldview that is then taken to be the true narrative about the world without remembering that it represents just one potential partitioning of the world. Thus, taking such experiences seriously also has an important corrective function for our current view of the world and our so called "scientific worldview" of what we allow to be real and what we think is imagined, or only "in the mind".

Thus, the major problem we see is the crystallisation of one potential way of looking at the world – in terms of material entities, atoms and their constituents, molecules and larger material systems such as organisms – as the only viable "scientific" one, relegating everything else into the domain of mythology, religion, or fantasy, or the humanities for that matter. This, in turn, makes a broadening of the viewpoint difficult, perhaps even precluding it. Spiritual experiences pour water into the crystalline structure and help to make it more fluid by introducing novelty.

The Replication Crisis

Certainly psychology and medicine suffer from a severe replication crisis. Only 39% of 100 mainstream psychological research findings could be replicated successfully by competent and well trained researchers, and only 47% of the replicated effect sizes were within the confidence limits of the original ones (Open Science Collaboration, 2015). Considering that the tested research paradigms were mainstream examples of successful cognitive, social and experimental psychology, this is a severe lack of robustness. The same can be observed in medicine (Horton, 2015): many findings lack replication. Systematic reviews and meta-analyses of clinical studies as conducted by the Cochrane Collaboration have yielded clear results only in roughly 10% of the cases, while in about half of the remaining reviews benefits were likely but unproven and in the rest more research was called for (El Dib, Atallah, & Andriolo, 2007). Prestigious claims, such as the medication against bird flu, proved to be unsustainable in the face of all replications (Jefferson et al., 2014), and this has been seen in various other areas such as antidepressants (Gøtzsche, 2015; Ioannidis, 2008; Kirsch, 2016; Kirsch et al., 2008). Celebrated breakthroughs like the potential prevention of cervical cancer through vaccination against human papilloma virus (Arbyn, Xu, Simoens, & Martin-Hirsch, 2018) have been doubted because of bias and conflict of interest that is pervasive in much of medical research (Jørgenson, Gøtzsche, & Jefferson, 2018).

Some of this is certainly due to sloppy science and can be remedied by more stringent application of methods already applied and known (Ioannidis, 2005, 2018), by pre-registration of experiments (I. Chalmers & Glasziou, 2009; I. Chalmers, Glasziou, & Godlee, 2013; Glasziou et al., 2014; Moher et al., 2015; Open Science Collaboration, 2015; Schooler, 2011), and by solid reporting.

But part of the crisis is inherent in the stance of compartmentalisation and intellectual rigidity which we associate with the scientistic mind-set. We will elaborate on this below, where we analyse the methodological consequences of those background assumptions. Then it will become understandable why the current set of assumptions that underpin the scientistic concept are actually part of the reason why we have this problem of a lack of replicability. To move ahead of ourselves: only an artificial separation of agent, cause and effect, of observed system and observer, of "reality" as independent of its observer and actor, can create situations where idealised actions, effects, or separated realities have any ontological status at all and can be seen as "true reality" (Bouratinos, 2018).

As soon as we understand that there is only relative separability, replication becomes a more fluid, context dependent concept and "effects" become context dependent and relative within a whole network of meaning. Hence a medication can, for instance, become active in one context, but not in

another, and will not have an "activity" or "efficacy" as such. While there will certainly be medications whose effect is rather generic and little dependent on context, such as anaesthesia medications, others will have effects more strongly dependent on context, such as psychoactive substances like coffee or alcohol (Fillmore, Roach, & Rice, 2002; Flaten & Blumenthal, 1999; Hull & Bond, 1986; McKay & Schare, 1999), and indeed most others.

Some branches of physics, such as classical dynamics, can largely neglect contexts, although even here, in the three-body problem, this neglect becomes visible and expresses itself in the inability to make a precise prediction of the movement of the third body (Burtt, 1932). In practice this leads to the necessity to adjust satellites' orbits in order to account for gravitational influences and contexts that had to be neglected at the outset. But the more complex systems become, the more important contextual factors will be. It is only a conception of science modelled along the methodologies and assumptions of physics that leads to such neglect. The scientistic framework of thinking and doing science makes such neglect more likely.

The replication crisis points to the fact that the background assumption of separability and separateness are only partially valid in complex systems. Many sub-branches in complexity sciences, systems-biology and systems-thinking in other areas have actually realised this already and are taking this insight into account. Complex statistical procedures are available to model such effects. But that should not detract from the widely observable fact that mainstream thinking and practice is largely unafflicted by such doubts. Medical researchers still seek "the true" effect of a medication, independent of context. Psychotherapeutic researchers still seek to determine "the" effectiveness of a particular psychotherapy. And biological researchers still seek to isolate the effect of a specific enzyme. Only slowly is the insight penetrating that separability is an idealisation stemming from a epistemological stance that is nourished by materialist assumptions.

The Ecological Crisis

There can be little doubt that various ecosystems are on the brink of collapse (Ripple et al., 2017), be that the climate system due to global warming, the food chain of some animals, for instance due to decreasing numbers of insects (Hallmann et al., 2017), reduction of biological diversity due to extinction of species, or the strain on the marine ecosystems due to overfishing or pollution (Brunnhuber, 2016; Krabbenhoft & Sunderland, 2013; Zdanowicz et al., 2015). Including the ecological and other costs into economic calculations shows that we are actually on the decline globally, ecologically as well as economically (Kubiszewski et al., 2013). These are severe challenges. Some argue that they can be met by just applying more of the extant type of science and rationality (Pinker, 2018). This is passionately debated by others (Eisenstein, 2018; Lent, 2018; Lutz & Kebede, 2018). We think that this controversy and the problems it is trying to address are demonstrations of inconsistencies inherent in the current scientific model that have rarely been addressed and analysed by the scientific establishment. This is the case because some underlying assumptions are taken for granted and little debated. The analytical stance, for instance, that recommends taking more complex entities apart and analysing their constituents in order to understand them, entails and supports compartmentalised thinking. Such a type of thinking allows for the dominance of one type of logic, for instance a certain ideological-political logic or the economic logic of profit, over others like the logic of ecological interdependence.

To be sure, climate science is highly interconnected and uses complexity theory and systems thinking, which is a living example what a different type of science can achieve. Its calls to urgent action are not only credible, but also a consequence of advanced science. But the point here is this: it takes a long time before scientific advances actually change political and economic culture, and the effects we are reaping in a changing climate are due to the accumulated shortsightedness of a protracted limiting ontology that has branched out to inform politics and economics.

In this way, science can even be used in the service of some ideology, for instance the ideology of the superiority of the Western political model, to debate robust scientific findings. This has been shown for the debate around the health hazards of tobacco, acid rain, nuclear waste and, more recently, global warming, each time with identical strategies and results (Oreskes & Conway, 2012, orig. 2010). In the name of "freedom of speech" and of science, well informed detractors were employed to debate robust findings and fight against one logic, the logic of scientific discovery, in the name of another logic, namely the ideology of the supremacy of freedom, economy and individual choice over other concepts.

This is only possible because, in a certain understanding of "science", scientific findings have to be subservient to an ideology that is thought to be more important than the findings themselves. Such a stance works both ways: it can be used in order to sow doubts against scientific results in the service of a religious or political doctrine, or in the service of a materialist, supposedly "scientific" world model. In any case, it is not science but an ideology that is at work and puts science at stake and at risk.

The Crisis of Credibility

This has led to a crisis of credibility. Sectors of the public have become sceptical regarding the findings and authority of science. While mainstream politics are still largely supportive of science and its role in society, it can be observed with right-wing politicians in all countries how their ranting about the lack of credibility of "the establishment" in politics and economy is sweepingly generalised to science at large. It is easy for populists to pick out failures of and within science to discredit the whole enterprise. It might be more difficult to do this if science itself had established mechanisms of self-reflectively and critically examining its own foundational assumptions. Hence what we are urging us all to do in this text – critically examining foundational assumptions - will in the long run serve the credibility of science as such. A science that is more encompassing and more relevant will also be more easily understood and accepted and is less open to attacks from vested interests.

The Crisis of Meaning

It is a truism to say that modern people in the West often suffer from a lack of meaning in their lives. This has been observed over the past half century (Frankl, 1964). Diagnoses of the causes vary. But one reason seems to be that the modern worldview which has disenchanted the world narrows the goals that seem worthwhile (Griffin, 1988). Values worth striving for very often suggest themselves, by advertising and public opinion, to be material in nature or comparatively mundane, such as a well paid job, a nice house, a career with the chance to increase power and income. How these goals have to be achieved, with long working hours, little rest, multi-tasking and often at the cost of intimate relationships, is a mode prone to produce burn-out and depression and a kind of existential ennui.

This has been well documented for the medical profession (Duarte & Pinto-Gouveia, 2016; Dyrbye et al., 2018; Panagioti et al., 2016; Shanafelt et al., 2012). The scientistic prejudice that there is no knowledge to be gained outside science and its methods is directly relevant for this problem. Meaning, for instance, is clearly *not found* in the

Jiddu Krishnamurti (1895-1986)
Professor David Bohm FRS (1917-1992)

material world and our knowledge of it. Meaning cannot be created or made, like money or wealth. Meaning is something that we either find or which reveals itself, or we do not have it. The discovery of meaning is obviously a very personal experience. Psychology can describe the circumstances, but cannot produce it. Medical science and psychology can analyse and document the consequences of a lack of meaning in people's lives and what influences it has on somatic processes through psycho-neuro-endocrinological-immunological connections (Kruizinga et al., 2016; Shanafelt, 2009). But it cannot remedy a situation that is due to a lack of meaning. The promise that psychotropic engineering will solve the problem is mostly an illusion and in the worst case bad propaganda (Gøtzsche, 2015). There are a few exceptions such as the findings that some natural or artificial psychedelics lead to deep insights and meaning and thus can be curative of mental and physical problems. Interestingly though, these experiences are very similar to spiritual experiences and regularly transcend the limits of a materialist ontology (Carhart-Harris et al., 2012; Doblin, 1991; Ferrer, 2013, 2018; Krippner & Sulla, 2000; Pahnke, 1963).

Hence science may point a way to the most important ingredients of people's lives, meaning and fulfilment, but it can neither engineer nor guarantee this. The experience of meaning is itself an act of consciousness, or rather a gift through consciousness. In its widespread lack we see the consequence of a worldview that has relegated subjectivity to the margins or irrelevance and made consciousness a derivative of brain physiology (Wallace, 2000). Without meaning our societies lack the major cohesive factor and are in danger of flying apart following centrifugal forces of egotistical pleasure seeking that often step in where a solid experience of meaning is lacking.

The Crisis of Health

The most important protective factor against disease, early mortality and suffering is not economic wealth, but education and social support and relationships, as well as a fulfilled life (D. B. Larson & Larson, 2003; Lutz & Kebede, 2018; Ray, 2004). If people lack meaning in their lives, they are in danger of falling prey to burn-out, depression and anxiety. Some assume that incidence of depression and mental disease are stable (Baxter et al., 2014; Pinker, 2018). However, a wealth of data from global epidemiological surveys contradict this (Global Burden of Disease Study 2013 Collaborators et al., 2015), and the WHO projects depression to be the second most important disabling disease worldwide from 2020 onwards, which is on the rise with an increase in incidence figures of more than 5% per year world-wide (Murray et al., 2012). The same is true for other psychological disorders such as alcoholism or anxiety disorders. These psychological or behavioural problems are likely an indirect reflection of the lack of meaning and of a modern lifestyle geared towards gaining material wealth and societal prestige, and neglecting other factors such as relationships and meaning.

While premature death due to childhood and maternal mortality is waning worldwide because of improved hygiene and living conditions, at the same time bacterial resistance is starting to become problematic in Western countries and will soon be so globally (European Centre for Disease Prevention and Control, 2011; Fätkenheuer, Hirschel, & Harbarth, 2014; Hemkens et al., 2016). A large part of this resistance is not driven by medical applications, although liberal prescription of antibiotics for minor health problems also plays a role. But preventive application of antibiotics in mass-animal food production is the major culprit here (http://ec.europa.eu/health/amr/antimicrobial-resistance_en (European Centre for Disease Prevention and Control, 2017). This is again due to compartmentalised thinking that is not respecting the wider network of interdependencies.

Overall mortality due to cancer is either stagnant or declining (World Health Organization, 2017). But the *incidence* of new cancer cases is increasing. The reasons are likely many. Some are due to improved diagnostic facilities and better healthcare world-wide. But some are also due to direct or indirect consequences of our style of living and the shadow side of scientific progress understood in a narrow way. For instance, the increase in black skin cancer due to more ultraviolet radiation is not due to the fact that people are more outdoors, but rather due to a thinning of the ozone layer that was attacked by fluoride-carbon-hydrogen combinations until they were banned by the Montreal Protocol in 1987. We are still suffering the consequences 30 years later and for some years to come.

This is a comparatively uncontested example of how progress in one area – invention of cooling devices due to progress in chemical knowledge – led to problems in another area, and how the economic logic took its toll until overall rationality prevailed and problematic substances were eliminated. It is a very good example of the situation where the separate logic of invention

and technical progress is infringing on another area, complexity of our ecosystems, and for the comparatively protracted period of neglect and fighting of 30 years from the first discovery to decisive action. And it is the only example where concerted action has reversed a potentially dangerous trend. This is likely due to the fact that economically viable alternatives to fluoride-carbon-hydrogenates have been found. In many other areas, from marine to freshwater resources, from pollution to global warming, there is no change in downward trend visible (Ripple et al., 2017).

While not definitively proven, it is likely that some cancers are induced by modern inventions, from herbicides and pesticides to non-ionising or ionising radiation (Falcioni et al., 2018; Hardell, Carlberg, & Hedendahl, 2018; Lerchl et al., 2015; Panagopoulos, Johansson, & Carlo, 2015; Samsel & Seneff, 2013, 2015; Starkey, 2016; Yakymenko et al., 2015). Here we see, again, that the compartmentalisation of thinking into the logic of progress and economic profit and the logic of ecological interdependence are at odds. If the scientific mainstream is in line with economic interests, then dissenting voices on the side of ecological interdependence have practically no chance of being heard. But the current debate about global warming shows that even if the majority of scientists have reached a rare consensus (Ripple et al., 2017), this has not been able to override the separate logics of economic growth, political peace, or generic progress so far (Oreskes & Conway, 2012, orig. 2010). This situation is indicative of a generic dead end. Scientistic modes of science are prone to support compartmentalised types of thinking, methodology and logic, which will lead to a dialectical backlash: other types of compartmentalised logic that are not based on scientific evidence or insight but on ideologically based values, like economic growth or political ideologies, will override the scientific stance, if they are more powerful. And especially since scientific evidence is only one element in a complex network of actions, communication and values (Latour, 1999) , this should not surprise anyone.

Back to our topic: cancers are on the rise. It is likely that this is not only a natural trend but directly caused through a complex mix of causes by our modern, scientifically informed way of living, from intensive farming using herbicides and pesticides widely, to a lack of exercise, a change in food preparation and processed foods, and other as yet unknown factors.

The other big killers, cardiovascular diseases and diabetes, are on the rise as well (Global Burden of Disease Study 2013 Collaborators et al., 2015; Gregg et al., 2018), despite, or perhaps even because of, decades of research. It might well be the case that the type of logic, argument and research involved, looking mainly at single entities, such as saturated fat in cardiovascular disease, or neglecting nutritional patterns and behaviours in diabetes, is indirectly responsible for the lack of progress.

Example: Type 2 Diabetes

Let us illustrate this by an example: Type 2 Diabetes is caused by insulin resistance of cells. This leads to the necessity of increased insulin secretion by the pancreas to produce the same effect, namely getting sugar into the cells of muscles and the liver to provide energy, so circulating sugar becomes dangerous, glycates proteins and thereby produces damage, first in small vessels, then elsewhere. Now, if the pancreas has to secrete more and more insulin it fatigues and the result will be a lack of insulin production, a rise in blood sugar, and hence diabetes. It is alarming to observe that this is especially a problem in children and young people meanwhile. Since 1980 Type 2 Diabetes has increased 3-fold (Gregg et al., 2018).

For a long time, research efforts were focused on the management of the disease or on medication to reduce blood sugar pharmacologically. The latter is a clear example of how the logic of invention and profit, using the narrative of science, masquerades as science proper, as these medications, although to some degree effective, are also harmful and fraught with side effects (Gøtzsche, 2013), and they are by no means causal and do not heal the underlying disease. Now, one can make a good case, physiologically and from a public health point of view, that the easy availability of simple sugars and carbohydrates and the excess consumption of foods and beverages rich in simple sugars and carbohydrates is directly responsible for this increase in Type 2 Diabetes even in children. This is again due to a policy of reducing fat in foods, because fat, especially saturated fat, was, and often still is, considered the culprit in causing cardiovascular disease. If fat is reduced, for instance in yoghurts, it will be replaced, as a rule, by binding substances containing carbohydrates. If fat consumption is reduced, this will result in an increased intake of sugar and simple carbohydrates.

Recent historical research has disclosed documents

of strategic discussions in the scientific board of the sugar industry in the 1960ies that commissioned researchers from the Harvard School of Public Health to tilt scientific opinion towards fat as the causative agent for cardiovascular disease (Kearns, Schmidt, & Glantz, 2016; Nestle, 2016). The argument was that if the public could be persuaded to exchange some percentage of calories from fat for sugar, this would translate into a massive economic benefit for the sugar industry, and might *perhaps* translate in a health benefit. But this needed some massaging of the evidence and some persuading. This persuasion was achieved through a series of reviews tilting the balance of the evidence, which suggested at the time sugar, and not fat, as the potential culprit for the increase in cardiovascular disease (McGandy, Hegsted, & Stare, 1967a, 1967b).

Independently, Ancel Keys, a major figure in nutrition research, published a selective data set of correlations of incidence of heart disease and availability of saturated fats (Keys, 1953). It became known as the "Seven Countries Study" and is probably among the most highly cited single papers in the literature around heart disease and fat consumption. However, it was really a 22 countries study, and Keys simply ignored the data of all those countries that did not fit his hypothesis and thus derived a perfect correlation of fat availability (not even consumption!) and heart disease. Two statisticians pointed out the flaw four years after Keys' original publication (Yerushalmy & Hillboe, 1957), but were never heard. We condense what is a very complicated history. But in essence, this led to national nutritional policy documents cutting back on fat with a comparative neglect of sugar and a shifting of nutritional habits toward simple sugars and carbohydrates, either directly or indirectly, in food additives, in beverages, sauces, or processed food. This policy is increasingly considered responsible for the disastrous consequences in public health: increase in metabolic disease and diabetes type 2 (Brogan, 2016; Taubes, 2001, 2013).

So what has happened is that one type of, admittedly bad and conflicted research, has led to heavy and unsubstantiated influencing of public policy in favour of sugar over fat, which has created in turn another problem, namely an epidemic of diabetes. Most likely it has even created the double problem of diabetes epidemic *and* rise in cardiovascular disease. And as collateral damage it has severely damaged the public reputation of medical science in the eyes of a well informed public.

This is only possible if science operates in isolated compartments of thinking, if the background assumptions of one's scientific activity remain obscure and unreflected, and if there is no overarching goal that connects scientific activity in one field with a broader perspective. Nicolas Maxwell has therefore aptly argued that science should not be about seeking knowledge, but wisdom (Maxwell, 1984, 2017). We would argue in continuation of this line of thinking that the methodological stance of compartmentalisation and analytical breaking down of complex situations and problems into specialised fields is prone to generate such problems. One might contend that this would not have happened had science been applied more ethically and solidly. We do not think that ethics and solid methodology can safeguard science against the danger of compartmentalisation and neglect of background assumptions.

These are only some examples of where we see problems for the current model of science, its acceptance in society and the wider culture, and for its own understanding. They may illustrate why we think we need a widening of the scientific outlook, a broadening of scope and remit. This widening of scope is mainly centred around consciousness and spirituality. Not that this will be a universal remedy. But integrating consciousness into the scientific agenda, or perhaps more precisely, divesting science from its unconscious link to philosophical and ideological materialism will help to create a more diverse culture, a more inventive and human type of science, and more encompassing methodologies.

This we do in the spirit of agnosticism, methodologically understood, as it was originally defined by T.H. Huxley (1892, p. 362): "*Agnosticism, in fact, is not a creed, but a method, the essence of which lies in the rigorous application of a single principle... 'Try all things, hold fast by that which is good.' It is the foundation of the Reformation, which simply illustrated the aim that every man should give a reason for the faith that is in him...In matters of intellect follow your reason as far as it will take you without regard to any other consideration.... That I take to be the agnostic faith*."

This is, at the same time, to say two things: such a science is open and undecided towards ultimate questions, such as whether there is a God or not, whether there are spiritual entities or not, whether consciousness ends after death or not, whether there is moral responsibility or not, whether there is a spiritual realm or not, whether ultimate reality is benevolent, indifferent, a Spaghetti monster,

Erwin Schrödinger FRS, Nobel laureate (1887-1961)

or something else. And such a science must not be dependent on any type of religious or other ideology. Only then does it have the moral integrity to call itself science. It may be part and parcel of this process to make scientific discoveries that will provide an answer to one or other of these ultimate questions. For instance, we may discover that there are moral absolutes and that infringing them will have some causal reverberations, as most spiritual traditions teach. But for the time being, there is no such thing as a scientific discovery of moral absolutes. Neither is there a scientific discovery of the absence of such moral absolutes, spiritual entities, God, purpose or any other of these ultimate issues, because they have never been part of the scientific remit, and perhaps never will be. But it is a gross misunderstanding and part of the foundation myth of scientism to assume that science has actively disproven and done away with those ultimate questions and entities. It hasn't. This is a claim originally voiced by Sprat (1667/ 1722, p. 339ff.) and repeated many times after him, without ever concretely indicating which experiments or findings had ruled out such questions or entities (Wallace, 2000).

It is important to underline this, to challenge the scientistic creed, and to demand the openness that is part of the arsenal of virtues both of a good scientist and of a spiritual seeker. In that sense spirituality and science have much in common: both demand openness towards experience. Both are critical towards dogmatism without solid reason. Both are modes of inquiry (Walach, 2011). We suggest combining these modes of inquiry in order to grow their strengths and balance their weaknesses. This text is intended to give a rationale and lay out a roadmap.

3 THE INESCAPABILITY OF BACKGROUND ASSUMPTIONS

A typical simplistic concept of science has it that science can allow only statements that can be empirically verified (or falsified).[2] This sounds reasonable but is disproved by the very statement itself. For this statement "that science must allow only empirically verifiable or falsifiable statements" is itself not an empirically verifiable statement but an injunction or assumption. This, in a nutshell, is the predicament of science (Laudan, 1981; Maxwell, 2017). It is supposed to be empirical, but for our empirical science to function, it needs to make assumptions that are not in themselves empirical. Or, put as the yet unsolved Humean problem, inductive science can only progress through inductive experience. But how can it then justify this injunction, which is itself not founded inductively? Well, it cannot. It has to make an assumption which, as such, lies outside the practice of science.

Science, therefore, cannot rely on empirical statements alone. Another way of putting this is that all experience and perception is theory- laden (Hanson, 2018, orig. 1969; McMullin, 1985; Suppe, 1977), or that, without a knowledge of what to look for, we would not be able to make any sense of our perceptions, or perceive anything meaningful at all. Thus, there is always, and inescapably so, some theory, or some set of background assumptions we must hold in order to operate in the world at large and specifically within science. This has been pointed out now and again, ever since the debate between Locke, who insisted on a purely empirical concept of mind (and of empirical science as a consequence) and Leibniz, who pointed out the necessary conceptual preconditions for experience and perception (Leibniz, 1971; Locke, 1975). More recently Maxwell has again demonstrated that a purely empirical concept of science is not viable (Maxwell, 1984, 1998, 2004, 2013, 2017). The minimum additional assumption science has to make, presuppose and cannot empirically verify is that the universe is comprehensible and unified, or else nothing can be said and experienced.

On more formal and general grounds, one can put it this way: *it is not possible to construct a system that can prove its own foundations.* Mathematically and logically this has been proven by Kurt Gödel in his incompleteness theorem (Basios & Bouratinos, 2006; Devlin, 2002; Gödel, 1931). There he formally proved that any axiomatic system has to recur to at least one statement outside the axiomatic framework which cannot be proven by the framework itself, but has to be presupposed. Roughly in parallel to Gödel, Robin Collingwood, working in Oxford, developed his ideas about the importance of background assumptions in science and philosophy. He called those "absolute presuppositions" (Collingwood, 1998, orig. 1940). By "absolute" he meant that they are final, not disputable and non-negotiable. They are "presuppositions", because they are implicitly presupposed in whatever we do, especially in science. Scientists also subscribe to such absolute presuppositions, largely unconsciously and largely unchallenged. These presuppositions, Collingwood held, come from the background of a current culture, are not questioned or critiqued, because they feel so natural and so self-evident. They are like the air we breathe or the water fish swim in. Necessary, ever present, and yet not consciously perceived. The idea of "absolute presuppositions" was later taken up by Thomas S. Kuhn who developed them into his notion of "paradigm" which informs generations of scientists during times of normal science (Kuhn, 1962; Toulmin, 1985). One can also call a paradigm a "dogma for a time" (Fischer, 2003, p. 66)

Whether Collingwood was right in his description of the process by which a community of scientists acquire such a set of presuppositions is of little relevance for our debate here, nor is the question important, whether paradigm shifts happen in revolutionary upheavals, as Kuhn thought, or occur on a gentler slope, with various preparatory steps and with less general upheavals (Toulmin, 1985). What is crucial, though, is the observation that such background assumptions are powerful, inescapable and define how activities such as science are structured, understood and socially negotiated.

We do not have the liberty of being free of such assumptions, nor should we indulge in the idea that this is a concept only relevant to others, and not to ourselves. It is always relevant, for all science, from all perspectives, and also for our own effort here. But we can reflect on the assumptions we make. We can become conscious of them and of their powerful grip upon our imagination and actions and be aware of them. A good iconographic representation of this situation is the famous drawing by Maurits Escher "Drawing Hands" (1948).

Here we see hands that draw each other, thereby

[2] There is no difference between a falsificationist or verificationist attitude towards science for this argument. Both, falsificationist and verificationist attitudes have strengths and weaknesses and very likely both approaches are necessary and in fact employed by science as it is practiced.

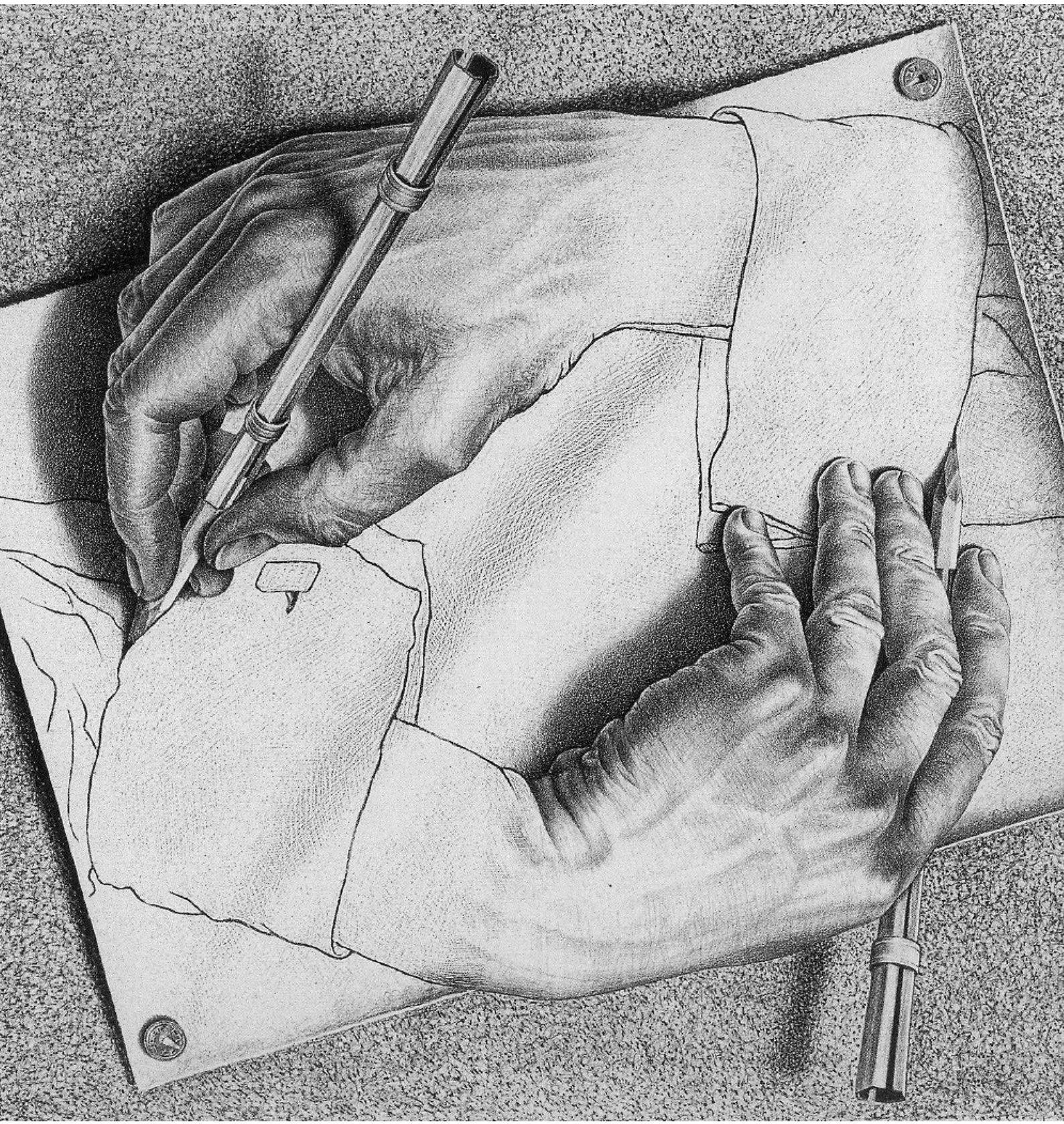


Figure 1

Maurits Cornelis Escher – Drawing Hands 1948

representing the situation that we have no privileged vantage point on which to ground our activities. We create a science out of the assumptions we derive from the culture at large and the scientific culture in particular, into which we have been educated and introduced, and thereby create the language, concepts, methods and limitations of our particular approaches, as Fleck has aptly demonstrated (Fleck, 1979), another of Kuhn's important sources.

In order to understand the operation of such assumptions better, we can employ the methodological step of alienation. As we go back in history, when other background assumptions were operative, or into completely different cultures where our assumptions do not hold, we understand better the power, the grip and the working mechanisms of such assumptions and our tacit world model. Let us do both as an exercise.

Let us first use the historical alienation: going back into the Middle Ages, to the middle of the 13th century, we find scholars who called themselves "the modern ones (moderni)" in order to differentiate themselves from their predecessors or supposedly old-fashioned rivals (Flasch, 1986, 1987, 1989; Kretzmann, Kenny, & Pinberg, 1982; Le Goff, 1985). The "modern ones" read Aristotle, were fascinated by what they discovered there, tried to square what they read there with the traditional teaching of the Church and a more Platonist and Neoplatonist philosophy as handed down in the Augustinian tradition. The old-fashioned ones disputed the relevance of Aristotle, held philosophical speculation as less important than solid biblical scholarship and knowledge of the tradition.

Both factions would use clear logical argument combined with thorough knowledge of biblical and patristic texts, often by heart, and used argumentative structures that are admirable to behold, even 700 years later. To anyone who has the relevant background knowledge of the texts and topics, a scholarly disputation of the 13th century is a prime example of logic and consequential thinking. And by reading such disputations one sees immediately how the proven solutions of those inquiries or questions are only acceptable if one shares their assumptions and presuppositions. But of course part and parcel of such assumptions is the faith in the veridicality of some biblical teachings, the truth and value of patristic sentences, and the belief in holy inspiration of the biblical and patristic past.

We do not share these beliefs any longer, and so we are flabbergasted at disputations about how many angels might be sitting on a pinhead. If one accepts the reality of spiritual beings like angels, as the medieval scholars did, and if one learns about the concept of "spiritual matter" which was at the time being discussed, coming from Jewish sources like Ibn Gabirol (Avencebrol (Ibn Gabirol), 1895), then such a discussion is sensible, even necessary. But if one does not share those ideas it can only sound silly, and so it does to modern ears.

Within the framework of a spiritual-religious culture like that of medieval Europe and the intellectual awakening in the Paris of the 13th century all those activities were extremely important, natural and scholarly robust. With a changed set of presuppositions that do not posit spiritual entities like angels and demons as naturally given, or acts and wills of God, or a set of authoritative teachings like biblical texts, we have different questions, different methods and different outcomes. From our modern vantage point – observe, we also call ourselves "modern" as opposed to earlier scholars of the past – such approaches lack sense and method. Now the point here is this: in the same sense we are looking back at a set of presuppositions and methods which we find meaningless, future generations of scientists might look back on our way of doing science, feeling very much the same as we do vis-à-vis our medieval counterparts. What is modern, which methods are useful, which questions we consider worthwhile is to some extent historically contingent on the set of assumptions we adopt. Projecting ourselves into the future might also make us aware of our own presuppositions.

Another method is going into the perspective of a completely different culture, as anthropologists or ethnographers do. Here we will find peoples who clearly and without questioning see the world in a certain way, normally quite different to ours. They may "see" spirits, "talk" to them, experience them in their dreams or in a semi-wakeful dream-state during rituals, such as the Ayahuasca ritual, learn something about the power of plants, animals or spirits, discuss how to harness these powers for healing or other purposes, and might even have shared visions where two participants in the ritual have the same vision of a spirit guide (Ferrer, 2013, 2018). And all this is extremely natural for them, no questions asked. This is the way it is and has been and will be. Only we, coming from another culture and with other background assumptions start asking questions, like: are these spirits, "seen" and "experienced" in visionary states, in fact real? Or are they "only" imagined? If the latter: where does the information come from, and why can two

people have identical visions? Is it useful? If it is: how can this be? And by imagining or experiencing such a different culture we suddenly become aware of how we ourselves create a different culture, a different set of inquiries with different presuppositions.

Now we are prone to assume that ours is the "correct" way of doing things, or the "better" way of gaining knowledge. After all, we were able to make aeroplanes and rockets fly. We can put people into deep anaesthesia and replace damaged hip joints, heart valves and the like. So we assume our science and knowledge is superior. However, as Feyerabend has pointed out, it may be the case that other types of knowledge or ways of doing things achieve other things (Feyerabend, 1980). Perhaps the Hopi Indians do indeed know how to make rain, while we don't, because for them it was vital to know this and for us it isn't. Perhaps with acupuncture one can achieve different ways of healing and pain control in ways we still don't understand.

This does not preclude our potential future understanding, nor does it negate our achievements or the veridicality of our own findings and discoveries. But it underlines that different types of knowledge structures, deriving from different sets of background assumptions may be useful for different things, and it may make the point that it is less a question of "better" or "worse", or more or less "truthful", than of what type of ends a certain set of background assumptions leads to, and what insights it can create (Sax, Quack, & Weinhold, 2010). For instance the indigenous knowledge implicit in the Ayahuasca ritual is quite stunning (Ferrer, 2013, 2018; Shanon, 2002). For one, how did those ancient Indians that developed the ritual some thousand years ago (Krippner & Sulla, 2000) and invented the brew, know how to combine two plants, *banisteropsis capii* and *psychotria viridis*, that grow in completely different areas and are not at all obvious candidates for such a medicinally active drug combination at first sight? Well, they would say: "The plants told us." Obvious, isn't it?

Modern analysis has figured out that one plant helps to make the ingredients of the other plant available for longer to our system, because one contains dimethyltryptamine (DMT) and one harmine, which is a monoaminoxidase (MAO) inhibitor that prevents the DMT from being degraded. This makes the DMT, which is a precursor to serotonin, pharmacologically available such that, pharmacologically speaking, the whole ritual has a serotoninergic effect, among others (Adelaars, Rätsch, & Müller-Ebeling, 2006; Shanon, 2001). How did they figure that out without modern pharmacological knowledge? It is highly unlikely that this happened by pure chance as there are millions of potential combinations, many of which will be poisonous. Aboriginal shamans would say: "We listen to the plants."

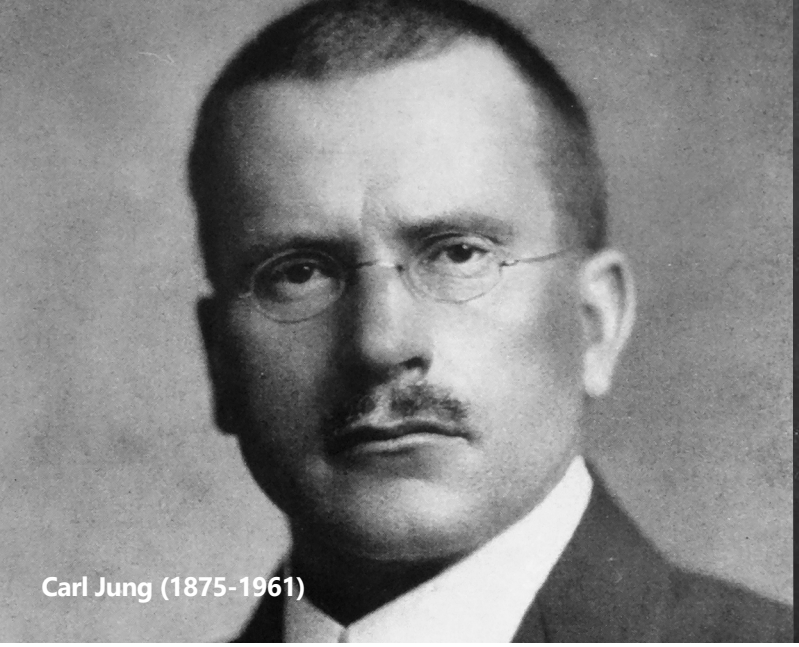
This demonstrates that by different assumptions, for instance about what entities are real and what methods achieve knowledge, in that case altered states of consciousness, we may arrive at different results.

It may also demonstrate the relativity of our modern scientific stance vis-à-vis an indigenous set of assumptions. For an Indian of the Amazonas this is just how the world is: there are spirits of plants, animals, people. Animals can be inhabited by spirits of people and vice versa. Dying people's spirits move into another realm from whence they can come back. And shamans in their ritually induced altered states of consciousness can commune with those spirits and gain knowledge, avert danger, and report distant events (Garve, 2012). It is so clear to them that the name by which they call themselves translates into "human being", while everybody else, including Europeans, are considered inferior.

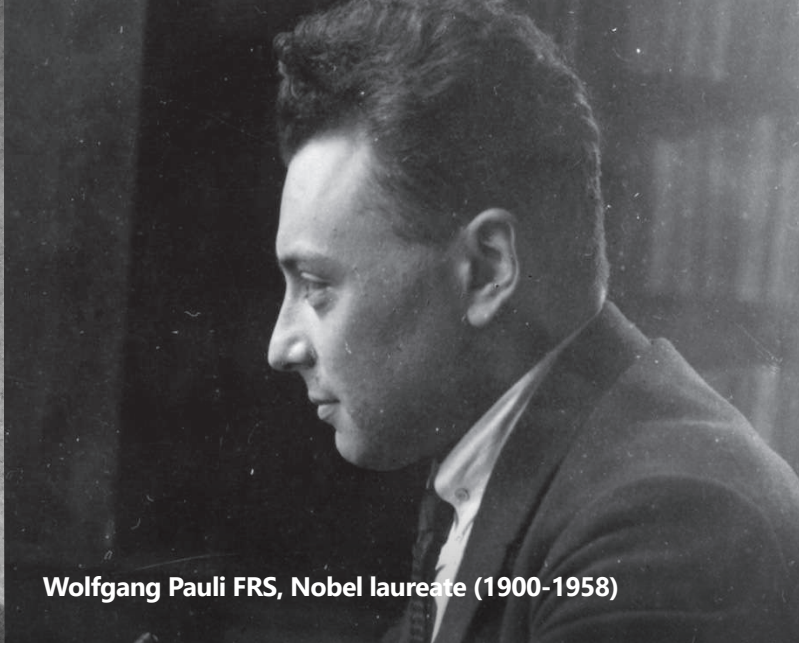
In the same sense, our background assumptions structure the world into what is clearly the case - no questions asked and no discussions, debates or discourses are necessary. And the methods that are part of this set of assumptions define how we gain knowledge. For us it is the empirical method of systematic observation including experiments, where we ourselves interact with nature or artificial systems. For other cultures it is some way of introspective knowledge, gained through some altered state of consciousness, sometimes induced by drugs, such as in the Ayahuasca ritual, sometimes induced through meditative states such as in classical disciplines of meditation, sometimes spontaneously through ideas and insights.

It is also important to realise that our background assumptions define what we can actually see, what we experience, what is contained in our world and what is likely non-existent, irrelevant or impossible. Watzlawick put it in the well-known adage: for someone who only has a hammer, everything looks like a nail. A more poignant example is Harvey's discovery of the heart beat and the reaction of his peers.

As is well known, in the Aristotelian-Galenic physiology the heart was a convection heater



Carl Jung (1875-1961)



Wolfgang Pauli FRS, Nobel laureate (1900-1958)

that circulated blood by warming it (Aristoteles, 1968, De Partibus Animalium 665 b 6 ff.). After the cooling down by the brain the blood flowed down to the lower parts of the body and was transported back to the heart by the temperature gradient. Harvey seems to have doubted this at some point and started his experiments, which were conducted by vivisection in dogs and other animals, where he could observe a beating heart. From this observation he concluded that the heart was a pump that pumped the blood through the body. This was probably one of the first major examples how Descartes' new proposal of a mechanistic understanding of the organism was fruitfully applied to a concrete example: the heart as a pump.

When Harvey made his discovery around 1623 and then published it, there was an outcry through Europe about this outrageous new finding. Emilio Parisano, philosopher and medical doctor and one of the leading figures of his time wrote: "*We deaf people cannot hear the heart's beat, and there is no one in Venice who can. If he can hear it in London, lucky him, but we are writing in Venice*"[3] (Parisano, 1647, p. 101). This is a good example to illustrate the filtering function of presuppositions: under the assumption, or rather presupposition that the heart is a convection heater, we actually miss the rather obvious fact of a beating heart, or if we hear it, we misattribute the perception to something else, neglecting or denying it. This is because such a perception does not fit our model, and hence the phenomenon is ignored. Observe that we are not talking about theoretical entities, but manifest perceptions and phenomenologically obvious perceptions that for us, knowing about circulation and the heart, are next to impossible to miss. Nor do we understand how someone could have possibly said that there is no such thing as a heartbeat.

This historical vignette is a good example of what absolute presuppositions, or *background assumptions* do and *how they operate*:

- They implicitly provide a framework of expectation: what entities to expect and what not to expect.
- They therefore guide our perception, our activity and our thinking.
- And so they partition the world and distinguish the full, rich network of possibilities and realities into what is relevant for us and what isn't.
- This helps us: it allows us finding and discovering things we have been looking for, expecting or hoping for.
- It also hinders us: it makes it more likely that we overlook things that are obvious under different assumptions but not under those we are subscribing to, and it makes everything background, noise, or irrelevant that is not in the focus of our model and expectation.

[3] The original passage of Parisano's text reads: "ut ita ex sanguine sequatur pulsus et (quod ulterius addit) sonitus: quem nos surdastri audire non possumus, nec Venetiis sunt qui audiant. si tantummodo Londini exauditur, faustum, felix, fortunatum esto. nos Venetiis scribimus" and translates into: "… such that from (the motion of the) blood a beat follows and (what he says in addition) a sound: That we deaf ones cannot hear, and there is no one in Venice who can. If he can hear it in London, he may be happy, blessed and lucky. We write in Venice." All translations of texts into English here and elsewhere by HW.

To sharpen it even more: if scientists and other people think they are only relying on science, scientific discoveries and theories they are actually lying to themselves and the public. They may be relying on scientific discoveries, experience and theories *as well*. But in order to be able to do so, they also have to rely on assumptions about the world, on assumptions about the right methodology, on assumptions about what is valuable and what isn't. A gold-washer who does not know what to look for and what gold looks like will never find it. The assumptions of scientists about what the gold is, how to find it, why it is important, how we know that we have it, those assumptions are what we call absolute presuppositions or background assumptions of science.

We necessarily have such assumptions. But we can hold them with different attitudes: we can know that we need to have them and be fairly conscious of them. We can know of their relativity, or can at least have a basic understanding of their contingency and historicity. And we can be ready to change them, once we see evidence, phenomena, data that contradict them or are incompatible with them. Such a stance is a consequence of an enlightened, open, curious and thus scientifically proper attitude. Or else we can be unaware of our background assumptions. Then we operate like Amazonian natives, only that we then are naturalistic natives (van Fraassen, 2016). We assume that this is just how it is. In such a case we use scientific background assumptions as articles of faith, and then we really subscribe to a new religion (Principe, 2016; D. N. Robinson, 2016).

Perhaps the fact that so many people subscribe to science as a religion, even if unconsciously and sloppily, testifies to our human condition. We are unable to operate without such basic assumptions about the world, human nature, absolute realities and other big questions. Science has solved some questions, or has at least offered some potential answers to some questions, but by no means to all important questions. Were we to draw up a list of unsolved questions, it would be very long, and the more we know, the longer the list will become. In fact, once we delve into the depths of what we think has been solved, such as the cosmological question as to how our universe came into being, or the developmental question how life arose out of the primordial soup of elements, or the further question exactly how evolution proceeds, then we discover that there is a still very long list of puzzles, inconsistencies and contradictions (Hands, 2015).

However, because some questions have been answered, some puzzles solved, and a lot of functioning technology been developed that offers help and comfort in everyday life there is the *promise* of future solutions to those puzzles and answers to our questions. And if we believe that science will eventually have an answer to all those questions that are still open and offer a solution to all problems, then background assumptions and their working mode become an article of faith. The essence of faith is hope in some as yet absent fulfilment and is at the base of religion of any kind. Faith in Jesus Christ is the essence of the Christian creed. Faith in the reliability, benevolence and presence of Jahweh is the essence of the Jewish religion. Faith in Allah is at the base of Islam. Faith in the truth of the Dharma is at the core of Buddhism, and so forth. The faith in any one of the traditional religions or in Science, with a capital "S", is structurally similar. Everyone is entitled to their religion, be it the Christian, the Jewish, the Islamic or the scientistic creed. Our point is: scientists who believe in Science, i.e. in the future superiority and the universality of the current scientific approach, do not practise science but profess a creed.

Only if we are conscious of the basic assumptions we are making, are aware of the contingency, i.e. the historical, political and cultural relativity of those assumptions, if we are ready to change them in the face of new evidence and data and are not dependent in any way on whether they will turn out to be useful or be overturned one day, only then are we truly operating from a scientific stance. One might assume that scientism as faith in science is a result of this double stranded development in our times: that religion in the true sense of the word has receded and is less available in theologically solid modes, and that science has offered such a seemingly compelling and universal new narrative (Principe, 2016; J. K. A. Smith, 2016).

Another way of putting this is: we are not free to have no religion, because we must always make assumptions that we cannot prove and will never be able to. And if we treat those assumptions as holy cows, untouchable and non-negotiable, then we have in essence created a religion. The question is not: do we have a religion or not, in the sense that we have to rely on statements of faith? We always have one. The question is, are we aware of it or not, and can we justify it.

We have discussed the fundamental inescapability of background assumptions. We cannot *avoid* holding such assumptions. For all mental and scientific activities have to fall back on at least one statement, usually more, that cannot be verified and guaranteed using the methods it is

supposed to found. Usually those assumptions grow out of a complex historical process in which evidence, belief, cultural changes and political decisions form a complex amalgam of a particular culture of beliefs and assumptions that inform not only society but also scientific activity. It is fair to say that the background assumptions of science currently operative are materialist in ontology, naturalistic in outlook, and empiricist in methodology. As a corollary a reductionist attitude forms part of those background assumptions. These background assumptions together form a particular set of attitudes that are often mixed up with the business of doing science. To put it differently: being scientifically active or being part of the scientific community is often implicitly equated with subscribing to those implicit background assumptions.

The point we wish to stress is this: one can be a scientist, be scientifically active and part of the scientific community without necessarily subscribing to all or some of those background assumptions, in fact instead subscribing to quite a different set of assumptions. The key to understanding this is the differentiation of science into its active-methodological branch and a particular ideology. We do this by differentiating Science 1 from Science 2.

Science 1 and Science 2

We introduce the following distinction here: **Science 1** we call all practical ways of doing science and methodologically securing the evidence and separating it from illusion by methodological controls. In fact, one could define science as *the collective attempt at understanding the world and securing the findings methodologically, avoiding delusion and illusion as much as possible*. Note that this is an operational definition of science that avoids reference to all fundamental assumptions. This methodological part of science, how it is actually done, the methods employed to secure the findings, what conventions are agreed upon as successful or sufficient, when findings are accepted as factual or in need of further support, all this we call Science 1.

This may vary from discipline to discipline and also over time. For instance, for a long time it was sufficient in medicine to observe effects of medications and compare them with previous states or untreated cases. Nowadays we have understood that a lot of confounders can mask effects or masquerade as intervention effects, and hence experimental evidence from randomised studies is normally demanded as a standard. This is an example of how methods may evolve. Although methods have preconditions and make presuppositions as well, one can apply scientific methods regardless of one's understanding of the world. A materialist, a Hindu, a Buddhist, a fundamentalist Christian, a Catholic or a Muslim can all use the same methodology of a randomised controlled clinical trial to study a new pharmacological agent, an old herbal preparation or even acupuncture, and by and large they should have the same results, apart from the fact that their intention, their enthusiasm, their expectation, their skill in handling the methodology, their organisational prowess might make some difference to the outcome.

Astronomers of different ideological background should be able to see the same astronomical entities through telescopes as long as they are well trained. And for the presence of an antigen in an immunological assay the religion and worldview of the laboratory worker does not make a difference. Thus, Science 1 is, by and large, operative on methodological principles that are shared and consensually agreed upon. Science 1, although to some degree derivative of and historically dependent on the scientific world-view, can be seen as the scientific methodology that is, to a large extent, applicable to all sorts of problems and questions, even those questions that are critical of the current scientific world view or Science 2.

By **Science 2** we mean the set of background assumptions operative within a scientific culture. Currently, as pointed out above, these background assumptions are of a materialist kind. Thus Science 2, also often called the "scientific worldview", is a particular set of assumptions about the world, about the role of science within it, about what the world likely consists of, and of what is likely not the case. It is, in essence, just a belief system like any religion. If held fervently and emphasised strongly, then we call it *scientism*, which is more akin to an ideology or a religion than to science proper. Because science, as any human activity, has to fall back on some background assumptions, some such structure cannot be avoided.

However, we can reflect upon the content of Science 2, the background assumptions we hold, whether they are warranted or not, whether they are useful or not, to what degree they help or hinder us. And thus we might progress to adopt an enlarged or altered set of background assumptions. We assume that this process is helped by critical discourse about

current assumptions. And we also expect that an altered or enlarged set of assumptions will have reverberations on the future methodology of science. Thus an enlarged Science 2*, in transition to a more enlightened Science 3, will also generate a wider methodology within Science 1, a kind of Science 1*.

For instance, if we discarded the background assumption that consciousness can only be seen as derivative from brain processes and assume that consciousness might have its own access route to reality, through contemplative, meditative or introspective procedures, we will have developed a new methodology which had hitherto not been part of the scientific methodology, even though it might have been part of indigenous or spiritual cultures. This would necessitate a different stance towards scientific methodology and the status of consciousness, which we will elaborate on below. Suffice it here to say that an enlarged and different set of background assumptions will also enhance and change methodology. Sometimes a newly invented methodology or discovery will also give rise to changing background assumptions.

For instance, the insights of psycho-neuro-immunology and –endocrinology gave rise to the understanding of bidirectional causality from the immune system to psychological experience and from psychological experience of stress and loss to the immunological status of an organism including the causation of disease. This belongs to Science 1, and was methodologically solid research. This in turn has reverberations on Science 2, namely how we view the world at large and what assumptions we hold about reality, in that case the reality of our body. In effect, the insights filter through from Science 1 to informing Science 2, but usually quite slowly. Another example is the discovery of quantum mechanics. Although this has had a 100-year history now, the major paradigm of most scientific activities in chemistry, biology, psychology and medicine still follows a Newtonian ontology (Aerts, 2014). In that sense, insights gleaned at the level of Science 1 are slow to change Science 2.

Alfred North Whitehead OM, FRS, FBA (1861-1947)

This is likely so because those implicitly held beliefs at the level of Science 2 are mostly unconscious, have multiple effects and consequences in our culture at large and are slow to adapt to new findings. It is an old adage that new scientific findings take some years until they are known among all specialists of the fields, even longer until they have filtered through to the rest of the members of the discipline, still longer until the scientific community as a whole has taken note and longer still until they have arrived in our culture at large, informing our way of living, our schools and the way we bring up our children.

This is not all bad, as some scientific findings turn out to be wrong, irrelevant or understandable by other means after a while, and thus the inertia and conservatism in incorporating new findings represents a kind of self-preservation. This explains why changes in Science 2 are slow, and often take a long time. Thomas Kuhn, in his model of scientific revolutions, postulated that such changes in Science 2, or paradigms in his terminology, are disruptive and revolutionary. We are not sure that this needs to be the case, although history provides a few examples such as the adoption of the solarcentric view in astronomy or the discovery of quantum physics in physics.

Other changes such as the adoption of the mechanistic model in medicine and biology introduced by Descartes in his *Traité de l'homme* (Descartes, 2003, orig. 1664) in the 17th century and supported by individuals such as Harvey were more gradual and took about 200 years to become generally accepted and operative, when physiologists like Emil du Bois-Reymond, Hermann Ludwig Helmholtz or Rudolf Virchow made it the guiding paradigm in the middle of the 19th century. Although accompanied by fierce resistance of the "old school" there is no revolutionary turn in this process of adoption of the mechanistic view where suddenly, within a generation or so, everyone would have changed sides. Rather it was a bouncy process with advocates and resistance over many generations.

Thus it need not always be a revolution that changes background assumptions such as in the examples produced by Kuhn. But it is clear that empirical findings and discoveries at the level of Science 1, methodological application of scientific methods and rationality, sometimes have effects at the level of Science 2 and necessitate a change in background assumptions. This process is sometimes disruptive and takes the shape of a revolution. Sometimes this process is more protracted. Sometimes cultural processes help to change background assumptions, such as in the adoption of the Copernican model. This was more inspired by ideas of principle than by scientific adequacy. Scientifically, the Copernican model explained astronomical data less well than the Ptolemaic model. But it was simpler and spoke to the new understanding of man as being central (Burtt, 1932; Danielson, 2009).

Our quarrel is with a certain set of background assumptions in Science 2 which can be termed scientistic: the belief that *all* relevant knowledge comes from the application of science as we know it; the expectation that this will suffice to explain and understand the world; and the assumption that material reality is all that is needed and all that is real, and everything else is just a form and appearance arising from this material reality. From this follows the methodological stipulation that only empiricist methods and mathematical analysis are valid scientific methods. Our quarrel is with the frequently employed equation that Science 1 = Science 2.

The problem we wish to highlight is with those background assumptions of modern science: if they are not explicitly reflected upon and held unconsciously, then they operate through unjustified judgments similar to the way Parisano ridiculed Harvey's discovery. Let us now turn to some of these modern background assumptions. We are not attempting a comprehensive listing here, but wish to indicate what we see as the most important and powerful ones.

4 THE MOST IMPORTANT BACKGROUND ASSUMPTIONS OF CURRENT SCIENCE

For our modern, scientifically informed mindset the set of background assumptions is mostly materialist in ontology, naturalistic in outlook, and empiricist in methodology. Another way of saying this is: reality, at least that part of reality that is worthwhile dealing with using methods of science, is supposed to be material in nature and can be explained in full. Matter is the ultimate reality in the Universe. This is a materialist ontology, which is fundamental for modern science. A naturalistic outlook means the expectation that science will eventually be able to understand and explain all of reality. The way to explore this reality is experience. Experience comes in two generic types: observation and experimentation. Observation means that we use our senses – eyes, ears, touch, and less so smell and our kinesthetic sense – to explore the world, ideally through repeated observations including natural variations.

This is the method of astronomy and many other more observational sciences such as geology. It is used a lot in surveys social science research. Experimentation means we are actively interfering with systems: we create conditions and observe the development of the system following our intervention. This has the benefit of better controllability and availability of conditions. It has the drawback of artificiality. Hence natural observation and experimentation are, in a way, complementary approaches (Cook & Shadish, 1986; Cook & Wittmann, 1998; Shadish, Cook, & Leviton, 1991; Walach & Loef, 2015). In medicine, psychology and biology this complementarity plays out in findings from field studies or natural observational studies and studies from the laboratory, clinical randomised experiments or experiments in artificial circumstances. Both types of studies give us different types of knowledge.

These experiences need to be structured by theories and so analytical strategies are part and parcel of the methodology. Logical analysis, statistical-mathematical modelling and the analysis of consistency of observations with theoretical expectations are all part of those methods. But at any rate, and as a rule, these methods of observation and experience address the outer, material aspects of reality and hence are methods that are useful to inquire about the world in its material aspects. So far so good, and the naturalist native would say at this point: "And is there any other aspect to the world than a material one?" and thereby demonstrate the absoluteness of the presupposition that material objects are all that exist in the world.

A somewhat different status is occupied by mathematical and formal theories, such as we have in physics and sometimes in other branches. Physics, as one of the oldest branches of science has had a longer history than most other sciences and a more circumscribed subject matter. One might also say it is the paradigmatic science of matter, and many other sciences are modelled along the successful trajectory of physics. In physics we see how highly elegant mathematical structures are used to model relationships and causal contingencies, such as in Newton's law of gravitation, or Kepler's laws. The mathematical structures themselves are ideal or mental and have no material subsistence except that the structure of our world is an exemplar of those structures.

Nevertheless, the basic assumption of modern science is that matter is the most fundamental entity in the Universe. And the most appropriate method is experience and rational analysis of experience. Part of the latter is mathematical modelling.

Another important assumption is naturalism. This term is used differently, depending on who is using it to describe what. It means, in its core, the outlook that scientific discoveries will reveal everything in the world to be part of the natural order, submit all phenomena to natural explanation and weed out all supernaturalist explanations that introduce agents that are not bound by scientific laws (Burtt, 1932; B. Lightman, 1987; A. Sommer, 2018; van Fraassen, 2016). Naturalism has various movements. The original marriage of Aristotelian philosophy with Christian doctrine by Saint Thomas Aquinas and others was one of the first epochs of naturalism. Here the attempt was to show that the articles of faith do not contradict what is known about the world, as exemplified by Aristotle's teaching, as much as possible (Oeser, 1969). Another wave of naturalism was embodied by the Victorian agnostics, Huxley, Spencer, Tyndall and others (B. Lightman, 1987). Their attempt was to secure the teachings of science over religious creeds, but were sure that science would reveal a more enlightened type of religion, even though, perhaps without the God of the Anglican church.

Modern naturalism is part of Science 2, i.e. a background assumption, but not necessarily

tied to a materialist ontology. It assumes that all phenomena will be eventually explainable by adequate scientific theories. Sometimes naturalism is conflated with materialism. But this need not be so. Some scientific models attempt to explain anomalous and spiritual phenomena using the framework of science (Carr, 2015; Walach, von Ludacou, & Römer, 2014), and in a sense the motivation of this text is to explore the reaches of naturalism beyond the restrictions of a materialist ontology. We come back to this point later.

It is important to note that these assumptions are neither true nor false. The categories of truth and falsehood are not applicable here. This is probably the difference between our postmodern times and earlier concepts of science and philosophy: the largest part of the history of philosophy consisted of debating the truth or falsehood of such basic assumptions about the nature of reality. History also testifies to the fact that this debate is not solvable. As Wittgenstein has pointed out: we cannot overcome the horizon of our language, and the concepts we are dealing with (Wittgenstein, 1958, orig. 1953, 1980). The postmodern insight is that there is no absolute vantage point or view from nowhere, where we can decide about the truth or falsehood of those absolute presuppositions or assumptions about reality we make. Not even science can offer such a view from nowhere. But we can discover what consequences they allow, what horizons they open or close, what methods they entail or foreclose, and thus we can debate the usefulness of the particular set of assumptions. Part of the purpose and exercise of this report is opening this debate and initiating a discussion of the viability of an enlarged or modified set of assumptions.

Materialist Ontology and Reductionism

Currently, science is predicated mostly on the ontological assumption of materialism: that the ultimate reality of our world is matter, and on the methodological assumption of empiricism (Dawkins, 2006; Nagel, 2012; Pinker, 2018; Sheldrake, 2013; Whyte, 1961).

An important corollary of this set of assumptions is the methodological attitude of ontological and methodological reductionism (Agazzi, 1991; Primas, 1991). This means that unknown entities should be analysed in a way that they might be reducible to known entities. Thus lightning, in former times supposed to be an expression of the wrath of gods, has been understood as a particular form of electricity. And electricity has been understood to be one aspect of electromagnetism. And electromagnetism has been understood to be one of four fundamental forces of nature that conveys the electromagnetic force and operates via photons (Davies, 1985; Hands, 2015; Penrose, 2004). And ideally scientists hope to find a fundamental theory that explains all those forces, particles and interactions which will then allow reducing the more complex entities and appearances to simple interactions of matter and energy.

As an important insight, this analysis has actually yielded a fundamental contradiction of sorts: at the heart of material reality lies information, and mathematical structures describe them, two very non-material, ideal or mental concepts (Currivan, 2017; Zeilinger, 1999). By ontological reductionism we mean that we reduce the rich phenomenology of some unknown, complex entity, for instance lightning, to the ontological description of something known, electricity. By methodological reductionism we mean that we use a supposedly more fundamental method to understand results gleaned with a more complex method. An example for methodological reductionism would be biological psychiatry (Cloninger, Svrakic, & Przybeck, 1993; Mössner et al., 2007; Van Praag, 1981). It has arisen with the idea that the rich phenomenology of psychiatric disorders can be reduced to the understanding of biological interactions of transmitter molecules and receptors in the brain. Note that this type of methodological reductionism is consequent on the ontological reductionism, namely the attempt to understand the rich diversity of our world in terms of basic material entities and their interactions.

Granted, there is a large body of diverse scientific approaches, mainly in the social sciences, but also in ecology, medicine and biology that has gone beyond reductionism. It uses complexity theory, systems thinking and analysis of interdependence and produces very interesting and important outcomes (Barabasi, Gulbahce, & Loscalzo, 2011; Capra & Luisi, 2014; Hankey, 2015; Hyland, Jeffery, & Wilkin, 2014; Kauffman, 1995; Lemke, 2018; Pezzulo & Levin, 2015; van der Greef et al., 2010). But this should not cloud our analysis that the mainstream is still very much steeped in those background assumptions of materialist ontology and reductionist methodology. I beg the patience of more knowledgeable readers if I cut out the fringes in the interest of simplifying and clarifying the argument. Apart from that: the general practice both of science and therapy is far from integrating the insights of systems thinking and complexity

theories. Although systems therapeutic approaches have been around for a long time, it is only now that in Germany systemic therapy is on the verge of becoming accepted. In the UK it is still mostly cognitive behavioural therapy and consulting that are accepted methods within the NHS, although mindfulness based approaches are being added. And although systemic therapy has been around for some time it was only this year that a chair for systemic psychotherapy and research has been established in a German university, the only one in all of the German speaking countries. And in medical practice there is still very little evidence of systems thinking, let alone practice, despite pleas to the contrary for 50 years (Engel, 1981). Thus, I think it is justified to simplify the picture for the sake of argument. Materialism in ontology and reductionism in methodology are still the mainstay of Science 2, although Science 1 has long overstepped that ideological boundary.

This reductionism, as part of the modern set of background assumptions in science, leads to an important consequence: it assumes that consciousness and its rich phenomenology is "nothing but" the set of neuronal interactions in the brain that is intensely correlated with conscious activity (Armstrong, 1968; Churchland, 1986; Dennett, 1991). The philosophical stance associated with this type of materialism comes in many variations which we will not address in any detail. Their common denominator is the belief that consciousness is either the result of brain activity, or not a relevant entity in the first instance. Those who hold that consciousness is a result of brain activity can be grossly divided in the group that holds that consciousness has no further causal relevance, epiphenomenalists. Consciousness would then be only an epiphenomenon of a complex organization of the neural system (J. Kim, 2005; Rudd, 2000). Some hold that it would not even have to be a neuronal system; it might be a complex array of silica chips, beer bottles or whatever is capable of coding binary information (Fodor & Pylyshyn, 1988; Putnam, 1975). Others allow some causal efficacy to consciousness (Metzinger, 2003; Searle, 1992). But the common denominator, and very often implicit and not even spelled out formally, is quite frequently that consciousness is the *result* of brain activity. We will come back to this in later sections. Suffice it here to state that in many instances this belief has the status of an unexamined background assumption that is held to be self-evident in the same way as Amazonian Indians find it obvious that there are spirits and experiential contacts with those spirits.

A consequence of such an assumption is that whatever our consciousness is capable of in terms of perception, imagination and internal states of emotion, introspection or mental content falls into one of two categories: either it is referring to something real that is out there, in the world that is perceived as distant and separated by the Cartesian cut, as in perceptions. Or it is something that is not referring to an element of the outside world, but to some internal state, as in imagining an apple I would like to eat as opposed to seeing an apple on the table which I am going to grab in a second and eat. Those internal states can be very rich, as our dream life, our imaginary world, our day dreaming testify.

However, the consequence of these assumptions is that such an internal state has no relevance to the knowledge we have of our world. Technically speaking: the assumption that consciousness is a purely brain-derived activity precludes any introspective knowledge that reaches beyond the cognitive system. We can, of course, use introspection to understand why we are currently angry, or to discern whether we are currently hungry, thirsty or tired. We can introspect to understand the power of our desires, and so forth. And in that sense psychological research relies mainly on introspection (Boring, 1953). In each and every case we only learn something about ourselves exclusively, but not about the world "out there" without having had prior sense experience of it.

On such an assumption there should be no way of knowing how two locally distant plants in the Amazonas region should come together to form the ritual beverage of Ayahuasca except for diligent pharmacological screening through empirical methods or by sheer chance. On such an assumption internal states and introspective knowledge gained in such ritual Ayahuasca sessions should also be irrelevant. For what, except the neuronal system's own internal states, can be the basis of such experiences? All introspective knowledge that is not about one's own internal state – such as emotions, feelings, intentions, thoughts – but refers to some reality outside or beyond oneself is impossible. Hence no spiritual experiences and insights can be of any real value in such a system of materialist assumptions. And introspective ways of knowing have no relevance over and beyond the psychological exploration of internal states.

The important point here is, once again: these absolute presuppositions, background assumptions or world hypotheses (Pepper, 1942) are not themselves the result of rational processes of

generating evidence and discourse. They are rather assumed to be true, because social processes, mainly social psychological processes of consensus finding, group psychology and belonging exert their influence (Fleck, 1979; Shadish & Fuller, 1994). We are, after all, social beings who want to belong, be accepted and valued. So we subscribe to the values and rules of the group we want to belong to. The rules and values of the scientific community are its currently active background assumptions, among others. So whoever wants to belong is trained into understanding them and subscribing to them, as Fleck has pointed out.

They have nothing to do with right or wrong, true or false. They are working assumptions that have come to be adopted, because they have proven useful for some purposes. For instance, the materialist background assumptions have proved useful in developing physics and chemistry, biology and biochemistry, medicine and to some extent even psychology. Without them we might still assume some difficult to prove entities at work such as phlogiston or vital forces. Perhaps vital forces exist, only we don't know. But the decision to work without reference to such hidden forces has given science some clarity in developing simpler models and enabled it to arrive at important insights about genetics, epigenetics, biochemistry and other fields.

Ockham's Razor or Parsimony

Another important regulative principle is at work here. It is dubbed "Ockham's Razor", after the medieval Franciscan philosopher and theologian William of Ockham (ca. 1288-1347). Few who wield this razor to free science from supposedly unscientific concepts appreciate that William of Ockham himself never gave a clear rationale for it, except that it is "obvious". It reads in its original "*quia pluralitas non est ponenda sine necessitate* – for a plurality [of entities] should not be posited without necessity" (Ockham, 1982, p. 59). He used it to argue against the theory of perception and mind, derived from Aristotle, that was prevalent during his time, held by Thomas Aquinas and Duns Scotus and others. There, every act of perception was an act that abstracted some simulacrum, a "species", from a percept, and another one from the mental images, and so forth, until the mind had reached a clear concept or percept (Oeser, 1969).

Ockham attacked this in order to safeguard immediate, intuitive knowledge, of one's own inner states, and of course in order to have direct and immediate access to one's God in the heart's innermost perception (Day, 1947; McCord Adams, 1970). Ironically, by his sceptical attack with the aim of securing the almighty power of God and the soul's direct access to Him, he paved the way for the scientific enterprise and the eventual demise of this God, but this is a historical aside. The methodological principle has remained and is often referred to as the principle of parsimony. It stipulates that we should not invent entities or theoretical concepts if we can achieve the same goal of explanation and understanding with fewer concepts and entities.

While this is certainly a good regulatory principle, it can also overshoot if it is used to curtail phenomenology in the service of ideology, and as such it is often used. It is important to understand the role of this principle: it is a regulatory methodological axiom and not a scientific law. It has to be viewed within its purview and limits. And it should be suspended when phenomenology demands that we save the richness of experience against the reductionist impulse. The Platonic tradition called this the "saving of the phenomena". We have dubbed this complementary principle "Plato's lifeboat", in honour of this tradition (Walach & Schmidt, 2005). Originally it meant that astronomical theory should be complex enough to be able to incorporate all the empirical evidence of astronomical observations. Out of this arose the complex Ptolemaic system of antique astronomy, which fitted the data better than the simpler model of Aristarchos of Samos that posited the sun in the centre and the planets, including the earth, revolving in circles. This is the model that was revived 1700 years later by Copernicus. Thus, in astronomy, "saving the phenomena" or "Plato's lifeboat" trumped Ockham's razor for a long time.

In an extrapolated sense this principle means that we should not foreclose our debate and judgment of phenomena in favour of a more parsimonious model if the application of the more parsimonious model neglects important aspects of the phenomenology. We will come back to this complementarity between parsimony and phenomenological fidelity when we discuss near death experiences.

The Dominance of Binary Logic and the Analytical Strategy

Theoretical analysis, but also the generic style of Western scientific thinking uses binary logic. That is a type of logic and a way of thinking

William James (1842-1910)

that relies on Aristotle's insight that something is either the case or not, simply put. Either it is raining, or it isn't. Either an observation is true, or it isn't. Either the simplest element in the periodic system of chemical elements is hydrogen or it isn't. Either quarks are the final constituents of matter or they aren't. Aristotle's seminal insight has been named in various ways, the sentence of contradiction, or of the excluded middle. In his "Metaphysics" Aristotle introduces the principle in the following way: something cannot, in the same way, at the same place and at the same time be and not be (Aristotle, 1960). This turned out to be a heavyweight principle, as it started to become the hub of predicative logic, the logic that deals with sentences. Also, it is important to note: Aristotle was quite clear that this principle, and all other principles of logic which he introduced in his Organon (Aristoteles, 1990) only apply to *sentences*, and not to *reality* as such. That is to say: if we are formulating statements that express something we want to say about this world, then logic and the principle of contradiction applies to these sentences.

We have made the grave mistake, culturally speaking, that we now apply this structure of binary logic to reality as such, because we fail to see that our sentences, our statements about our experience and observations determine the structure we are able to see and express. This results in a severe impoverishment of our world. It is as if the world started to become only what we are able to say about it in terms of scientific logic (Wittgenstein, 1980). But it is of course much more. Love may be a rush of endogeneous opioids, oxytocin and the hectic activity of some brain centres. But it is of course much more, phenomenologically and experientially speaking, as everyone knows who has been or is in love.

Iain McGilchrist has built up a strong argument about the seemingly unassailable logical grasp our rationality has on the world in his magisterial "The Master and His Emissary" (McGilchrist, 2009). He integrates the neuroscientific knowledge about the differentiation of our brain hemispheres and their different operative modes with cultural and philosophical argument. Abridged and simplified, this is the argument: our left hemisphere – this is for right handed people – is normally the dominant one which is the one capable of language, denoting things and concepts with words, operating in a sequential and logical mode, and hence also provides the sort of activities that are necessary for scientific understanding. Put differently, our scientific understanding makes use of our capability to analyse the world logically and causally, denote things and concepts and formulate sentences and statements about our world. Here, the left hemisphere is mainly active and dominant. Our whole cultural development, mainly over the last 400 years, our education system and the way our societies operate has led to an ever greater dominance of this logical-analytical language and denomination system of the left hemisphere, or very bluntly put, has led to a left-hemispheric dominance in our Western cultures.

The important point McGilchrist makes, is, however, that this is only part of reality and half of the truth. For the more important activity comes from the right hemisphere, which, in right handed people, is the non-dominant one. Its task is mainly pattern analysis, the deep connection of experienced events with past events and different episodes. It is also important for meaningful connections between events and things with our sense of self. This is the reason why this mode of operation is very important for meaning-making, for our sense of who we are, what we want to achieve and how our environment is part of this. This right hemispheric mode is important for the realisation and appreciation of beauty and aesthetics, as well as other types of experience. In shorthand notation one could say the right hemisphere is our experiential mode.

It is highly active in all activities of art, like making music, painting and other forms of creative expression. When we have a "hunch" or a kind of intuitive insight about a situation or a person, then neurobiologically we draw on a lot of implicit information, experiences and memories that we are unable to name or consciously express, because they are largely processed by the right hemisphere. This right hemisphere has no language in the usual sense, but its mode of expression is rather like music, singing, dancing, rhythm and patterns. This is why it has to present the results of its analysis to the left hemisphere which then applies its capability of naming and analysing to it. So the "hunch" receives a label, for instance "I am probably not talking to this person, I do not like him", without being able to give a reason why. Children, in whom the balance between the two hemispheres is normally much more even and who often operate with a right-hemisphere dominance react like this. When probed why they do not want to shake hands with a stranger or why they are running away they give fake reasons because they cannot really name what has prompted them to act.

Speaking in evolutionary terms this pattern analytical capability of the right hemisphere and

relating the experience to the concept of our world and its meanings is extremely important, because it relates distinct and quite separate elements of experience with our concept of self and thus is a repository both for intuitive knowledge and creative invention and action. The upside of its widely networking mode of operation is that it is very fast and reliable. It is an important source of meaning. The downside is that we cannot explicate why we have this or that impulse, for instance not wanting to have anything to do with a certain person. This right hemispheric activity and result we often express as "gut feeling", because, phenomenologically speaking, it seems to come from "deep down", as it does: it comes from the depth and wealth of our experience, and it summarises all we have learned and know about the world and relates this to our own sense of self. Only, we do not have a name for this. But we often have images for it. For the right hemisphere operates in images and metaphors.

Because the right hemisphere is quick yet speechless, holistic in analysis yet unable to express the results in a concept, except in images, our left hemisphere is necessary for translating the results of this analysis into language and concepts. In that sense the right hemisphere is the master – as McGilchrist's title suggests - because it is more efficient and in terms of survival more important, and the left hemisphere is the emissary, the speaker and interpreter. We see an archetypal image in Moses and Aaron. Moses receives the task of leading the people. But he is unable to speak, he says, so Aaron is appointed the spokesperson. Moses is the one who experiences, Aaron is the one who talks. It is similar with our brain hemispheres, roughly speaking. In truth and reality, of course, we see a rapid and continuous exchange of information between the hemispheres, and there is hardly anything we do that is just relegated to one hemisphere. But by and large the division of labour described is a robust finding of neuropsychology.

What has happened, culturally speaking, McGilchrist demonstrates, is that the master has been dominated by his emissary, that the left hemisphere has taken over the leading role. An old oriental story illustrates this:

An emir was very fond of good food and so had a very good cook. And because the cook was so good and served him always fresh and delicious food, the emir wanted to honour the cook and allowed him a wish. The cook said he wanted to be emir just for one day of his life. The emir granted the wish. As soon as the cook had been enthroned as emir for the day, he gave order to take the real emir prisoner and decapitate him, and henceforth he himself was the emir.

This, McGilchrist holds, has happened on a grand scale culturally in our Western cultures over the last centuries. Our right-brain mode has been sidelined in favour of our left-brain mode of logical analysis and verbal denomination. Our unconscious, meaning making, imaginary style of thinking and analysis, our experiential mode has fallen out of favour with our culture. Our schooling system emphasises the left-brain modality; subjects that support our right-brain modality, such as music, playing, art, drawing and painting, poetry and creative subjects, have been reduced in curricula of our schools in favour of others that support logical analysis.

The scientistic world model we find fault with is a direct result of this cultural domination of our left-brain activity. This is not necessarily the result of science as such. For any good scientific activity needs a lot of right brain activity: good imagination, good intuitive instinct what type of research might be fruitful, good pattern recognition capability, and a lot of crazy ideas, all of which are not part and parcel of the arsenal of the left hemisphere. If one reads the biographies of great scientists we often find that other types of activities, music or art especially, played a big role in their lives. Einstein is reported to have withdrawn for hours to play his violin, when he was unable to find a solution to a problem, especially during the days when he was working on his relativity theory (Brian, 1996). Consequently, the discovery of relativity theory is not the result of analytical logical analysis, although this certainly played an important part as well, but of a holistic-imaginative grasp of reality. On p. 61 of Brian's (1996) biography of Einstein we read: "*Banesh Hoffmann confirmed this account: "Einstein said his basic discovery came on waking up one morning, when he suddenly saw the idea. This had been going around and around at the back of his mind for years, and suddenly it wanted to thrust itself forward into his conscious mind... Einstein ... said: 'Ideas come from God.' Now he didn't believe in a personal God or anything like that. This was his metaphorical way of speaking. You cannot command the idea to come, it will come when it's good and ready. He put it in those terms: 'Ideas come from God'*".

This is a good description of the holistic grasp that is a sign of right-brain activity. Note how images and metaphors are employed here to describe the phenomenon of sudden insight. Culturally speaking we can observe whole movements that try to

save this experiential, holistic, right-brain mode of operation. Their hallmark is an anti-logical, anti-scientific stance with statements that the world is more than science can think of, often bolstered with Shakespeare's famous sentence that Hamlet speaks "The world is more than is dreamt of in your philosophy, Horatio", when Hamlet is referring to the appearance of his murdered father's ghost, his intuition of the murder and the demand of vengeance, all of which are an expression of right-brain activity.

We can find such counter-cultural movements in psychology, where the human potential and humanistic psychology movement of the 60s and 70s, the transpersonal psychology movement that grew out of it of the 80s and 90s tried to counterbalance an over-simplistic and scientifically narrow view of the human being (Adams, 2006; Daniels, 2005; Grof, 2008; Hartelius, Caplan, & Rardin, 2007; Walach, 2013). We can see such counter-movements in fundamentalist religious groups that ignore hard scientific evidence in favour of some very vague inner conviction that they have a truer access to reality, very often paired with a highly experiential mode of religious expression, with dancing, singing, shaking and other hypnoid group rituals. And we can see counter-balancing weights in escapist behaviours of the exponents and subjects of the left-brain dominant culture: rave parties with drugs and mind-numbing music and dancing. This is not to make any moral judgment but to observe how one-sidedness in one pocket of our culture entails the counter or balancing move in some other area.

We can also see the counter movements in complementary and alternative medicine. Here the analytical, dissecting and logically-causal and mechanistic mode of operation of conventional biomedicine is countered by treatment modalities that promise a more "holistic", "intuitive", "energetic", balancing approach that do not intervene but stimulate the organism into self-healing (Boon et al., 2006; Hammerschlag et al., 2015; Koithan, Bell, Niemeyer, & Pincus, 2012; Pincus & Walach, 2012; Verhoef, Vanderheyden, & Fonnebo, 2006). The therapeutic options are often accused of being little more than placebo, and yet they work quite well in practice. This is likely so because they serve the need to stimulate the right brain's holistic, experiential and meaning making function or answer a need for more intuitive-holistic experience in people's lives. Interestingly, some imaging studies found indeed that activity in right hemisphere nucleus accumbens activation, which is part of the dopaminergic reward system of the brain, was the strongest predictor for placebo-analgesia (Scott et al., 2008), or strong, but not exclusive, involvement of right hemisphere centres in successful placebo analgesia (Wager, Atlas, Leotti, & Rilling, 2011).

Following McGilchrist's argument, the scientistic world model is an expression of this over-dominance of left-brain activity and logical-sequential, algorithmic processing. I repeat: this is not to minimise or ridicule this activity. We need it and we have reasons to be grateful for because of it. But if it becomes the dominant mode, if the emissary dominates his master, if the cook murders the emir, then the balance is tilted too much into one direction with negative consequences. For it is then that other experiential content, phenomenology and data that are otherwise obvious are ignored, like the heartbeat was ignored before Harvey.

And this dominance of the left-brain working modality of our intellect does a disservice to mankind because it excludes a lot of information. If this sequential-logical algorithmic mode becomes overactive in an individual, this leads to mental illness, for instance schizophrenia, which is characterised by a left-hemispheric over-activity (Hains & Arnsten, 2008), and, phenomenologically speaking, by an over-activity of language-processes which are then heard continuously. Indeed, it is interesting to observe that while melancholia seems to have been a constant companion of humankind through cultures and the ages, schizophrenia is a relatively recent phenomenon that seems to have appeared roughly with industrialisation, the disruption of social relationships accompanying it, and perhaps the typical intellectual stance that is presupposed (Jablensky, 1986; McGilchrist, 2009).

But even below overt mental illness an imbalance between the activities of the two hemispheres leads to a lack of meaning. The activity of the right hemisphere results in deep connection of events, experiences and autobiographical, self-related memories and hence constitutes, among others, a meaning-making system. This has also been observed quite independently from McGilchrist by Julius Kuhl in Germany (Kuhl, 2000a, 2000b, 2001). If this system is dominated by the left hemisphere's logical, algorithmic appraisal, a system which Kuhl aptly calls a slow, sequential, algorithmic mistake-control and avoiding system, then the meaning-making system is reciprocally down-regulated. The result is depressed mood and lowered affect. Thus, the crisis in meaning which can be observed on a larger societal scale seems to have some relationship with the dominance of this left-brain

mode activity, which is socially sanctioned and wrongly assumed to be the only expression of rationality. In fact, it isn't. It is just the expression of one *type* of rationality and of a sub-routine of a rational approach to the world, which, when it becomes too dominant, leads to a withering of richness, meaning and human flourishing.

Part of this left-brain mode of functioning and the method of this sequential system is the analytical method. Analysis is a consequence of the atomistic approach in general (Whyte, 1961) that seeks out ever smaller constituents of a whole. It was also successfully employed by Plato in Socratic dialectics, which takes apart complex concepts into manageable smaller bits (Beierwaltes, 1972; Cornford, 1960). As such the analytical strategy is a very helpful tool, because it helps dismantle complex problems into their constituents and deal with each of them separately. It is similar to a well-known military strategy: if the enemy is too powerful, try to get him to separate his forces into smaller bits and then deal with them one by one. And perhaps the military strategy of "divide and conquer – *divide et impera*" and the analytical-dialectical strategy of taking concepts apart into constituent pieces are results of the same mode of mental functioning. It helped William Wallace and the Scottish forces to overcome the English army at the Battle of Stirling Bridge in 1297, where they let part of the forces funnel over the bridge, then cut them off and kept the rest of the army at bay, while killing the ones that had crossed (https://en.wikipedia.org/wiki/Battle_of_Stirling_Bridge). It was employed many times by successful strategists and was standard operating procedure of the Roman army (S. James, 2011; Sidebottom, 2004).

The counter strategy was employed, whenever seemingly weaker forces massed together to beat an obviously stronger enemy, such as when the Roman bred German noble Arminius, who knew the Roman strategy, convened many tribes into one league to beat the Roman legion which had to stretch out on a march between hills and a bog and hence could be divided up in the battle that is traditionally called the battle in the Teutonic Forest, but had happened near the village of Kalkriese in Northern Germany (http://www.kalkriese-varusschlacht.de/museum/veranstaltungen/forum-kalkriese/). Hannibal employed this strategy, when he crossed the Alps with a comparatively small contingent, but then collected the Celtic tribes in Northern Italy and other groups along the way to form a huge army that killed more Roman legionaries than any other and was the severest threat to Roman autonomy that Rome had ever seen (Seibert, 1993).

Thus, the analytical and the holistic strategy, dividing up complex problems and putting together seemingly disparate elements are likely not only military strategies, but are famous military strategies, because they are supported by two complementary modes of intellectual strategies based on a division of labour in our brain, the left-brain and right-brain mode. I beg knowledgeable readers to forgive the coarseness in this representation. It goes without saying, of course, that in real life there is no left brain activity that is not also heavily supported by right brain activity and vice versa. But the dominance of modes seems to be a valid abstraction, which we use here.

The analytical mode needs the support and the complementarity of the holistic mode, otherwise we end up with a lot of single pieces and lose sight of their cooperative synergy. A purely holistic mode is not helpful either, because then we don't understand the actual working principles behind a complex system. Thus, the two modes should always go together and should be employed differentially, depending on what the problem is and what one wants to know. If the problem is to understand how something really complex functions, we need to employ analytical strategies, taking it apart until we find constituent elements or basic, solvable problems. This is how science has mainly operated. It has taken matter, for instance, and asked the question: what is it constituted of? And we have arrived at marvellous knowledge about atomic and subatomic particles, the forces that hold them together and the principles that are employed when they bind together to form more complex entities such as atoms and molecules.

Or we have asked about the nature and essence of life, and have taken cells apart and their regulating principles, arriving at bio-molecules such as DNA, transmitters and their receptors, principles of genetic coding and so forth. It is now quite complicated to understand how it all hangs together, as those principles that govern the interactions of the parts or holistic coordination cannot be found in the constituents themselves, but are rather overarching regulation rules that can only be deduced and modelled once larger elements and their coordinated behaviour are the object of study.

For instance, gene regulation turned out to be not a simple 1:1 transcription process but under multiple controls that can only be understood once the full genome is taken into account and epigenetic processes as well that describe how the environment interacts with the genome (Bayarsaihan, 2011; Levin, 2014; G. E. Robinson,

2004; G. E. Robinson, Fernald, & Clayton, 2008). And this environment-genome interaction is in essence the result of the behaviour of an organism. In humans it is the result of lifestyle decisions, of environmental and climatic factors, what we eat, for instance, how we sleep and how long, what we drink, how solid our relationships are, whether we suffer from work stress, and so on (Buric, Farias, Jong, Mee, & Brazil, 2017; Hoffmann & Spengler, 2012; Labonte & Turecki, 2010; Lin, Epel, & Blackburn, 2012; Weaver, 2004). Thus, we see how a holistic principle comes into play and has to complement the analytical strategy, or else we do not understand the meaning of the single elements. For it is only once we take the whole behaviour of a living system into account, its full immersion into its environment with all its interactions that the single genetic elements and their expression or silence make sense.

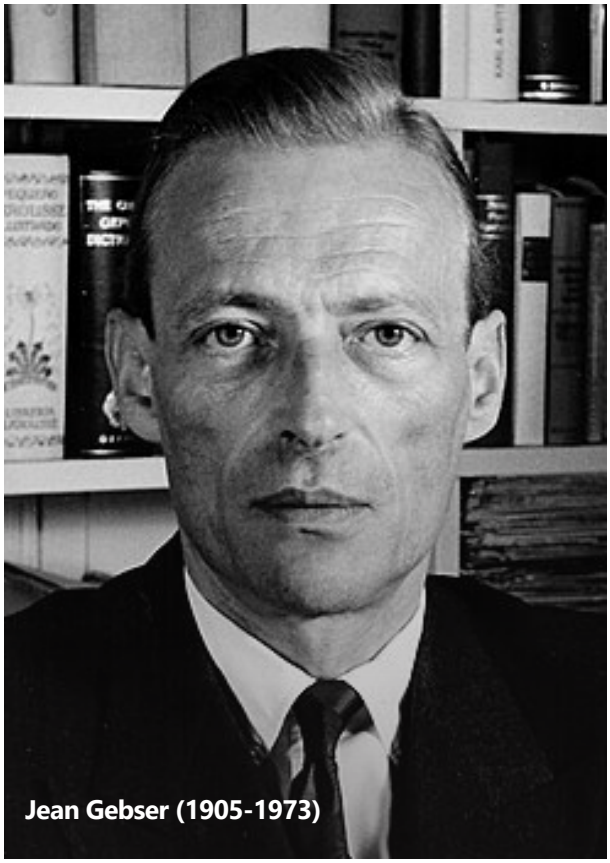
Binary logic and analytical strategy belong together. The same system and the same operation that takes complex pieces apart and categorises them also has to name them unequivocally. Either this is a basic element, or it isn't. If not, take it apart further. The analytical strategy does not work without binary logic, and binary logic is a methodological-linguistic expression of the analytical mode at work.

Our diagnosis and critique is that currently, and with a dominance of the scientistic mindset, the analytical strategy and the modality of binary logic are emphasised and valued more than is their due. That is not to say, I repeat, that they are without value or can be neglected. Not at all. Both are very valuable strategies, have served us well up to a point. It is with the overemphasis and the neglect of the complementary strategy of holistic synthesis that the problems arise. This we bemoan and wish to see remedied.

We suspect that what is needed at this point is a double move: We need to correct the imbalance between logical-analytical-language associated rationality and holistic-synthetic-experiential-imaginative rationality on an individual, social and educational level. On an individual level methods of correction addressing the imbalance consist in all activities that emphasize the counterweight: art and music, poetry, painting and rhythm, meditation and a culture of consciousness. Interestingly, a meta-analysis of all studies that used magnetic resonance imaging (MRI) of the brain in experienced meditators versus matched controls (cross-sectional) or novices starting to learn meditation versus their controls (longitudinal) showed an increase in white-matter thickness, i.e.

R.G. Collingwood FBA (1889-1943)

better connectivity, in the corpus callosum, the strong fibre bundle that connects the left and the right hemispheres and is important for reciprocal deactivation and exchange of information between the hemispheres, thus hinting at a better balance (Fox et al., 2014).



Jean Gebser (1905-1973)

Gebser's Cultural Anthropology

Another way of addressing this issue is by drawing on Jean Gebser's cultural anthropology (Gebser, 1985). In his massive work Gebser discerns five stages of the cultural – phylogenetic and ontogenetic – development of consciousness, i.e. across the ages through time, and within each individual's developmental trajectory. Not all of them will always be found and the abstraction into five stages will not always coincide with all the temporal evidence, and as Gebser admits there will be progressive and regressive developments. But by and large, Gebser postulates five stages of development of human consciousness. The first stage he calls "archaic" consciousness, about which we have very little evidence and knowledge. He assumes that this is the consciousness of complete unity with nature, as very early hominids may have experienced, or animals even may still have. The early experience of a foetus or a very young baby might be an example. This is followed by a "magical" consciousness, where a differentiation of consciousness from nature is observed for the first time. Magical rituals that are meant to dominate nature testify to the double nature of this consciousness: on the one hand it is only possible if there is still a sense of universal connectedness, on the other hand it presupposes some sort of consciousness as different from nature. Gebser thinks that the subject of this kind of consciousness is not the individual I, but the group ego. This type of consciousness Gebser supposes to have been the working mode of consciousness of ancient people and of those people that still follow a neolithic kind of lifestyle, such as some tribes in Australia, Amazonia or Africa.

This stage is followed by "mythical" consciousness. The prime example can be found in the heroes of Homer, Achilles and Odysseus. The beginning of the Iliad, the epic that describes the Trojan wars, begins with the words: "menin aeide thea… The wrath sing o Goddess…", the wrath, of course, is the wrath of Achilles who has been slighted by Agamemnon and now he lets the Greeks fight their own battle. The Greek accusative "men-in" is derived from the same Indogermanic root that yields, in Latin, the word "mens – mind", Gebser observes, and hence gives a hint as to the stage of consciousness. It is an emotional consciousness. The heroes of the epic tales are individuals that are described in their own individual typicality, but they are not reflecting individuals. They are individuals driven by affect and emotion. Agamemnon is driven by his vindictiveness for his robbed wife, others by glory and power, and so forth. Achilles is driven by his wrath and later by his anger about the death of his friend Patroklos.

The Odyssey, the travels of Odysseus, Gebser sees as an image of the path of consciousness to itself, following Neumann (Neumann, 1968). It has to fight against the Gods and the powers of Nature in order to remain whole and find its home. When Odysseus meets Nausikaa, which is the beginning of his final salvation and homecoming, he steps forth with the words: Eim' Odysseus…I am Odysseus, for the first time using the first-person singular pronoun "I", indicating that here the individual steps forward. The mythical consciousness is a type of consciousness, where the fight against Nature and the inner demons of overwhelming affect and emotions still dominates, but the I has emerged from the background of immersion in nature and has put behind the group as the dominant structure.

This development is culminating in what Gebser calls the "mental" consciousness, which starts with the classical Greek period. Here, reflective thinking is taking its starting point, self-reflexive thoughts about the human being and its role in the world, including ideas about the coming and going of things, the goal of a human life, its role in the cosmic story, the role and power of Gods, or whether there might not be any in the first place, what the regulative principles of the world and human social life are. In art we find, for the first time, perspective, which we can glean from ancient descriptions and from the rest of Roman wall paintings that were crafted by Greek artists. Perspective is only possible for a mental stance that creates a distance between the observer and the observed, between subject and object (Panofsky, 1960). And thus, the mental consciousness is at the same time the consciousness that differentiates between the human consciousness and everything else, especially the world and its surroundings. Gebser used a large number of cultural examples to make his point, including artistic and philosophical ideas. This mental consciousness is also associated with the rise of a certain stance of the human mind in the face of nature and the world, and eventually gives rise to scientific reasoning, which is the prime expression of the mental type of consciousness.

Every transitional period also shows signs of regress, the re-enactment of older layers of consciousness, Gebser maintains. He diagnoses our time as a transitional time in which a new type of consciousness which is not even clearly describable, as it has not yet fully emerged, is arising. This he calls "integral" consciousness, because, he assumes, it will integrate earlier types of consciousness, have them consciously available as needed and hence have a fuller grasp of the world and of ourselves as actors in the world. The hallmarks of this integral consciousness he sees arising in art: in paintings, for instance, that transcend perspective, such as cubistic paintings where different perspectives are present in one, or in Picasso's light art, where he painted with a torch in darkness a flower that can only be seen in an overexposed photograph, thus transcending time. He saw integral consciousness at work in quantum theory, where complementary concepts were necessary to describe reality, and in fact he had a wide exchange of letters with the founding fathers of quantum theory, from which he quotes extensively in his appendix. Thus, Gebser assumes that a new type of rationality is slowly emerging, probably similar to other transition periods over many generations. Some, such as artists with foresight or scientists with a genial grasp of reality, have already presented glimpses. He also calls this integral structure of consciousness a-perspectival, because it contains all sorts of perspectives in one, and a-categorical, because it transcends categories and categorising. An independent diagnosis similarly calls our times a time of transition and a second Axial Age (Elgin, 2009).

To bring this discussion to an end: our current, prevalent scientistic mindset is heavily mentally biased, to use Gebser's language. It overemphasises the distant, analysing stance. It loses thereby other approaches and a holistic viewpoint. What is required is a more integral type of consciousness. We have offered the image of balancing analytical with holistic strategies, left-brain with right-brain activities. In Gebser's language it would be an integral type of consciousness that is needed. In such a consciousness more ancient types of cognition are all available, but in a more conscious mode. Thus, the unity of archaic consciousness can be experienced consciously, and the connection with Nature that is at the base of the magical consciousness, and the emotional-affective struggle, as well as the rational-analytical mode of mental consciousness. They all can be consciously employed and can become integrated.

Such ideas about an integrated and integral type of consciousness have been voiced in parallel by others, like Sri Aurobindo, Vivekananda (MacPhail, 2013, 2017) and in their wake by Wilber (Wilber, 2000). It is often ridiculed, because it is misunderstood as something anti-scientific and anti-rational. We think it is important to realise that it is nothing of this kind. It is a call for a more encompassing type of rationality that enlarges our vista and our methodology and will in the end not lead to a scientific apocalypse, but to an enhancement of scientific activity, because the analytical, compartmentalising mode of thinking will be supported and complemented by a more inclusive-holistic one.

The Problem of Values and the Foundation of Morality

Until a few generations ago morality, ethics and values were guaranteed by the adherence of the majority to some religious teachings and the inherent morality of religion. Ethics is thereby the larger, overarching concept. Morality is how the code of ethics is spelled out and values are the modal units that underpin morality, at least this is the way these notions shall be used here. Whether the way religions grant morality is useful or not

is another question, but grant they do morality and ethics. There is no religious teaching without such an ethical code and in essence they are remarkably similar, which suggests that there are moral absolutes that religious teachings were able to translate.

The beginning of the scientific age saw a conventialist approach to ethics: Thomas Hobbes with his political theory and probably the first explicitly naturalistic-materialist philosophy of the age of science (Burtt, 1932), famously derived the power of sovereigns from the necessity to curb the potential fights between people and channel their energy into peaceful means. He saw a necessity of explicit political negotiation to guarantee morals and sustain values. Kant famously postulated a transcendent moral principle that would guarantee morals, but saw that it cannot be rationally or empirically derived but needs to be presupposed. He thought that the Golden Rule that is at the core of biblical moral teaching as well as that of other cultures would be able to guarantee morality. It states that – in positive form – we should act towards others, as we would have them act towards us, or – in negative form, sometimes called the Silver Rule – that we should avoid acts that we would hate others to perpetrate towards us.

At first sight this sounds reasonable and sufficient. But a little analysis will reveal that it is not quite sufficient. If my moral compass allows me to steal from someone else, for instance their car, because I happen to think no one should own a car but all cars just sit around for the use of anybody in need, tanks full and ignition keys left dangling, that does not make such an act morally justifiable. Or if someone from a monogamous culture happens to encounter someone from a polygamous culture there is bound to be trouble, if the polygamous person fancies the other's partner not understanding the trouble the monogamous person might encounter.

Thus, ethics, moral and values need somehow to be ascertained and underpinned. In close-knit

Susan Stebbing (1885-1943)

cultures with little exchange between surrounding groups and cultures it is comparatively easy to uphold a certain code of conduct by sanctioning transgressions within the social group, as is still often the case in some atavistic and remote cultures. But in a time of global exchange of people and ideas this is no longer viable. So how to negotiate what moral codes are valid? Observing the political arena one can see that quite a few problems that cannot be solved at the level of the United Nations' Security Council stem from the fact that different moral presuppositions are made. While Western countries often start implicitly with their prioritising the individual, his or her dignity and rights, other countries such as China or other Eastern countries start from the assumption that the collective – the group, the nation, the family, the state, a tribe – is the principal moral subject and the rights of individuals are secondary. How is such a fundamental conflict to be resolved?

We can of course fall back on political negotiation and consensus seeking. This might even work for a lot of problems. But then ethics and morals are considered commodities like the price of sugar or the border between two countries, all of which are pretty much contingent and open to market forces or political discussions. What if some political group should start to deny certain values or ethical principles that we today still uphold? For instance, the right of old people to live and die in dignity. What if at some future time political argument will shift, under pressure of economical necessity, towards deciding that everyone has only a right to live until and as long his or her financial resources sustain them, or else they get euthanised? The dreadful practices in Nazi-Germany show that it is possible to install such a programme at least at a national level without much resistance. It is not far-fetched to assume that with broad consensus it would also be possible to install something similar world-wide. Is there a moral absolute that would prevent this? And if so, how do we attain it?

These thought experiments have one simple goal: to show that consensus is no basis for ethics and morality and it cannot guarantee values. Science, as it is currently conceived, has nothing to say in that area either. Scientistic programs such as Pinker's (2018) base their discussion of ethics and morals on the Golden Rule and a somewhat naïve concept of enlightenment: once all agree on a naturalistic worldview this also entails the understanding of mutual flourishing and the liberty and tolerance to allow others their understanding of flourishing. Every neighbourhood quarrel that is carried to local courts, about the duration of night time parties, frequency of grill evenings, height of fences and number of cats in a house show this is not realistic, as people's understanding of flourishing, even in quite similar cultures, can widely diverge.

Values and morality do not occur in the natural world and hence cannot be studied scientifically with known methods of empirical and experimental science. Of course, we can study with empirical methods how people construct values and norms, what it does for them, how they change, and we can even develop evolutionary theories of values (Abele & Wojciszke, 2014; Bowles, 2009; Melis, Hare, & Tomasello, 2006; Norenzayan & Shariff, 2008). But this does not define, which values and moral norm are "right" and adequate, but describes at the most a current state of affairs. Science, defining itself as knowledge inquiry, has nothing to say to them. Maxwell (Maxwell, 1984, 2004, 2017) saw clearly that science is neglecting the most important question, namely how to arrive at knowledge that is worthwhile. He suggests, in his wisdom inquiry, that first of all a consensus about what is valuable and worthwhile should be found and then scientific methods used to ascertain those goals. This is a very innovative, creative and exciting concept of science. But it would also presuppose a process whereby what is valuable is discovered in the first place. Science, as it is currently conceived, has no means of doing this.

Thus a scientistic framing of our world would in fact be unable to guarantee morality and ethics other than through consensus finding and political processes. Currently, we are still living off our moral capital from the times when the social consensus was that the values and ethics from our Hellenistic-Christian (or Jewish) heritage are still worthwhile, even though the religious teachings might not be meaningful any longer for many. But what happens in a few generations? Living off capital only lasts for a finite amount of time. Then the sudden loss will strike us bitterly.

Whether a broadened concept of science as we have in mind would be of help is another question. But it is certainly worthwhile exploring. It would start from the assumption that values are similar to meaning in the individual case, inner structures of our world, i.e. moral absolutes that can be discovered. But the mode of discovery is not the mode of observing the world form outside, but the mode of contemplation or systematic introspection (Sedlmeier & Kunchapudi, 2016).

5 THE LIMITATIONS OF THE CURRENT BACKGROUND ASSUMPTIONS

We have already pointed out in the previous section that current background assumptions are limiting. We will revisit this now and point out in more detailed descriptions what is limiting, what is missing and what is wrong.

The Limitation of the Materialist Background Assumption

It was good, even necessary, that science started focusing on the material basis of our world at the beginning of the scientific revolution. Understanding astronomy, the motion of bodies on earth and in space, and the discovery of gravitation as a unifying principle by Newton, the ensuing richness of scientific discoveries to our day, all this speaks for the fruitfulness of the scientific thrust. But focusing on matter and analysing its constituents, understanding the laws under which material objects move and develop is different from materialism as a worldview. In fact, as has been pointed out many times, none of the pioneers of the scientific revolution who laid the foundation for science were themselves materialists (Buckley, 1987; Burtt, 1932; B. Lightman, 1987; Principe, 1998, 2011). While agnosticism became a viable position of intellectuals during Victorian times, this steered a middle ground between religious faith and materialism (Huxley, 1892; B. Lightman, 1987; A. Sommer, 2018), and to the agnostic intellectuals of the 19th century materialism was as crude and untenable as blind faith in religious creeds. The modern foundation myth of scientism that a scientific stance entails atheism and a struggle between enlightened scientific knowledge and backward religion is not only factually wrong, it is also cheap (Principe, 2016; J. K. A. Smith, 2016). Historical research has shown that the development of science and the rise of atheism and materialism as a viable background philosophy are two rather independent developments (Brooke, 2009; Buckley, 1987; Davis, 2009; Taylor, 2007).

It is true that the first self-proclaimed atheists in modern history were closely associated with enlightenment and scientific ideas, like Hobbes, Diderot and D'Holbach. Earlier forefathers often mentioned, like Epicurus and Lucretius were no atheists (Buckley, 1987; Taylor, 2007). For instance, Diogenes Laertius, the late-antique biographer, quotes a letter of Epicurus, where Epicurus says: "*take God to be an imperishable, happy being… and do not attribute anything to him that contradicts his permanence or happiness… For Gods are existent; knowledge about them is evident. But like the masses think, they are not…. Godless is not, who destroys the Gods of the masses, but who transfers the views of the masses onto the Gods…*" (Laertius, 1998, p. 124f)

It is also true that for some, science became the new religion or took a similar function. This can be seen in a classical quote from Voltaire. He had the physicist Maupertuis explain Newton's physics to him and wrote him an enthusiastic letter afterwards (Hamberger & Pietschmann, 2015). On November 8th, 1732 he wrote: "*Pardon Monsieur. Mes tentations sont allées au diable d'où elles venaient. Votre première lettre m'a baptisé dans la religion Newtonienne; votre seconde m'a donné la confirmation. En vous remerciant de vos sacraments. Brûlez, je vous prie, mes ridicules objections, elles sont d'un infidèle. Je garderai à jamais vos lettres, elles sont d'un grand apôtre de Newton, lumen ad revelationem gentium… - Sir, my temptations have gone to the devil, where they belong. Your first letter baptised me into the Newtonian religion, your second gave me the confirmation. I thank you for your sacraments. Please burn my laughable objections of an infidel. I will guard your letters well. They are from a great apostle of Newton, 'light to enlighten the heathens'…" (Voltaire, 1830, orig. 1732, p. 320)*

Although Voltaire, the ever ironic *homme de lettres*, made a lot of fun of everyone, including himself, I think this text should be really read as it presents itself: he calls Newton's physics a "religion", uses explicitly religious language and in the end quotes from the "Nunc dimittis", the classical prayer that was said for compline, taken from the gospel according to Luke (2.32), where the old Simeon prophesies of the little Jesus baby that he will be the long awaited Messiah. Voltaire was a very well read and educated man. He kept his own chaplain although he might not have been a very firm believer, and certainly knew this passage and its theological significance. By applying it to Newton he implicitly acknowledged the role that science was about to take, namely replacing religion as an explanatory model and becoming the new religion. Whether Voltaire did that in his common stance of irony or in full earnest is of little relevance for our point here. He clearly saw that for intellectuals science would be the new religion.

That this is neither necessary nor logical is another matter. Scientists with a materialistic leaning like to present the narrative as a replacement story, where an enlightened science built on firm knowledge replaces a weak teaching of religion founded on blind faith and a lack of knowledge. This has been observed and shown to be deficient (Principe, 2016; J. K. A. Smith, 2016). By and large, materialism as a background philosophy is both historically and systematically independent of the development of science. Empirical data show that among scientists there are somewhat more agnostics than in the general population, but the deviation is less than one would suspect.

Larson and Witham tried to replicate a classical study of Leuba from 1916, where Leuba had predicted that scientific progress would extinguish religion among scientists (and in the population at large). They sent questionnaires to 1,000 randomly sampled scientists from the register "Men and Women of Science". Interestingly, 80 years later they found somewhat smaller, but in essence quite similar figures (E. J. Larson & Witham, 1997): Leuba had documented roughly 42% of scientists believed in a personal God, while 41% were disbelievers and 17% had doubts. In 1996 the figures were 39% believers, 45% disbelievers and 14% with doubts. Belief in immortality which 51% held in 1916, shrunk by 13% to 38% in 1996. Thus, it seems, in "ordinary" scientists the materialist background ontology is less prominent than some might think. This may be the case because "leading" scientists, those who are members of the US National Academy of Science have a decidedly agnostic or atheist position. In another poll of those leading scientists, Larson and Witham found that more than 90% were either atheists (72%) or agnostics (21%), and more than 92% did not believe in immortality (E. J. Larson & Witham, 1998).

Thus, the belief system of the more prominent scientists seems to be more associated with "science" than is warranted, given the background assumptions of a sizeable minority of working scientists. This is due to the fact that by definition they will be more vocal, more present in the public arena, have more power in defining research topics and distributing funding or deciding on publication of papers. Put differently the equation good science = materialist worldview can only be partially vindicated on empirical grounds. It is assumed to be true because the majority of powerful and well respected scientists hold such assumptions. But that does make them neither true nor necessary.

As we saw in the previous section, background assumptions are neither true nor false, they are just assumed for working purposes. That they happen to also represent the worldview of some has nothing to do with their truth, nor with their usefulness. This is an entirely contingent relationship that has arisen from the history of the process. This history led scientists to study matter, as a quite natural proposition. The study of the constituents of matter and its relationships with other constituents, the laws of motion and development, all this was a historically useful process. But it does not entail materialism as a necessary philosophy.

Materialism as a background assumption only works under the precondition that we can explain conscious experience that way. For, after all, materialism as a philosophy is always articulated by a conscious subject, because materialism as a background philosophy is itself not a material entity but a system of ideas. Nothing in materialism is matter (Nagel, 2012; Wallace, 2000). All sentences, stipulations, assumptions of materialism are prima facie ideas, mental constructs of a thinking, idealising, theorising and philosophising mental system or, for brevity's sake, of consciousness. Thus, the viability of materialism as a background philosophy of science is contingent on the success of a materialist theory of mind and consciousness. This has been heralded, as one of the earliest attempts, by the Berlin physiologist Emil du Bois-Reymond in 1842. He wrote in a letter to his friend Hallmann:

"*Brücke und ich, wir haben uns verschworen, die Wahrheit geltend zu machen, dass im Organismus keine anderen Kräfte wirksam sind, als die gemeinen physikalisch-chemischen; dass, wo diese bislang nicht zur Erklärung ausreichen, mittels der physikalisch-mathematischen Methode entweder nach ihrer Art und Weise der Wirksamkeit im konkreten Falle gesucht werden muss, oder dass neue Kräfte angenommen werden müssen, welche, von gleicher Dignität mit den physikalisch-chemischen, der Materie inhärent, stets auf nur abstossende oder anziehende Componenten zurückzuführen sind* – Brücke [*the Viennese physiologist who later became Freud's teacher in Vienna, HW] and I, we have pledged to make known the truth that there are no other forces active in the organism as the common physical-chemical ones; and that, where those are currently insufficient as an explanation, one has to use the physical-mathematical method to look for this kind of effects in a concrete case, or that new forces have to be assumed. These, however, would have the same status as the physical-chemical ones that inhere in*

matter and can always be reduced to attractive and repulsive components." (Du Bois-Reymond, 1918, p. 108)

This is a true materialist manifesto. The truth should be made known – even before it is actually known! – that there are only material forces operative in the organism. This can be, of course, understood as the attack on vitalist background theory to which Du Bois-Reymond and his modern colleagues, like Helmholtz, were opposed. But it is interesting to see the materialist stance that there are only material forces at work be called a truth that needs manifesting. A more sober stance would have been to research whether this is true or to figure out what kind of forces are actually operative. But Du Bois-Reymond was sure that the materialist stance was correct. This was a research programme that professed a creed and not a research result that reported a deed. And as such it has remained ever since: a research programme or a background assumption that is assumed to be true and hoped to come to fruition at some time in the future. Du Bois-Reymond became a famous physiologist. At the height of his career, quite famous and a member of the Prussian Academy of Sciences, 30 years after his letter to Hallmann, he stated in a famous address to the German Association of Natural Scientists at their 45th anniversary conference in Leipzig regarding this problem of consciousness or how consciousness can be explained through neuronal processes: "ignoramus et ignorabimus – we do not know and we never will." (Uexküll & Wesiack, 1988) This is quite an admission.

It seems we have not progressed much further since. 150 years down the historical road similar sentiments are voiced (McGinn, 1999). A materialist theory of consciousness is, despite some proclamations to the contrary (Churchland, 1986; Dennett, 1991) still far from being realised. And if vocal opposition from a philosopher like Nagel who calls himself explicitly an agnostic are to be taken as a symptom of collective discontent, then such a theory is principally and fatally flawed from the outset (Nagel, 1974, 2012).

The principal argument against the viability of such a theory comes in various forms but a central hinge of it is the categorical difference between mental and material attributes. This was already pointed out by Descartes (Descartes, 1954). The argument has become somewhat unpopular because people assume that it necessarily leads to substance dualism of a separate mental or consciousness reality and a material reality whose communication would then have to be established. This leads to fundamental and as it seems insurmountable problems. But lack of viability of substance dualism does not invalidate Descartes' other arguments, and substance dualism is by no means the only possible inference from understanding that mental and material attributes are categorically different.

Overlooking "categorical differences" and treating categorically different things as if they were the same leads to category mistakes. A category mistake can be best illustrated by wrong usage of language. It would be a category mistake if we said things like "the lemon is tuned in A minor" or "the clouds speak in a low voice". Lemons don't have a tuning and clouds don't speak, except in poems or in the language of schizophrenics. A philosophical category mistake happens when we attribute material attributes to a mental entity and vice versa. There are many arguments in the literature (Bieri, 1995; D. Chalmers, 2007; D. J. Chalmers, 1996, 2010; Hoche, 2008; Nagel, 1974, 2012; Noë, 2009; Searle, 1992) and as far as we can see no solid refutations of these arguments. Rather, the arguments are ignored or brushed aside.

Perhaps the strongest argument is the one by Chalmers who constructed a thought experiment. The thought experiment assumes that one can build robots or can imagine Zombies that for all appearance are like humans, have the same neuronal make-up, can be observed from the outside as behaving similarly, but are lacking an internal perspective or a "feeling of what it is like to", for instance to taste a chocolate or the taste of old Pinot Noir, or having the experience of love. So we can imagine entities similar to us, with a functioning neuronal apparatus, which, however, lack our subjective, qualitative feel. Therefore, consciousness as the qualitative, highly subjective and individual experience of what it is like to be someone, to have some experience, to hold a particular belief, etc. cannot be equated with the neuronal processes.

Now, if consciousness cannot be equated with material processes and is not identical with them, does this invalidate a materialist ontology? Not quite. For it would still be possible that consciousness is a qualitatively different entity that, however, is nevertheless fully dependent on the material functioning of the brain. The arguments for this position are certainly very strong, and hence it is not surprising that it seems to be the mainstream opinion of the majority of working neuroscientists. After all, we know from a host of neuropsychological studies that our brain activities are highly correlated with conscious experience. If we knock out part of the brain's activity in

deep anaesthesia, especially its information integrating function, we lose consciousness (Alkire, Hudetz, & Tononi, 2008). If some neurological damage happens, certain psychological or mental faculties are handicapped as every stroke patient demonstrates (Damasio, 1994, 1999; Sacks, 2010, orig. 1986). Those correlations are so well established that it would be extremely silly to doubt them. But do correlations establish causality? We all know that they don't. What would establish causality is a truly causal theory. But such a theory is not in sight.

Gary Schwartz has pointed out that the current arguments on which the mainstream neuroscientific account of consciousness as produced by the brain rests, is similar to claiming that a TV set is producing the TV programme. The same arguments are used: strong correlations, individual and distinctive knock-outs. But yet we all know that TV sets do not produce TV programmes. They just display them. In the same vein, the brain is a necessary organ for consciousness to manifest, it seems, but this does not prove that it *produces* consciousness (Davids & Schwartz, 2016).

Thus, currently, the materialist stance that assumes consciousness is just brain activity is by no means vindicated. It is rather, what Popper and Eccles called a "promissory materialism" that promises that at some future point in time it will deliver a theory. This promise is, as we saw, as old as 1842. And looking into the literature of 20 or 30 years ago we find statements over and over that the problem will be solved within the next couple of years. The decade of the brain that started in 2000 has amassed data, and likely also a lot of mistakes (Eklund, Nichols, & Knutsson, 2016), but not yielded a viable theory of consciousness. Perhaps materialism as a background assumption of science is not such a good idea after all? Perhaps it is even "wrong" in the sense that it prevents better and more fruitful attempts?

Well, this might be jumping ahead a bit. Perhaps more complex models that assume consciousness is a result of brain activity and in that sense causally dependent on it, but qualitatively different and causally active might do the trick? Let us examine this claim.

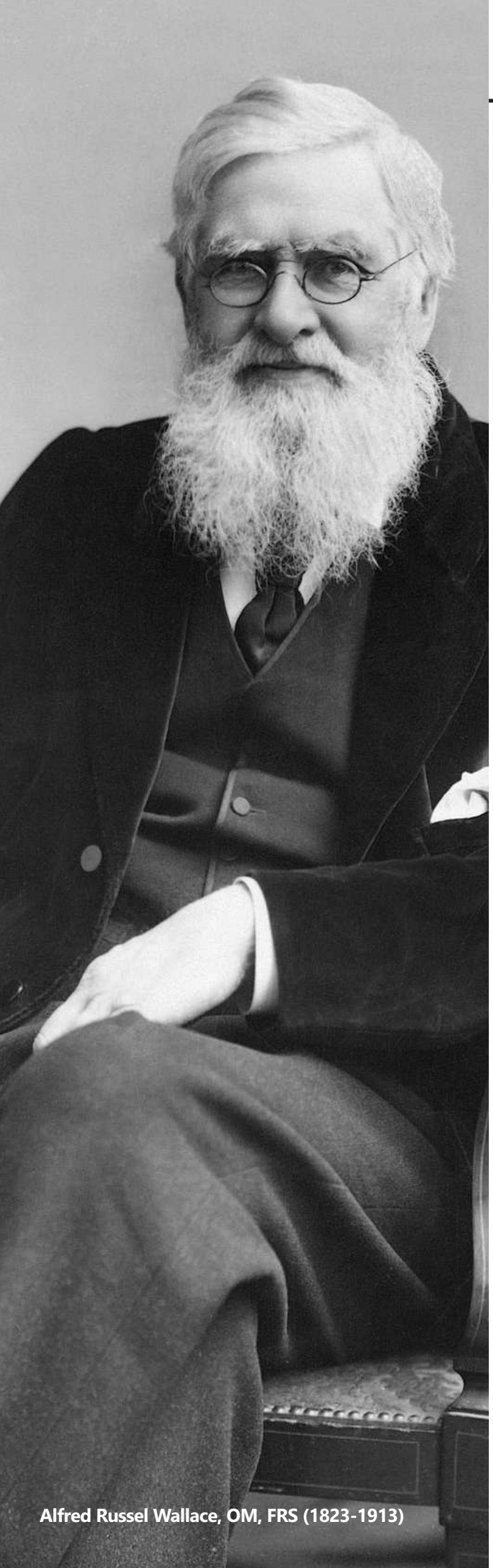
Causal Efficacy of Consciousness: Complex Emergentist Materialist Models of Consciousness and the Presumed Inefficacy of Will

There are a large number of different models, and we do not presume to cover them all. But their basic structure is the following: the brain is a complex system. After some degree of complexity has been reached and by virtue of a certain architecture that is circular, self-referential and multi-nodally connected within itself it may produce some novel, emergent property, consciousness. This is different from the brain as its sustaining anatomical substrate, but dependent upon it. Thus, if the brain is switched off, as in anaesthesia, consciousness goes. If brain activity in some centres is reduced, as in deep sleep, we are unconscious. If the brain dies, our consciousness, our sense of self and all qualitative experiences and memories that go with it, die as well for good, being entirely dependent on brain activity.

Conscious activities and consciousness as a new, emergent feature of brain architecture also have some as yet little understood causal effect on its substrate. This can be seen in studies that demonstrate that the brain is altered by conscious activities, such as learning something. It is well known that brain matter in the right hippocampus in London taxi drivers is increased, because they have to learn complex road maps (Maguire, Woollett, & Spiers, 2006). Grey matter increase is dependent on learning a new skill such as juggling, and it is reversible, if practice is reduced (Driemeyer, Boyke, Gaser, Büchel, & May, 2008). Also the meta-analysis of brain changes in meditators documents that a purely mental activity that primarily involves consciousness can change the structure of the brain (Fox et al., 2014). All these data speak in favour of the fact that consciousness and conscious activity have causal influences on the brain. Thus, not only the brain has causal influences on consciousness, but the reverse is also true: consciousness has causal influences on the brain.

These data rule out epiphenomenalist positions that are intermediary between materialistic concepts of mind and those that allow consciousness causal efficacy. Such epiphenomenalist positions would hold that consciousness arises from brain activity but does not have its own causal efficacy (Creel, 1980; Ziman, 2006). Well, that's simple wrong. It does, as the data quoted in the previous paragraph show.

One would not actually need brain imaging data to see that our conscious activity is causally active. We



Alfred Russel Wallace, OM, FRS (1823-1913)

can experience this every time a conscious impulse leads to an action. I want light and get up to switch on the light switch. I want food and go to the fridge and find myself something to eat. But this also works the other way round, when we prohibit ourselves from following an impulse, and here the experience is even stronger: I want food but decide that I have eaten enough for today and so prohibit myself from eating. Or I decide to fast for a week and so overcome the first impulses to eat until I get into a ketogenic state where hunger subsides and then start my fast. Or an alcoholic or similar drug addict decides that he wants to stop his addiction, goes into therapy or stops taking his drug out of his own accord. All those examples, and especially those, where someone acts consciously against a strong impulse and exercises his or her will, show: consciousness is causally effective in the world.

Now, the standard argument here is that the experiments of Benjamin Libet have shown that these phenomenal experience of conscious willing are actually a deception, as the conscious experience of will happens only some hundred milliseconds after the readiness potential in the brain has prepared the hand's motion. Benjamin Libet famously conducted an experiment, now replicated several times, where participants had to decide when they wanted to move a finger (Haggard & Eimer, 1999; Libet, 1985, 1999; Libet, Gleason, Wright, & Pearl, 1983; Libet, Wright, Feinstein, & Pearl, 1979). They had to watch a clocklike device and tell the experimenter, when the wish to lift a finger happened as indicated by the clock. In parallel their EEG was measured. It turned out that even *before* the participants lifted their finger or experienced the wish and decision to lift the finger, the so called readiness potential of the brain drifted into negativity, preparing the action, and only afterwards was the conscious wish to lift the finger reported to occur.

Libet also found that the participants could veto their decision, a fact often neglected and sometimes referred to as "free won't". The readiness potential is a slow drift in the EEG. It was observed in physical activity by Kornhuber and Deecke (1965) for the first time. Whenever someone is preparing for a voluntary movement the brain drifts into negativity in the motor area. This is interpreted as the brain preparing for the upcoming voluntary motor activity and is hence called readiness potential. Now, importantly, the electrical polarity of brain activity is changing in slow waves from positivity to negativity and back and it so happens that voluntary motion is more likely, when the brain is in negativity. But by no means can it *only* happen during negativity.

This was shown by a careful re-examination of the Libet experiments, where it could be seen that about 30% of movements also happened during positivity. Thus, also during positivity voluntary movement may happen, only it is less likely (Jo, Hinterberger, Wittmann, Lhündrup Borghardt, & Schmidt, 2013). In replications with a meditator who was highly skilled in describing his inner mental state it could be demonstrated that the negativity was something like an "inner urge" to act, which, however, could be vetoed. It was also demonstrated in meditators that they had both a clearer awareness of impulses and could easily withhold them (Jo, Hinterberger, Wittmann, & Schmidt, 2015; Jo, Schmidt, Inacker, Markowiak, & Hinterberger, 2016; Jo, Wittmann, Borghard, Hinterberger, & Schmidt, 2014).

Thus, apparently, the Libet experiment has been misinterpreted, both by Libet and his followers. It does not demonstrate causal inefficacy of conscious events. It simply demonstrates that actions are more likely during certain conditioning circumstances that the brain provides. But the brain neither forces the will nor prevents it from becoming active. And brain activity is no explanation for the subjective, phenomenal experience of the will and its causal effectiveness in the world.

But where does this leave us with a so called emergentist framework that allows consciousness its own qualitative status, even its own causal efficacy feeding back on brain circuitry and structure, but holds fast to the idea that consciousness is completely and fully dependent on the brain? Metzinger has produced a highly sophisticated model in which the brain is seen as providing representations of the world around, including inner states (Metzinger, 2003, 2008). But the inner states are opaque as to its cause, or else there would have to be an infinite regress of representations of representations and so on. Hence this representational circle has to be stopped which gives us the illusion of a subjective centre of "I" and "egoness", which in fact does not exist. All that exists is brain activity making representations either of outer or inner states and events.

If such a model, or similar ones, were vindicated, this would allow for a materialist ontology and still a qualitatively rich subjective experience. There are two types of argument that make such an emergentist framework unlikely. One is philosophical and theoretical, the other is empirical.

Let us start with the theoretical argument against such an emergentist framework. All emergent properties we know of in nature are emergent properties of the same categorical kind. For instance, water arises out of two hydrogen molecules and one oxygen molecule and displays emergent properties that neither hydrogen nor oxygen have and that cannot be predicted by the single constituents. It freezes at zero degrees Celsius temperature and is liquid above. It has a phase transition again at 100 degrees Celsius, when it turns into a gas. It has its highest density at 4 degrees Celsius, which allows water to freeze from the top and the fish to breathe and survive in a frozen lake. And it even has a fourth phase, namely a quasi-crystalline state which is highly ordered, like a crystal, yet fluid like a liquid, whenever it is in contact with hydrophilic surfaces under infrared radiation conditions, as in living systems (Pollack, 2013). This explains a lot of properties of living systems. But none of this can be seen in hydrogen or oxygen, let alone derived from the single constituents' properties.

So, obviously, there can be very complex new properties which emerge out of simpler constituents in their specific systemic combination. And even more complex examples can be introduced, such as complex electronic devices like computers that produce, out of a certain arrangement of simple binary elements, highly complex activities such as calculation operations that allow even more complex activities like controlling the behaviour of cars, aeroplanes and other technical devices. So, quite obviously, we see complex behaviour emerging out of the intelligent arrangement of simpler constituents all the time. And these more complex properties of systems are in no way predictable by looking at the constituents. Taking a TV set apart or a computer and looking at all the parts will never tell us what the end product was capable of doing, nor will looking at hydrogen or oxygen tell us what kind of properties water will have and what will result of water's properties in combination with still other things like hydrophilic border areas.

While this is all true and impressive, it is important to note that in all examples we know of, we see emergence always on the same conceptual or categorical level. The properties of water are still material properties, like the four phases, or the capacity to be subject to electrical or osmotic forces. The properties of TV sets and computers are still material, namely to relay and receive electromagnetic radiation, photons, properly speaking, and convert them into meaningful signals. And here another categorical plane comes

into play: meaning. Those signals and their results are only meaningful for a conscious observer and agent. And they have been made meaningful by a conscious inventor and engineer, otherwise they would not be there. All emergent properties we know in nature, such as the fluidity of water, the light producing property of certain algae and bacteria, the light converting properties of photosynthesis, the light producing properties of strong electrical discharge in lightning, or metabolism and movement as consequence of organisation in higher organisms, all these properties remain properties at the same conceptual level. They are still material, physical in nature.

One can of course claim that there was at least one phase transition or emergence that was across a categorical border, namely the origin of our universe, where matter emerged sponaneously out of an incredibly dense energy, which itself emerged out of, well, immaterial informational blueprints (Currivan, 2017; Hands, 2015). But following this argument through reveals: at the bottom of matter is actually information, a thoroughly non-material concept. So if there is any phase transcategorical transition and emergence into another ontological plane then it is one from information or consciousness-like reality into matter. Not exactly helpful in arguing that matter is basic, is it?

All properties of conscious mental systems have different conceptual status. The quality of an experience, the feeling of "what it is like to be" me, or you, this is a categorically different element of nature (Hoche, 2008; Nagel, 1974, 2012; Velmans, 2002, 2009). None of the emergent properties we know in nature lead to a categorically different thing, except the original emergence of matter from information-energy. Or put differently, emergence, as far as we know and understand it, never transcends categorical boundaries from matter to something else. If a child says: look, a ghost emerges out of the forest. We correct it and say: but this is not a ghost, it is fog. Thereby, we implicitly correct the illicit usage of the term and the implication that something completely different could be assembling itself out of a certain level of reality.

Well, this does not prove that it is not possible. But it does demonstrate that we have not seen any type of emergence that implies transcendence into a different categorical plane of reality out of material reality. If a flock of birds suddenly acts in a highly coordinated fashion this can be described by synergetics in a highly formal and sophisticated mathematical way (Haken, 1983). But the coordinated behaviour of complex systems such as birds, fish, clouds or the weather does not result in a different level of reality or another kind of being. A flock of birds still remains birds and does not become a dragon and a school of dolphins does not become a human being just by being organised, and an arrangement of water droplets in a cloud does not become a weather god, even though it might look like it.

So, natural emergence within complex systems, as far as we know them and have described them, does not switch planes, transporting the constituents into another level of being or into a different nature. *But this is exactly what consciousness is. It is categorically different from all material systems we know*. The inner, subjective phenomenal feel of what it is to be conscious does not occur in any material descriptions we know of our world or which we can create. Granted, one might say that perhaps in a very complex system such as the brain a new mode or order of emergence might happen, such that indeed an ontologically and categorically different level such as consciousness is reached. But this then is not an explanation but begging the question, or an overstretching of the notion of emergence. For it says, in essence, that we define consciousness as a new, categorically and ontologically different emergent property of a complex neural system. *This is a postulate or definition, but not an explanation*. It may in fact be so, but then we should be aware that we are not using known examples of emergence to reduce consciousness to an exemplar of such known types of emergence, but we are postulating a hitherto unknown type of emergence and are postulating that consciousness belongs to that type. This is, argument-wise, the same thing as Descartes did when he postulated a second type of substance, because its properties were not in alignment with the definition of material substance. This is possible, but it is neither an explanation nor does it help. However, empirical arguments and data speak against such a concept of emergence, as we shall see now.

Empirical Data that Challenge a Materialist Ontology

Empirical data that call into question a materialist ontology mainly come from three different strands of research. The phenomenology of deep mystical states and spiritual experiences are usually conveyed in a language and speak of realities that are difficult to understand in a materialist view of the world. The database of

anomalous cognition – telepathy, clairvoyance, psychokinesis and precognition – questions the non-locality assumption of special relativity and the completeness of the Cartesian cut. There are only three options, we see, to deal with it on the premises of a materialist worldview: it can be ignored, ridiculed or explained away as is the current practice of the scientific community with this database, in order to keep its materialist ontology untouched. Or it demands a change in the framework of physics, if a materialist ontology is to be salvaged. Or it demands taking consciousness more seriously, which in the end will likely also mean an expanded framework of physics as already Pauli had predicted (Pauli, 1954). The experiences of some people with Near Death Experiences (NDEs) are of a kind that contradicts directly any materialist ontology that makes consciousness dependent on the brain.

Non-Local Perception during Near Death Experiences

Near Death Experiences (NDEs) have become the focus of serious research after Ring and others documented that sometimes people had vivid experiences during apparent missing function of the brain (Greyson, 1983; Ring, 1984a, 1984b). Earlier reports also appeared in the German literature (Matthiesen, 1962). Wilhelm Wundt, who is considered one of the founding fathers of modern psychology as he founded the Leipzig psychology laboratory in 1879 also reported such an experience which changed his life and attitude and made him a psychophysical dualist for the rest of his career. His experience is worth quoting. He reported how he became seriously ill for a protracted period and was considered a dying man by his doctors (Wundt, 1921, p. 116):

"*Da war es freilich nicht diese ganze Leidenszeit, sondern es waren ihre ersten Stunden und Tage, von denen ich sagen darf, dass sie eine völlige Umkehrung meiner Lebensanschauung hervorgebracht haben. Die Ärzte hatten mich aufgegeben... Ich selbst hatte meinen ... Bruder kommen lassen, um von ihm Abschied zu nehmen. Niemals wieder in meinem Leben habe ich aber später den Eindruck einer so vollkommenen Ruhe empfunden wie in diesen Stunden... Diese Ruhe des Sterbens einmal erlebt zu haben schätze ich für einen Gewinn, dem nichts anderes gleich kommt... gibt es nur eine Hilfe, die vielleicht selten einmal einem Menschen erreichbar, den meisten aber versagt ist: diese Hilfe besteht darin, die körperliche Gebundenheit trotz der Macht, die sie ausübt, ganz zu vergessen und sich so durch Selbstüberwindung zu jener Seelenruhe durchzuringen, die dem schmerzlos Sterbenden von selbst beschieden ist – It was not the whole time of my sickbed, but the first hours or days that produced a complete reversal of my views on life, I daresay. The doctors had given up on me… I myself had sent for my … brother to say farewell. Never again in my life, however, did I experience the impression of such a perfect calmness as in those hours… Having experienced this peace of dying once, I take for a benefit that nothing can match… If there is just one help that is rarely granted to a human being and precluded to most, it is this: this help consists in completely forgetting the physical fetters despite their power and to cut through to that peace of mind by self-discipline, which is granted to a painless dying person all by itself*."

Wilhelm Wundt's experience is not a classical NDE which normally occurs during unconsciousness, but it is nevertheless interesting for two reasons: it is an experience of a seemingly dying man who was certain that his life has ended, and it was transformative. This transformational power of NDEs is well documented and should be an extremely interesting element for research. Why would such an experience transform people's opinions and world views? How? What are the important elements that achieve such a transformation? For Wundt, as becomes clear from reading further, the transformation consisted in the experience of unity with the world and the universe that he saw matched in the descriptions of the famous medieval mystic and Dominican friar and Paris master Meister Eckhart (1260-1328). Thus, such NDEs often have similar qualities as mystical and spiritual experiences and can be deeply transformative (Brinkley & Perry, 1994; Lorimer, 2017; van Lommel, 2013).

Such experiences as the one described by Wundt are phenomenologically very interesting, no doubt, and psychologically rich, but they do not challenge the materialist-scientistic world view. However, there are types of experiences that are well documented meanwhile which do. These are experiences where conscious experience has occurred during times where objective evidence is available that blood circulation has been absent for at least 10 minutes, in most cases longer, and where hence a flatline EEG would result which in some cases is even medically documented, and still rich conscious experience occurred that sometimes even concerned veridical perceptions of outer events or situations. Sometimes even distant events were perceived and veridically reported, verified by a third party. Sometimes extraordinary capabilities resulted from that experience after the respective person had come back to normal life, like the capability of

clairvoyance or healing.

A recent thorough collection of more than 100 such cases reported in the literature makes a strong point (Rivas, Dirven, & Smit, 2016). All cases are reported in the literature and are published. In some cases, the authors tried to ascertain missing information. Cases were only taken into the collection when there was medical or other evidence about the state of the person, i.e. with absent heart beat and blood circulation, and evidence for the time circulation had been absent such that a likelihood of a flatline EEG could be assumed, if EEG was not measured. As is known from other types of research we become unconscious within 20 seconds after the heart stops beating and blood supply to the brain is suspended (van Lommel, 2004). Even though some activity of neurons and brain cells might be detectable quite some time after measurable surface activity has stopped and a flatline EEG results (Borjigin et al., 2013; Kroeger, Florea, & Amzica, 2013), this is not really relevant here.

The argument is not that *some* brain activity or cell viability needs to be present but specifically *coherent*, measurable brain *activity of higher centres* of the cortex and not some residual brainstem activity. After all, if the brain were completely dead and unviable it would be difficult to understand how people in a critical state can come back to normal at all. So the point here is: from documented medical records, either regarding the time of a lack of blood supply to the brain or actual EEG measurements it was clear that all the people reported in this collection of 100 cases had no higher brain activity to speak of. And yet they reported afterwards experiences of heightened consciousness, either of sense perceptions like seeing and hearing of events that happened in their surroundings, or sometimes even of perceptions of verified events that happened at a distance which they should have been unable to perceive even if they had been conscious. Some instances report concrete things, like a shoe on top of the hospital building or a coin on top of a medical apparatus that they had seen during their NDE that was later verified and where the perceiver would not have had a chance to see under normal circumstances, as he or she had never been to that hospital before. Other examples concern the perception of a conversation that was held miles away and which was later confirmed: it had happened and also the reported content was correct.

A prototypical example of such veridical perception was reported by Pim van Lommel during the course of his prospective study of heart attack patients that had had a NDE (van Lommel, 2004; van Lommel, van Wees, Meyers, & Elfferich, 2001). One particular patient had been unconscious for some 15 minutes after his heart attack and was rushed into emergency. For intubation the nurse took out his dentures and placed them on a rack. When the patient was better and about to be discharged from intensive care he recognised the nurse who had intubated him and whom he had otherwise not met during his conscious periods in hospital. He told him that he was the one who had taken out his dentures and placed them on a rack and that he had seen the whole procedure from above. This is one example of highly precise and verified "perception" during unconsciousness and missing activity of higher brain regions. Note that the patient had literally "seen" events around him, although his eyes were closed, his detectable consciousness gone, his blood circulation was absent and his EEG in all likelihood flat, and hence no higher brain functions such as perceiving, categorising perceptions, memorising and forming memories available. The collection of 100 cases by Rivas and colleagues (Rivas et al., 2016) contains many such cases by different authors.

Nonlocality

Another example, also from van Lommel's research, illustrates what we call "non-local perception". In such perceptions information is perceived for which no signal-theoretical trajectory is possible. The notion of locality is derived from Special Relativity. This part of Einstein's relativity theory states that no signals in the universe can surpass the speed of light, which is approximately 300.000 km/second. Thus, a light ray takes a second to cross a distance of 300.000 km. Every part of the universe that such a light ray passes is locally connected (Redhead, 1983; Reichenbach, 1957). To illustrate this by a thought experiment: the moon is about 300,000 km distant from the earth. Suppose we were to install an alien-deterring system on the moon because we are afraid aliens would be blowing up the moon, which we want to prevent. The deterring system is meant to discover and destroy alien space ships as soon as they approach the moon, but it is operated from earth.

For that purpose, it sends a signal to earth as soon as alien spaceships are discovered and a computer on earth creates a quick target analysis and gives the "fire" command to the deterring system on the moon. Now such a contraption would be impossible. For, the detection system would send out a signal from the moon to the earth which takes a second. And we would send the "fire" signal back to the moon which also takes a second.

During those two seconds the aliens would have destroyed the moon, because our signalling system would have been too slow, as it is bound by special relativity. A technical way of expressing this is to say that the moon is not locally connected to the earth at t_0, or the present moment, but only at t_0+1 second.

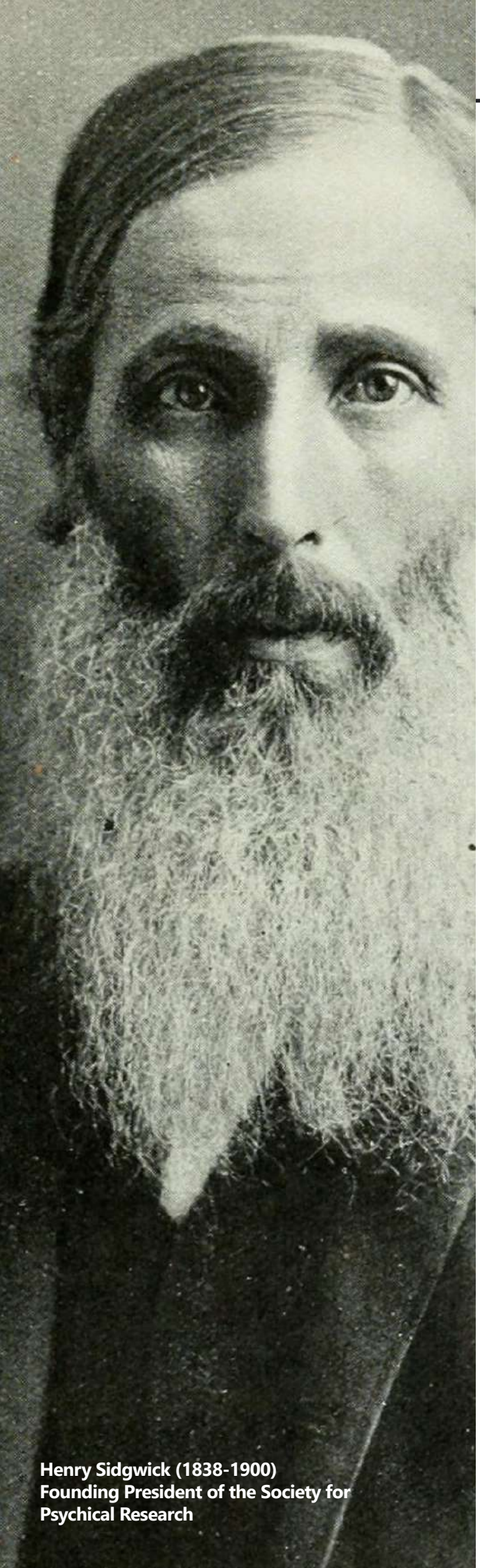
Therefore all perception using the electromagnetic force with photons as exchange particles, and in fact all known forces and exchange particles, is bound by this locality condition and can neither perceive events from the future, because these events have not yet occurred and are therefore not locally connected to the present moment. It can also not perceive events at the very moment that are too far away. And, in addition, the limit of influence (and perception) using such signals has to obey an inverse square law of distance and energy. In other words, the force of the signal decays with the inverse power of the distance non-linearly. The further away a source or target is the more energy is needed to either target it or perceive signals from it. This is the reason why our mobile phones need booster stations quite frequently to be able to receive and send signals. Hence "subtle" influence across a large distance is just as difficult as "subtle" perception. Both have to comply with the respective laws of Special Relativity and electromagnetism.

This is true as long as someone supposes standard physical signals are the only way information can be transferred or become active. Within a standard materialist ontology this is entailed. Only local physical signals, as a rule, electromagnetic signals, can convey information. One can, of course, create different world models or different types of field theories or hyperspatial models that allow for different types of forces and exchange particles, or higher dimensions, and some such models do exist (Carr, 2015; Heim, 1984, 1989).

Extending Physics To Accommodate Mind and Psi

Since psi involves an interaction between consciousness and the physical world, any theory for it would require some sort of extension of physics. On the other hand, some critics claim that psi cannot be real precisely because standard physics seems to work so well, both relativity theory and quantum theory having been confirmed with extraordinary precision. They argue that none of the known physical interactions could explain psi and query why - if consciousness really can affect the physical world directly – it does not show up in ordinary physics experiments, where the effects involved are often tiny? For example, the detection of gravitational waves by the LIGO experiment involves displacements of a thousandth the size of a proton (Abbot & LIGO Scientific Collaboration and Virgo Collaboration, 2016), although the energy involved in the displacement of the LIGO mirrors is quite large (Grote, private communication).

This argument may well preclude explaining psi through the sort of field or particle familiar to



**Henry Sidgwick (1838-1900)
Founding President of the Society for Psychical Research**

current physics. However, it neglects the fact that physics regularly undergoes paradigm shifts, so one could still consider some new type of field which transcends the usual spacetime description. Even mainstream physics accepts that both relativity theory and quantum theory must be modified in any final theory of quantum gravity, so the current paradigm is indisputably incomplete and the precision tests of current physics in the standard context is irrelevant. Indeed, it is possible that the marriage of quantum theory and relativity theory will itself involve consciousness in some way (Penrose, 1989), in which case it is only in that context that deviations from standard physics will arise.

Whatever the form of the new paradigm, it must presumably involve mentality in some way. Furthermore, one needs a theory which accommodates all mental phenomena – normal, paranormal and transpersonal – and not just the ones labelled psi. After all, there is already a big problem extending physics to accommodate ordinary mind (sensory perception, memory, dreams etc). Ultimately, one needs a theory of consciousness itself, this underlying all mental experiences, and there is some indication from physics itself that this may be a fundamental rather than incidental feature of the world. Already Wolfgang Pauli, one of the founding fathers of quantum theory and certainly himself a harsh critic of all undue speculation voiced the opinion that no physical theory would be complete that would not be able to also include consciousness, or psyche, as he termed it (Pauli, 1954).

Currently the most popular approach involves quantum theory, since this already exhibits a host of weird effects (non-locality, entanglement etc.) and is the one context in physics in which the observer may play a role. It has even been claimed that consciousness is involved in the collapse of the quantum wave function (Stapp, 1993), although this is a minority view kept alive since von Neumann and Wigner proposed the idea in the 1950s. Also it is important to stress that – despite the impression given in some popular books – standard quantum theory cannot explain psi or even normal mental phenomena. For that one needs some non-standard extension of quantum theory, such as "post-quantum theory" (which bears a similar relationship to quantum theory as general relativity does to special relativity) or "generalised quantum theory" (discussed elsewhere in this report).

Even extensions of quantum theory cannot describe the full range of psi phenomena, so while they may play some role in the final theory, they surely

cannot be the full story. Rather one needs a deeper paradigm of physics which underlies both mind and quantum theory and illuminates them both. So what form would this paradigm take? It must transcend the usual description of space and time – which is a feature of some theories of physics anyway – and it must involve mentality at some fundamental level. Note that the usual philosophical distinctions between materialism, dualism and idealism may no longer be clear-cut in a theory which purports to extend physics to accommodate mind, and the traditional Cartesian divide between matter and mind may need to be reassessed.

One such approach involves hyperspatial models, in which paranormal mental phenomena are interpreted as influences or intrusions from higher dimensions (i.e. those going beyond the four dimensions of classical space-time). As reviewed by Carr (2008), such models have a long history. The possibility of an extra spatial dimension was especially popular in the late 19th century, as a result of the work of Abbott (1983 (orig. 1884)), Hinton (1980) and Zöllner (1880). With the advent of relativity theory, it became clear that there really is a 4th dimension but that it is time rather than space. Nevertheless, it was still possible to attribute esoteric significance to this (Carrington, 1920; Ouspensky, 1931) or to contemplate 5-dimensional models with a 4th spatial dimension. More sophisticated physical models invoked extra dimensions by complexifying the space and time coordinates of relativity theory (Rauscher, 1979; Targ, Puthoff, & May, 1979) or introducing extra time dimensions (Whiteman, 1977). The basic idea is that points can be contiguous in the higher dimensional space even if separated in 4-dimensional spacetime. Subsequently, other higher-dimensional models were proposed by Heim (1988) and Sirag (1993).

A rather different approach – and one which involves mind explicitly – has come from philosophers rather than physicists and involves the relationship between physical space and perceptual space. For example, Smythies (1956) suggested that physical and sensorial space are 4-dimensional slices of a 5-dimensional space, this building on the earlier suggestions of Price (1953) that one needs a separate non-physical space to describe dreams and Broad (1953) that this can be merged with physical space. He developed this approach in many later works (Smythies, 1994, 2012).

A more recent advocate of the hyperspatial approach is the cosmologist Bernard Carr. The key point of his approach is that many psychic experiences (eg. telepathy, clairvoyance, apparitions, OBEs, NDEs) seem to require the existence of some form of communal space. This is not the same as physical space but hypothesized to be a higher-dimensional space of which physical space and ordinary perceptual space (including memories and dreams) are just lower-dimensional projections (Carr, 2015a, 2015b). This space is termed the "Universal Structure" and can be viewed as a sort of extended reality – an information space which goes beyond physical space but subtly interacts with it. The extra dimensions of the Universal Structure comprise a hierarchy of times, mental time being distinct from physical time in this model. Empirical support for this picture may come from NDE reports (Jourdan, 2010).

The crucial step is the identification of the Universal Structure with the higher-dimensional space already invoked by modern physics in models such as M-theory (Witten, 1995), in one version of which the physical world is regarded as 4-dimensional "brane" in a higher-dimensional "bulk" (Randall & Sundrum, 1999). This identification allows an amalgamated description of physical, psychical and even some mystical phenomena, these forming a natural continuum. It should be stressed that not all physicists are enamoured with higher-dimensional theories, since they are currently untestable and might be regarded as mathematics rather than physics, but they are at least respectable in the sense that eminent physicists work on them.

Although the hyperspatial approach is very speculative and prone to the criticism that it could explain anything with a sufficient number of dimensions, it shows that an extension of physics which accommodates mind is at least possible in principle. It also raises a number of important questions which might eventually be answerable: Will the final theory of quantum gravity involve consciousness in some way? Is there a deeper theory of physics which underlies both quantum theory and mentality? Will there ever be direct experimental evidence for higher dimensions from particle physics – for example, from the Large Hadron Collider – and, if so, how could one persuade mainstream physicists to contemplate the possibility that these might have some connection with mind?

NDEs, Nonlocality and Consciousness

Now back to the non-local nature of some of those perceptions and conscious experiences during NDEs. The perceptions reported above – veridical perceptions of something that happened in the surroundings of an unconscious body or even far

away – is very difficult to explain using the standard model of consciousness that depends on fully functioning brain activity. This is because we do not have fully functioning brain activity by any stretch of evidence and yet a highly sophisticated and even veridical perception is occurring. This would not necessarily entail any non-locality, if we were prepared to see consciousness as a separate entity, in the sense of a dual reality, whether ontologically real or just as a separate aspect of reality. For then we could postulate that, while the body is not fully dead, there is some conscious aspect of the human being that might be able to have its own perception. Normally it is in full synchronisation with brain activity, and hence we do not perceive any difference, but in moments of extraordinary threat or danger it might just become dislodged, yet still operative. This would make understandable the often reported phenomenology of "seeing from above", "hovering at the ceiling", "standing next to the body".

There have been attempts at explaining "out-of-body experiences" and wrong attributions like in the rubber hand illusion, and quite successfully so, as distortions of body schema and a mismatch between visual and kinaesthetic feedback (Blanke et al., 2005; Blanke, Ortigue, Landis, & Seeck, 2002; Lenggenhager, Tadi, Metzinger, & Blanke, 2007). However, these explanations do not fit here, as these experiments were all conducted with volunteers in full consciousness. One should, however, acknowledge that an experimental attempt at verifying veridical out-of-body perceptions during near death experiences in a clinical experiment failed (Parnia et al., 2014; Parnia, Waller, Yeates, & Fenwick, 2001). This may have to do with the fact that such experiences are extremely rare and thus even a comparatively large study as the AWARE-study was still unable to capture them. Or it might be the case that such experiences are fickle, as was already observed by William James (1985). If such experiences are conceptualised within a generalised framework of non-local correlations (see below), then it is actually expected that a testing framework that tests for causal signals will be unable to reveal them.

But there are also experiences whose phenomenology entails a non-local connection of consciousness to material reality. The collection of Rivas and colleagues (2016) contains quite a few of them, and the story reported above of a veridical perception of a distant conversation is an example. Perhaps one of the most striking examples is another one reported by van Lommel (2004, 2013): a man saw himself in his NDE approaching dead relatives whom he knew, including a man whom he did not know, and who looked at him lovingly. 10 years later, at her death bed, his mother confided in him that he was not the son of the man she had married, but was from an extra-marital relationship with a Jew who was deported and killed by the Nazis. She showed him the picture of his real father which turned out to represent the very man whom he had seen in his NDE 10 years earlier and not known until then.

This is a remarkable story. Presupposing the veridicality of its content it shows that such an experience can contain a cognitive component, namely seeing and remembering someone's face whom one does not know and a clairvoyant component, as the person was obviously unknown to the person previously but turned out to be the dead father. One might suggest cryptomnesia, i.e. the memory of not consciously known but once perceived material, as an explanation. This would presuppose that the mother had at some point revealed that information, including the picture. This is certainly possible, but would make the mother's deathbed revelation implausible if the patient had known this all along. The patient might have inadvertently seen a picture in his mother's belongings and registered it. But then, we see a lot of photos and pictures as children which we normally forget. Why should he see, in his NDE, relatives plus this particular unknown man out of all the available images from cryptomnestia?

This is one episode. Just as one swallow does not make a summer, but many do, so one story alone is not convincing, but many may be. The episodes selected by Rivas and colleagues are only those 100 from the literature that met their stringent inclusion criteria. There are many more in the literature, and those 100 cases are a weighty challenge to a materialist model of reality. Already William James observed, using an example of Gurney's, that the empirical evidence for anomalous cognition and conscious activity without an apparently functioning body was similar to a faggot: every single stick can easily be broken, but the whole faggot is very tough (W. James, 1896).

There have been serious attempts to understand NDEs from a reductionist point of view, which would be the normal thing to do (Marsh, 2010). Such approaches assume that NDEs are happening as the brain kicks back into operation. After all, the brain is not dead in the strict sense, otherwise there would be no resuscitation. Thus, the argument goes, when the neural system comes back into functioning there will first be some unconnected and dishevelled brain activity, which, phenomenologically might be some imaginary internal events. Also, during the dying

process, the tunnel experience that is frequently reported, might be the result of particular neuronal patterns. While all these potential explanations might fit some experiences, they do not fit all.

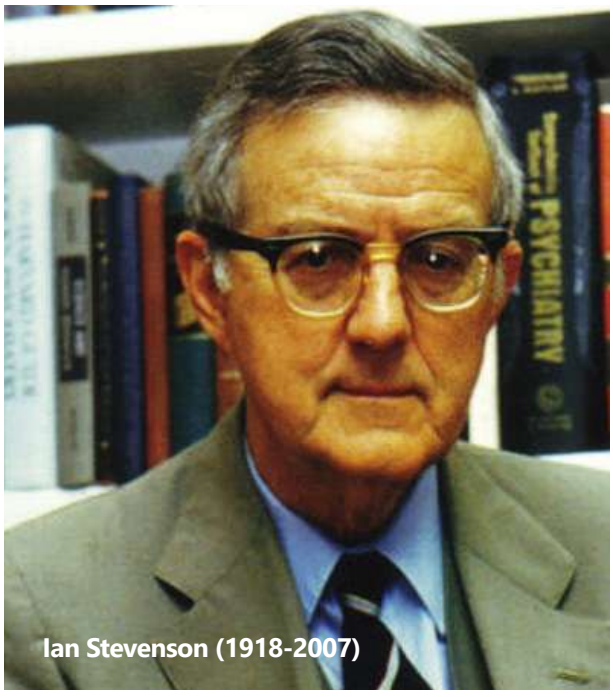
The Rivas-collection of cases was geared to excluding such explanations. Thus, cases were only taken into the case series if the reported cognitive content did not happen shortly before awakening but some time in between, as verifiable through the content – for instance perception of events or talks of medical personnel at a time point that could be determined quite clearly from medical records. Thus the explanation of an awakening experience out of a near-death state is not valid for those cases. Moreover, as already mentioned, some residual brain activity would not count as an explanation either, as the argument typically goes, because we require a fully functioning cortex for higher cognition such as perceiving, recognising, categorising and memorising. Apart from this, a particularly long and rich NDE report that was the result of a severe meningitis with a documented absence of higher brain function through EEG showed clear phenomenological differences between the rich, coherent and qualitatively soothing NDE that happened during the time of unconsciousness and the incoherent, hallucinating type of awakening experience (Alexander, 2012).

Thus, we contend, the Rivas-collection of cases poses a stark challenge to any materialist model, even sophisticated models, of mind and conscious activities which claim that consciousness is an emergent property of brain function. It seems that it is not, at least not always and in all situations. Note that such general claims like "consciousness is an emergent property of brain activity" can be refuted by single instances – the so-called white crow phenomenon. As William James (1896, p. 884) observed: "*A universal proposition can be made untrue by a particular instance.*" There is no need for a full refutation of this claim in all instances. But a series of cases of the NDE type pose a strong challenge, as does the database of parapsychology or anomalous cognition (Braude, 1978).

Children with Memories of Previous Lives and Corresponding Birthmarks

Another peculiar research tradition which has produced an interesting series of well documented cases is the research started by Ian Stevenson at the University of Virginia and continued by Erlendur Haraldsson at the University of Reykjavik and colleagues about children that remember previous lives (Haraldsson, 1995, 2003; Haraldsson & Matlock, 2016; Stevenson, 1997a, 1997b, 2000; Stevenson & Keil, 2000). The database collected by these researchers contains some 2,500 cases of children who claim, usually around age 2 to 4, that they belong to a different family or remembering a different life. In some of those cases it was possible for the researchers to collect independent evidence that confirmed some or all of the statements about the life and death of the previous personality. Sometimes, birthmarks could be seen, that are reminiscent of the death of the previous personality such as scarring tissue where a previous personality suffered shots or strangulations, or deformations, where the previous personality suffered from torture or was killed in a car accident.

A lot of the cases remain only partially "solved" or "unsolved", meaning not all or only parts of the information given by the children or their parents could be traced back and confirmed by independent evidence. But in some cases this was in fact possible. Even if only a few cases remain out of the large database, they raise the question of how it would be possible, if consciousness were nothing but an emergent property of physical arrangements of matter, that a child of young age, with not much factual knowledge about the world, could make claims about a previous life that then turns out to be true not just in one but in several cases. It seems to us more complicated to deny the phenomena than to assume the veridicality of these phenomena and and conclude that we need a model of consciousness that can accommodate such experiences. By any stretch of imagination this would have to be a non-local model.



Ian Stevenson (1918-2007)

Non-locality in Anomalous Cognition

Research into anomalous experiences and events has a long tradition. The Society of Psychical Research (SPR) was founded in 1882 by prominent members of the scientific establishment, and pioneers of psychology like William James and Carl Gustav Jung were members - indeed James was President, also of the American SPR (W. James, 1896). These scholars had clearly seen the potential of such experiences for understanding our world and to inform the debate about materialism that was rampant at the time. One might ask, before we even proceed here, why this concerted effort did then not result in an unequivocal acceptance of such phenomena and a worldview that included a spiritual level of reality. The answer would be, among others, that empirical data without a proper theoretical model are without much value, and empirical data that go against a prevalent trend and world model are usually ignored by the mainstream (Walach, Kohls, Hinterberger, von Stillfried, & Schmidt, 2009). Perhaps the conditions are better today, we hope. At least in one respect the database has seriously changed: we have now a long tradition of experimental research in anomalous cognition that has amassed a number of studies which lend themselves to meta-analysis and pooling and thus reduce power problems and errors due to artefacts and individual circumstances. In addition, historical research started on a critical assessment of those old field studies of mediumship and spontaneous cases that were conducted in the early days of the SPR (Braude, 2017; A. Sommer, 2014, 2016).

We use the term parapsychology and anomalous cognition interchangeably. We will, however, rather stick with anomalous cognition to emphasise the fact that such types of cognition are a scientific anomaly under current assumptions. Scientific progress, after all, advances through taking anomalies seriously, as Laudan has pointed out (Laudan, 1977). "Parapsychology" suggests an otherwise accepted fringe area of psychology. It is neither. It is neither fringe nor accepted. It is not fringe, because the questions it addresses are central to the scientific enterprise, namely understanding the relationship of consciousness to the material world. It is not accepted, because the current world model precludes such events, similar to the Aristotelian physiology precluding a heartbeat and hence preventing its perception.

There are different types of parapsychological phenomena. All of them pose an anomaly of sorts. *Telepathy* means the remote contact with a person that is not present, or understanding about a person's mental content without further means of communication. A classical example concerns the founding story of the electroencephalogram (EEG) (S. Schmidt, 2014). Hans Berger, the inventor of the electroencephalogram, reported an impressive telepathic experience which suggested to him that there may be some electrical connection between people that could be measured. The story happened when he was 19 years old and at a military exercise in Würzburg, in Fankonia, a part of northwestern Bavaria. He tripped in an exercise and fell and was nearly run over by horses towing a gun. The horses could be stopped at the last moment and nothing serious happened. But the next day he received a telegram from his father, the only time in his life, asking him whether he was alright. This telegram was instigated by his sister, living in Coburg, some 100 miles to the East, with whom he had a very intimate connection. She insisted that something was wrong with him. She seemed to have distantly perceived the danger he was in and arranged for her father to cable him. This experience is one prominent example of telepathy, where someone else, in that case Berger's sister, was able to experience mental content that related to another person, her brother. The decisive point here is: there is no "normal" signal that would convey this information. Although Berger thought there might be brain-currents that could explain that type of experience, which then led him to developing the EEG, he himself quickly realised that the current was much too small, and the laws of electromagnetism teach us that they decay quickly and would not serve to transport coherent information, as in Berger's case, over 100 or so miles.

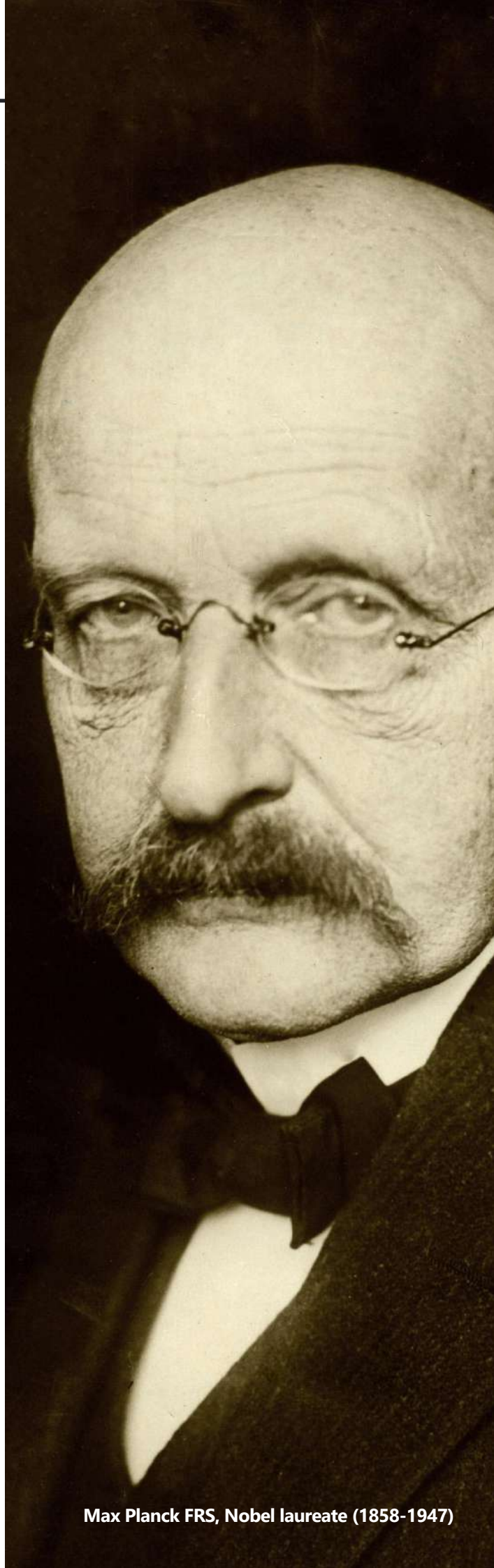
Experimental research into telepathy has often used either dream telepathy or Ganzfeld studies. Dream telepathy is a set-up whereby a "receiver" is asleep, while a "sender", located in a remote and often specially shielded room views images or video clips that are supposed to be "transmitted" to the recipient. Depending on the protocol, the recipient is questioned after awakening about the dream content. This reported dream content is then presented to external judges who do not know about the target. They have to rate the match between the target and distractor items with the dream report, which then yields a quantitative measure of consistency. In Ganzfeld telepathy the same basic set-up is employed with the exception that the target person is not asleep but relaxing in a "Ganzfeld". This is a state in which all sensory impressions are shielded: the eyes are covered with translucent goggles and bathed in some mildly coloured light and the ears receive pink noise via headphones. The person rests in an easy chair and reports all mentation into a microphone which is then transcribed. The content is again rated by judges to see whether it matches target clips that a "sender"

has seen, chosen by a computer randomly from a storage, or decoys.

A meta-analysis of all dream telepathy studies from 1966 to 2016 found 50 studies, a large set of the "Maimonides Dream Lab" with 14 studies, and 36 studies from different labs. While the Maimonides studies yielded stronger effects, the subsequent studies were significant as well, with an overall effect size of d = 0.20 with a highly significant effect of p = $5.19*10^{-8}$ (Storm et al., 2017). A meta-analysis of all Ganzfeld studies revealed a significant effect size of d = 0.15 with a significance of p = $1.15 * 10^{-10}$ (Storm, Tressoldi, & Di Risio, 2010) which was also supported in a Bayesian meta-analytical model (Storm, Tressoldi, & Utts, 2013).

If the target of perception is not another person's mind, but anything – events in a person's past that cannot be known, finding or seeing remote objects, etc. – we speak of *clairvoyance*. A special branch of clairvoyance is *remote viewing*, where someone is tasked with seeing and describing things or events that happen at distant locations, sometimes connected to a person at this location. This type of clairvoyance has gained some notoriety, because both Russian and US intelligence used clairvoyants for espionage. A recently released and declassified report of the US studies (May & Marwala, 2018) that contains a meta-analysis and review of all remote viewing studies done by the CIA and military shows that these 117 documents detailing 25,449 experiments yield a joint significance of all experiment of p = $2 * 10^{-20}$. The experiments also revealed that electromagnetic shielding does not prevent the effect, which makes a classical local interaction via electromagnetism improbable. Distance and size of the target seem to be irrelevant. About 1% of the population, it is concluded, possess the capability or sensitivity to perform remote viewing, and it seems not to be teachable (May et al., 2018).

Jessica Utts, who was the statistician calculating the analysis, is the former President of the American Statistical Association and knows her business. In her presidential address to the American Statistical Society she said (Utts, 2016, p. 1378 f.): "*Parapsychology is concerned with the scientific investigation of potential skills that are commonly known as psychic abilities, such as precognition, telepathy, and so on. For many years I have worked with researchers doing very careful work in this area, including a year I spent working on a classified project for the United States government, to see if we could use these abilities for intelligence gathering during the Cold War. This 20-year project is described in the recent book ESP Wars East and West by physicist*



Max Planck FRS, Nobel laureate (1858-1947)

Edwin May, the lead scientist on the project, with input from his Soviet counterparts. At the end of that project I wrote a report for Congress, stating what I still think is true. The data in support of precognition and possibly other related phenomena are quite strong statistically, and would be widely accepted if they pertained to something more mundane. Yet, most scientists reject the possible reality of these abilities without ever looking at data! And on the other extreme, there are true believers who base their belief solely on anecdotes and personal experience. I have asked the debunkers if there is any amount of data that could convince them, and they generally have responded by saying, "probably not." I ask them what original research they have read, and they mostly admit that they haven't read any! Now there is a definition of pseudo-science — basing conclusions on belief, rather than data! When I have given talks on this topic to audiences of statisticians, I show lots of data. Then I ask the audience, which would be more convincing to you — lots more data, or one strong personal experience? Almost without fail, the response is one strong personal experience! Of course I'm giving you an extreme example, and I think people are justifiably skeptical, because most people think that these abilities contradict what we know about science. They don't, but that's the subject for a different talk!"

Well, this is exactly the type of discussion we are trying to stimulate. The data of parapsychology only contradict a certain worldview which is predicated on implicit and not entirely suggestive presuppositions.

Precognition, the term mentioned by Jessica Utts in her address, means the perception, often in dreams or vivid imagery, of future events. It is scientifically speaking the most challenging phenomenon. This is so because if we suppose a signal theoretical concept of parapsychological events is true, i.e. a stable causal signal of whatever kind that transmits information, then we would have to assume that it also contravenes the locality assumption of special relativity, as explained above. For if the limit speed of any signal in the universe is the speed of light, then any signal, by definition, can also only reach us from the past and not travel to us from the future. Otherwise we run into time-reversal paradoxes (Fitzgerald, 1971). Such a paradox arises, if we were able to signal faster than light, because we could call someone in the past to kill our grandmother, which would prevent us from calling, because we would not exist to make the call.

Thus, precognition poses a problem. Often precognition is experienced as a premonition. A classical example is a case from Schmeidler's collection of spontaneous cases in the New York archive of the American Parapsychological Association, where a large number of such cases are stored (S. Schmidt, 2014). A mother reported that one night she felt compelled to look after her baby child who slept in her bed in her own room. After she had awoken several times the mother was tired of it and took the baby into her own bed. The next morning, she saw that the heavy crystal lamp that had hung over the baby's bed had come down and had fallen into the crib. Had the baby been in the bed she would have been severely injured, if not killed.

Precognitive experiences seem to have some biological significance. Clearly, whoever is able to anticipate danger or prey has a clear advantage of survival. There are surely also examples of pre-sentience based on classical electromagnetic signals. We found, for instance, that about 20% of patients with chronic headache or migraine react sensitively to sferics. These are ultra-short electromagnetic pulses that are normally produced by weather fronts and thunderstorms and travel ahead of the front at the speed of light (Walach, Betz, & Schweickhardt, 2001). They are an example of a classical warning system which in all likelihood conveyed some advantage of survival. For if one is able to find shelter in time before seriously bad weather arrives this is certainly helpful. But this is not true precognition as studied by parapsychology, because it is based on clearly describable physical signals that obey Special Relativity and warn of a much more slowly traveling weather event. But true precognition, sensing an advancing predator or another danger, which is not based on physical signals, would be beneficial for survival.

It is interesting to observe that animals seem to act precognitively. Sheldrake has studied experimentally a dog that seemed to know when her owner was coming home with all sorts of decoys to exclude classical perception, and could reliably observe the dog sitting expectantly some time before arrival of the owner, but not otherwise (Sheldrake & Smart, 2000a, 2000b). A replication of this experiment by skeptics was declared unsuccessful (Wiseman, Smith, & Milton, 1998), but found successful after reanalysis of the data (Sheldrake, 2011, orig. 1999)

Bem has used an experimental paradigm of retroactive priming. Here the priming stimulus, which is normally presented before a target, was actually presented after the target. Priming is known in psychology to accelerate processing of certain types of semantic content or improve memory retrieval of certain types of information. If someone were to memorise words like "beauty", "health", "sexy", "young" "lovely" and similar ones and then were primed with the image of a young

person or an old person, then items associated with a young person would be easier to recall.

Bem used the opposite procedure and presented the priming stimulus, usually an image, after targets and found in a series of experiments that retroactive priming produced a clearly significant effect. Altogether he published the data of 9 experiments with more than 1,000 participants in variations of experimental approaches (Bem, 2011). Because Bem is a very well known social psychologist this paper created an uproar and triggered a series of replications, some of which were clearly negative (Ritchie, Wiseman, & French, 2012). But a recent meta-analysis, using the conservative Bayesian approach and including all 90 experiments from 33 laboratories, also the negative ones, shows a clearly significant effect which produces a Bayes factor well over 100, which is considered the threshold for decisive evidence (Bem, Tressoldi, Rabeyron, & Duggan, 2015).

There are other paradigms of precognition research, for instance presentiment research. This uses unconscious physiological measures, such as electro-dermal activity. Since our sweat glands are innervated by vegetative nerves they react very quickly to autonomic arousal, and the electrical resistance in our skin changes. Thus electro-dermal activity can be used to monitor autonomic arousal, for instance as in fear reactions. The presentiment effect studies such fear related unconscious physiological reactions, *before* a fearful stimulus, usually an image, is presented. In such a research paradigm physiological arousal is measured continuously and then a fearful or calming visual stimulus is presented (it could also be a sexually arousing versus a boring stimulus or something similar). The period before the arousing stimulus is presented is then compared to a similar period before a neutral or calming stimulus is presented. A recent update (Duggan & Tressoldi, 2018) of an earlier meta-analysis (Mossbridge, Tressoldi, & Utts, 2012) that summarized 27 experiments confirms the significant effect with an effect size of d = 0.28 that in a Bayesian model has a robust credible interval of 0.18 to 0.38.

Thus, research into precognition has shown robust effects. Effect sizes are comparatively small, around a third of a standard deviation, as with all parapsychological effects, but highly significant. One may always find fault with single studies, even with single meta-analyses. But it is difficult to explain away the full database. This poses a challenge, or rather a puzzle: either Special Relativity is not the whole story and there are indeed signals that travel faster than light, allowing precognitive effects, for instance via as yet undiscovered fields. Such approaches are possible (Bohm, 1980; Peat, 2007), but not mainstream. We don't think that this is a promising approach, because the empirical signature of these effects seems to preclude a causal analysis (Lucadou, Römer, & Walach, 2007). But if tachyons, particles that travel faster than light, are not invoked for explanation, then such effects certainly challenge any signal-theoretical concept of anomalous cognition effects and open up the field of non-local effects in a macroscopic environment.

Another category of effects is *psychokinesis* or PK effects. By that term we mean a direct interaction of intentionality with other psychological or physical systems. Normally our intention needs causal physical signals to become effective in the world. We get up and press the switch if we want light, and we do not only think "let there be light" and then see the light come on. PK effects are just that: intentional effects, where human intention has a physical outcome without apparent physical interacting or causal signals. They are challenging conceptually and difficult to reconcile, because here we are not only talking about information transfer but also about "action" or "activity", i.e. physical effects in the material world. This means, conceptually speaking, jumping across the Cartesian cut from the mental level to the physical level.

Such research has mainly tested the effect in two different set-ups: healing research has used some system that was to be affected by intention only – physiological systems, in-vitro systems, ill people or similar, and a "healer" who had to influence the system towards more balance or a benevolent outcome. In another set-up intentional PK effect research has usually used some random process, usually a quantum process such as a Zener diode submitted to a lock-current, or similar, with a sampling and a display associated with it. Then volunteer participants were instructed to "influence" the display, and consequently the random process that was driving it, according to some experimental instruction.

There are three separate meta-analyses of variants of that effect. One analysis collated all data from studies that looked at the effect of human intention on random event generators. A large number of those have been conducted by the former Princeton Engineering Anomalies Research (PEAR) Lab (Dunne & Jahn, 2005; Jahn & Dunne, 1987), but also other studies are included (Bösch, Steinkamp, & Boller, 2006). It analysed 380 single trials and revealed a very small and significant effect of z = 2.46, i.e. 2.5 sigma, overall, which is significant at the 0.05 level. The last three of these studies were a joint consortium replication study of three labs in Princeton, Giessen

and Freiburg. Together they are the largest database and were meant to be a single and definitive replication of the previously successful Princeton-protocol. The whole study itself was clearly negative (Jahn et al., 2000), and led to the meta-analysis being just about significant, but not very strongly so. If those studies are excluded the data-base shows a significance at the level of z = 4.01 or 4 sigma, which is highly significant at $p < 0.001$. But this is of course a tricky issue and also reveals some of the problems of this kind of research. If we are looking at direct replications and their effects, such as the Princeton-Freiburg-Giessen consortium replication of the successful Princeton studies, then we often see that previously successful studies are not replicated, or the effects are seen in other parameters, which were not initially defined as targets by the protocol. For instance, in the micro-PK consortium replication there were clear deviations in the standard deviation and in non-linear parameters, but those were of course post-hoc analyses (Pallikari, 2001). In more recent studies we see the same behaviour of the experimental system: previously successful experimental paradigms were not replicable by a subsequent experiment (Maier & Dechamps, 2018; Maier, Dechamps, & Pflitsch, 2018).

This type of result is normally taken by critics as evidence that anomalous cognition effects are not real phenomena (Alcock, 2003; Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011). This is understandable but also problematic. The conventional experimental paradigm assumes that it is testing stable, causal and by definition signal-theoretical effects that obey the whole framework out of which the experimental method itself has arisen. If however, as we have argued (Lucadou et al., 2007; Walach & Horan, 2014; Walach et al., 2014), these effects are not causal signals, but a-causal, correlational non-local effects similar to entanglement correlations, then, by default, repeated experimentation and direct replication will destroy the effects, or lead to a displacement of the effect into a different parameter, or even into the control group. This is a bit of a technical argument, which we are not going to discuss in detail here. But it serves to make plausible why it is useful to look at the totality of the evidence via meta-analyses and not simply at the robustness of replicability. The latter is admittedly low, but for systemic and principal reasons, we contend.

The micro-PK or intentional effects on random event generators as a research paradigm is actually the weakest of the three meta-analyses. Another meta-analysis analysed all 49 studies where non-human targets – sick animals, cells or in-vitro models – were target of healing intention and all 57 studies were human physiology was the target (Roe, Sonnex, & Roxburgh, 2015). In human experimental studies normally some physiological measure, such as electrodermal activity is taken, while some remote intention is directed at calming or relaxing the participant which then is supposed to be visible in the physiological measure. In non-human models parameters such as cell viability or other objective parameters are taken to measure the intention effect of a remote "influencer" that has instruction to intentionally affect the system, such as a cell-line or intoxicated cells. The effect size was measured in terms of the correlation coefficient r. It was significant for both types of studies. The non-human studies revealed an effect size of r = .26 which dropped to r = .11, if only high quality studies were considered. The human studies showed an effect size of r = .20 which rose to .22 if only high quality studies were considered. All these effect sizes, though small, were significant.

Again it is important to note that a series of carefully conducted and strongly controlled experiments with Jorei-healers were unable to replicate originally achieved sensational results from equally strongly controlled experiments (Radin, Taft, & Yount, 2004; Taft, Moore, & Yount, 2005; Yount et al., 2004). This seems to be an important signature of such effects: overall, across experiments, there is an effect that can be accumulated via meta-analyses, but in single series of experiments it is difficult to replicate such effects.

Another meta-analysis by Schmidt (S. Schmidt, 2012) analysed the effects of studies on remote helping. In that paradigm a remote helper has the task to help participants focus on a target, for instance a candle, in random sequence and the participants press a button whenever they lose focus. The helper is placed in a remote location and the participants who have the task to focus have no clue when the helping begins and ends. This can be used to study whether such remote intention has any influence at all. Schmidt found 11 studies of that kind which revealed a joint effect size of d = 0.114 ($p = 0.029$). He also reported the results of a meta-analysis of remote staring experiments. (There are also data on a meta-analysis of experiments with the Direct Mental Interaction in Living Systems – DMILS contained in this publication but as these are contained in the Roe et al. analysis of distant intentionality they are not further considered here.) Remote staring is a paradigm where someone is instructed to look at someone else, usually presented via closed circuit TV, in random sequences. In the person who is looked at without knowing when, some measure is taken, usually electrodermal activity. 15 Studies yield an effect size of d = 0.128 ($p = 0.013$).

Table 1 – Summary of Most Important Meta-Analyses of Anomalous Cognition Research

Author	Paradigm	Effect Size	Significance p =	Comment
Storm et al 2017	Dream telepathy	d = 0.20	5.19*10-8	50 studies, 50 years research
Storm et al 2010	Ganzfeld telepathy	d = 0.15	1.15 * 10-10	30 new studies, replicating findings from 78 old studies
May et al 2018	Remote viewing	Not extracted	2*10-20	25.449 experiments within a military context
Bem et al 2015	Precognitive or retroactive priming	g = 0.09	1.2 * 10-10	6 sigma effect, 90 experiments, Bayes factor of 1.4 * 109
Duggan & Tressoldi 2018	Presentiment effect	d = 0.28	5.6 * 10-6	Replication of previous analysis with 27 new studies; Bayesian analysis yields robust results
Bösch et al 2006	Micro PK experiments	pi = 0.50003	z = 2.46, p < 0.05	380 experiments; final replication negative, hence small effect
Roe et al 2015	Distant intentionality	r = .26; r = .22	p < 0.05	Effects are not very strong; 49 non-human and 57 human studies
Schmidt 2012	Distant helping	d = 0.11	0.029	11 studies
	Remote staring	d = 0.13	0.013	15 studies

These are the most recent and most important meta-analytical data on anomalous cognition, which are summarised in Table 1. They show clearly that, over all experimental studies that have been conducted, all of which were blinded, randomised and controlled, there are clear and sometimes highly significant effects. The effect sizes vary but are usually small. They are quite robust and comparable across similar paradigms. This state of affairs led Cardeña (2018, p. 673) to observe: "*The analyses satisfy the "local and global criteria" specified by a critic of psi who demanded replicability, consistency of effects, and cumulativeness … The meta-analyses, conducted on studies using different protocols and by different researchers, provide cumulative vertical and horizontal support of psi. Vertical in the sense that across time different protocols have continued to produce positive results beyond what would be expected by chance, and with increasing methodological riguor; horizontal in the sense that there is support for psi across research areas*."

One can see that some paradigms yield very strong effects that provide significances beyond any reasonable doubt. If those were astrophysical effects predicted by some theory they would long have been accepted. If it had been a medication it would be on the market. But as our current worldview does not allow for such effects, people remain sceptical. However, the joint evidence should set us thinking. Those meta-analyses are, as

Cardeña observed, all quite recent. They summarise a long research tradition, in the case of the dream telepathy work it covers 50 years. Researchers have improved their methodology against previous analyses which we have not reported, and controlled publication bias critically. Publication bias is likely not a problem in this field of research, as the parapsychology community was among the first to demand that all studies, also negative ones are published, and this has been followed through quite diligently, as far as our personal informal experience goes, from talking with researchers and observing the field.

Thus, seen together and seen from a bird's eye view, the conclusion seems to be unavoidable that something strange is going on here, otherwise we would not expect to see so many experiments with positive results. These results are still hotly debated and contested after so many decades of research and actively ostracised by the scientific community. Every researcher trying to publish in this area can report anecdotes. Several anecdotes of sidelining, ridicule and active suppression are relayed by Dean Radin (2018). Perhaps the most obvious one is about a recent study of mediumship (Delorme et al., 2016) that was accepted after peer review, published, and then after a few months later retracted by the journal without further explanation in an editorial decision.

Such active or covert opposition is very likely due to the fact that the assumptions underlying current mainstream science, i.e. Science 2, cannot be squared with the results of parapsychological research. *Taking these results seriously is exactly what we suggest should happen*. They are strong enough. They question, together with other data and arguments, the validity of Science 2, or the materialist world view. The problem is that we have no fully fledged theoretical model which can accommodate both our traditional physical understanding and those anomalistic data. But this should be, we contend, stimulus for research and a different, broadened or more encompassing science. In terms of a Kuhnian or Laudanian view of science these types of results are an anomaly. Currently they are being ignored, sidelined, ridiculed or actively oppressed, depending on the circumstances. Taking them seriously would be the task of the day and would be likely to lead to a broader, more encompassing and perhaps even more exciting type of science.

Those types of findings contradict the rest of scientific findings only superficially. They call into question Science 2 with its unreflected materialist-localist background assumptions. Who has said,

Evelyn Fox Keller (1936-)

let alone proven, that there are only material entities and their effects in this world? Who has decreed that locality assumptions as stipulated by Special Relativity are valid beyond material signal exchange of photons? Who has demonstrated that Special Relativity is the final word on how connection within the universe is possible? In fact, nobody has. These are just assumptions, reasonable ones, without doubt, but assumptions nevertheless. Assumptions have to be questioned in the face of data, evidence and contradictory empirical results.

The empirical data reported in this section seem to speak a clear language whose minimum consensus message is that a materialist worldview that relies on local exchange of signals only is not sufficient to accommodate these data. What type of world model would be able to accommodate these findings is certainly an open question. We need a model that allows for some macroscopic non-locality, if we do not want to reform our physical theories to accommodate tachyons or give up on Special Relativity. The latter would be a very severe step (Cushing, 1989; McMullin, 1989; Stapp, 1989; Wessels, 1989). Lack of direct replicability is clearly a signature of these effects, as has been observed by recent attempts at such direct replications (Grote, 2015, 2017; Maier et al., 2014; Maier & Dechamps, 2018; Maier et al., 2018). This does not preclude meta-analytical pooling across many different experiments which, as we have seen, yields overall effects. But also within such analyses the decline, and often rebound of such effects, is seen – boredom on the part of subjects may play a role here (Storm et al., 2017).

It may be the case that the intentional stance of the experimenter – the "experimenter effect" - plays a pivotal role as well. This has been demonstrated experimentally by some studies that have been explicitly set up to test this hypothesis (e.g. Wiseman & Schlitz, 1997), or has been seen as an incidental effect (Walach & Schmidt, 1997, 2010). It has been demonstrated in a review (Kennedy & Taddonio, 1976), and it can be seen in the well known "sheep-goat" effect. This refers to the fact that participants who believe in the possibility of parapsychological effects, the "sheep", often have significantly positive results, while those who are sseptical, the "goats", often have significantly negative results. This has been confirmed by a recent meta-analysis which documented a robust effect of at least 5 sigma (Storm & Tressoldi, 2017).

Thus, the parapsychological database and its particular structure contains a double message that is difficult to unite with standard causal effects. It shows that such effects are clearly possible, or else we would not see so strong, continuously documented, and cumulative effects in diverse research paradigms, as observed by Cardeña (2018). But it also has some fickleness to it: the effects depend on the stance of the experimenter, and they are difficult to replicate by outright skeptics. As yet there is no fool-proof paradigm that could be taken by anybody to demonstrate such effects at will. They withstand direct and identical replications, while conceptual replications that change some element of the predecessor study are often successful.

We have suggested that this speaks in favour of the hypothesis that these effects are due to macroscopic types of non-local correlations, i.e. regularities and correlations between systems that are not mediated by known causal signals, such as photons or other exchange of energy or other types of interactions, and we have developed a model of these effects based on that idea (Walach et al., 2014). Such effects are not likely to be usable in a direct signal-theoretical sense as causes, and are therefore also not as reliable as causal effects (Lucadou et al., 2007). This is the reason why they do occur under certain conditions, but cannot be used causally, for instance to bankrupt a casino. This might also be the reason why such effects can be impressive in real life, but prove to be rather small and unimpressive in experimental models. It might even be necessary to operate within a physical theory of higher dimensions, hyperspatial models that posit such effects as reflections of higher dimensions of space and time, and some such models have been developed (Carr, 2015; Heim, 1984, 1989)

Whatever the true structure that is responsible for those effects, it is time to take them seriously. They are an example for why we need a broadened outlook of science and a reason why Science 2, as we currently have it, is inadequate.

These effects certainly point to one commonality: consciousness must be seen as an entity that is not solely dependent on brain activity, and that has its own causal role, not only within the organism, as causally feeding back on brain structure, but perhaps even in some as yet little understood interaction with other physical or mental systems. Exactly how such a model is to be conceived is certainly open to debate. We can here delineate what we find impossible and not reconcilable with the data, and what might be a minimum platform to start of from.

A Generalised Model of Nonlocality

One reason why the parapsychological database is difficult for scientists to accept is the fact that it implicitly contains a non-local concept of reality. We saw above, when describing locality, that the concept of locality is at the core of modern science. It is derived from Special Relativity which stipulates that the final speed in the universe is the speed of light. Together with the laws of electromagnetism this leads to the fact that signals can only travel at finite speeds and into the future, but cannot reach us from the future. This precludes precognition. Apart from that, signal strength decays by the inverse squared distance. This is why long-distance "signal transfer", such as in remote viewing, in distant healing or other types of subtle perception seem to be illogical on our current account of science. In addition, any signal would be subject to a multitude of interactions and hence the question can be raised how informationally accurate subtle signals can survive the heat and entropy bath they have to overcome in order to relay information.

Well, there is no good solution to this within a localist model, except if one accepts an extended type of physics that allows for some subtle field effect, such as the pilot-wave model of Dirac and Bohm, hyperspatial models like those advocated by Carr or Heim, or some other model like the akashic field of Laszlo. Such models are certainly possible as well and might probably describe the phenomena within an even richer theoretical framework that is in principle reconcilable with our known physics. They are theoretically coherent and formally plausible. And perhaps in the end there will be a clear need for such models. But we feel that currently a more parsimonious model might be sufficient as a bridge between mainstream theorising and the rich anomalous phenomenology even though it might be able to make only some aspects of the database plausible. It would be sufficient if some dialogue were starting to emerge, and to arrive at a final model at once might be wishing too much.

This is one of the reasons why we developed a generalised version of quantum theory (Atmanspacher, Filk, & Römer, 2006; Atmanspacher, Römer, & Walach, 2002; Filk & Römer, 2011; Walach & von Stillfried, 2011). It is important to note: *this has nothing to do with physics, but is a generalised theory* that applies to all types of systems. The background intuition is that physical quantum theory is one of the most successful theories of physics. Hence we assume that the *structure* it discovered is also relevant for other domains of reality, not only for physics proper, at least within our 4-dimensional reality. The basic two notions necessary to understand the generalised version of quantum theory (GQT) are the notion of a system and the notion of incompatibility. A system is whatever can be usefully separated from its environment for study or manipulation. Incompatibility denotes a pair of concepts that seem contradictory but need to be applied at the same time to describe an entity. Another word for "incompatibility" is "complementarity". The operational definition is that whenever the measurement influences the measured object we have a situation that has to be described by two incompatible operations. This is also the reason why incompatibility is at the core of the uncertainty relationship (2). Incompatibility can be formalised as

$$a*b \# b*a \quad (1)$$

or

$$a-b > 0 \quad (2)$$

In our normal, Abelian algebra, (1) would not hold. If we multiply 2 by 3, the outcome is the same as if we multiplied 3 by 2. In a quantum theoretical situation this is not true: the sequence of the operations makes a difference, or technically speaking: the observables (or operators, which are used to describe the observables) do not commute.

Thus, incompatibility is at the core of every quantum formalism. Or put differently: whenever we have incompatibility and impact of measurement on the measured object a quantum formalism applies.

Now the outcome of this analysis shows that this leads also to the prediction of a generalised version of entanglement. Entanglement is the technical term used by Schrödinger already in (1935) for the following observation. The formalism of quantum theory predicts that elements of one system remain correlated independently of space and time. Thus, if two elements of one quantum system were to be separated by a large distance and one variable measured in one part of the system, the corresponding variable in the other part of the system would exhibit a correlated value instantaneously, without any time delay and without any mediating signal. This "spooky action at a distance", as Einstein called it, is the correlated or entangled state of the whole system which shows itself in such seemingly intelligent or correlated behaviour.

For a long time this remained purely speculative

until physicists found set-ups to test this prediction. Today it is accepted as a reality, after a multitude of experimental tests (Aspect, Dalibard, & Roger, 1982; Aspect, Grangier, & Roger, 1982; Gröblacher et al., 2007; Kwiat, Barraza-Lopez, Stefanov, & Gisin, 2001; Ma et al., 2012; Pan, Bouwmeester, Daniell, Weinfurter, & Zeilinger, 2002; Salart, Baas, Branciard, Gisin, & Zbinden, 2008). The most recent and spectacular one was a test between measurement apparatuses set up about 1.5 km apart on roofs of buildings in Vienna, where the decision which parameter to measure was triggered by incoming light of stars 600 light years away only some nano-seconds before the actual measurement (Handsteiner et al., 2017). This set-up precluded almost all potentially hidden-variable theories. Thus, *physical* quantum-entanglement is an undisputed, real phenomenon.

However, such physical entanglement, although not precluded in principle, is unlikely to be the cause of other than strictly physical non-local phenomena. This is because physical entanglement can only be observed in highly isolated and artificially prepared systems and decays quickly with interactions with other systems.

But the generalised version we have developed actually predicts such entanglement correlations also in other systems, not as physical, but as systemic correlations, provided the following conditions are met:

1. There is a clearly definable system.

2. The system contains subsystems.

3. The description of the subsystems is incompatible with the description of the whole system, or, technically, global and local observables are complementary or incompatible.

This concept allows for an understanding of many phenomena that are otherwise difficult to intergrate into our scientific model as non-local generalised entanglement correlations that are not mediated by any signals but just originating in the set-up of the system.

This model has been successfully applied to understanding position effects in questionnaires that are well known in psychology, and the time parameters in a perceptual model of bistable perception, the Necker cube (Atmanspacher, Bach, Filk, Kornmeier, & Römer, 2008; Atmanspacher & Römer, 2012) Bach, Filk, Kornmeier, & Römer, 2008; Atmanspacher & Römer, 2012. It has been used to reconstruct practices of complementary medicine (Walach, 2003; Walach, Hyland, Hinterberger, & von Stillfried, 2006) and parapsychological phenomena (Walach, 2014; Walach & Horan, 2014; Walach et al., 2014) including its fickle nature of unstable effects (Lucadou et al., 2007). It can also be used to understand transference effects in psychotherapy, especially those cases where classical theories of implicit perception and cognition are insufficient (Walach, 2007)

To make it more concrete, here is the example of reconstructing transference experience. First of all, we can understand each human being as a nonlocally coordinated assembly of well arranged mental content. The elements of the psyche, the mental content, can hereby be seen as single subsystems of the total psychic system. The whole psychic system can be described by the observable of "unity" or "conjunction", as each psyche is its own unitary system. The single elements of psychic content – cognitions, ideas, impulses, emotions, mental concepts – can be seen as subssystems within the larger system. Those single systems can be described by the observable "separation" or "individuality", as they are to some extent separated from or individual constituents of the larger system, the psyche. Now, the observables "unit"/"conjunction" and "separation"/"individuality" are complementary or incompatible. Hence the model predicts non-local correlations between them. This is a reconstruction of psychic processes within each individual.

Now, if two individuals are joined together by a ritualistic bond, such as in therapy, or in a ritually sanctioned relationship, we have the same situation on a higher order level: two individuals – subsystems – joined together in a conjunction of a therapist-patient or couple dyad. Therefore, we would expect non-local correlations between them, as we have, again, the global description of unity or communion and the local description of separation. If, in the patient, part of the mental content is rejected or suppressed, there is a good chance that this will be transferred to the therapist who might then experience this content as her own, appearing in her psychic field. This is exactly how this experience is phenomenologically described by therapists (Daws, 2013; Heimann, 1950).

Note that all that is necessary here is the ritual bond, provided by the therapeutic contract and ritualistic elements of therapy like timing, place, beginning and end, payment arrangements, including the joint commitment of therapist and patient. This bond creates a new temporary system in which two individuals are joined together

through ritual systemic borders. The description of those sub-systems and the whole system as a unity and as individual or separated systems fulfils the requirement for a generic system describable through the generalised formalism of quantum theory, and hence we would also expect generalised entanglement correlations.

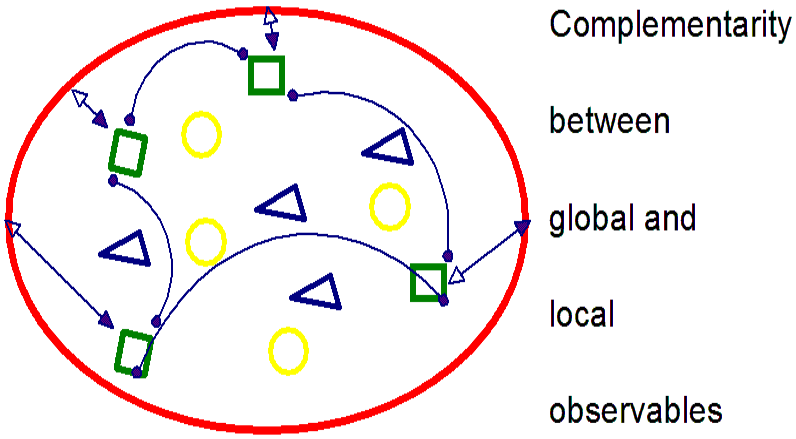
This same idea can also be used to understand telepathy, and in reverse order intentional healing. Here, the intentional act of the healer to imagine the healee in an improved or healed state is the moment that initiates a potential "transfer" of this image into the healee's lived reality. Indeed, some telephone telepathy experiments show a strong effect, if the caller was a closely related relative or friend (Sheldrake & Smart, 2003). We had difficulties replicating this finding, but saw repeated effects in specifically bonded and/or gifted pairs (S. Schmidt, Erath, Ivanova, & Walach, 2009). That ritual bonding might lead to some kind of correlation was visible in an experimental paradigm, where one participant was visually stimulated and anomalous deviations were seen in the EEG of the non-stimulated partner who had previously bonded with this person, but was electromagnetically shielded (Wackermann, Seiter, Keibel, & Walach, 2003).

The ideas are schematically represented in Figures 2 and 3. Figure 2 represents the requirements for generalised entanglement correlations schematically. Figure 3 is a schematic drawing of the example of a transference experience.

These are only examples that can show that the theoretical analysis of generalised entanglement or non-local correlations in a generalised context of quantum theory might be useful. This type of analysis can produce a theoretical understanding of how paranormal effects can happen without violating the common scientific consensus. The price one has to pay is low, in our view: we have to generalise the most successful physical theory, such that its structure becomes applicable to other systems. As a result we find that it might be meaningful beyond the physical context. There is no new entity, field or force that needs to be acknowledged. This does not preclude, of course, that some deeper structure, an as yet unknown field for instance, or a hyperspatial model of reality, might at some point explain the phenomenal correlations even more plausibly. Only, such models are more difficult to communicate, we suspect.

Figure 2

Schematic Drawing of the Requirement for Generalised Entanglement Correlations: Complementarity between global observables of a system and local observables of subsystems. The global observable is the complete description of the system, for instance unity. The local observables of the squared elements might be separation. They are incompatible with the global observable (arrows). Hence entanglement correlations (connecting lines to represent them) ensue



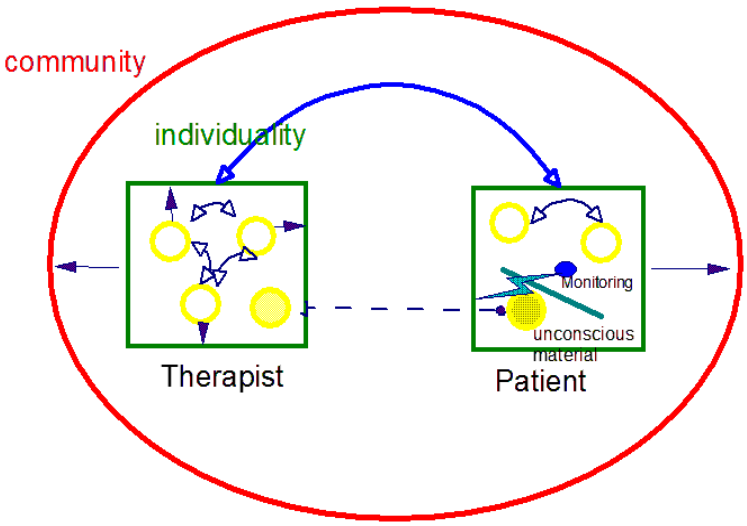


Figure 3

Schematic Drawing of the Transference Experience Analysed as a Generalised Entanglement Correlation: The common boundary is created by the ritual and therapeutic conctract and describable as the global observable "community". The individual subsystems of therapist and patient are describable through the local observables "indidivuality". Hence they are non-locally correlated. Within each person the same relationship holds. Therefore the unconscious or unwanted material in the patient can be transferred to the conscious field of the therapist

This little theoretical excursion might be suggestive enough to show that it is possible to construct a model of generalised non-local correlations that does not contradict our current scientific understanding. It might not be the end of the story but a viable, pragmatic way forward to incorporate non-locality in our world view. As it is our consciousness that does the partitioning of the world, that creates systems and boundaries, this model is also a good inroad to afford consciousness the place it deserves.

Photo by Iain McGilchrist

6 INTERMEDIATE SUMMARY: A ROLE FOR CONSCIOUSNESS

Consciousness has to be taken seriously in its own right and not only as a potential emergent property of a complex neuronal system. Or, in the words of Chalmers: consciousness is fundamental, at least as fundamental as matter (D. Chalmers, 2007; D. J. Chalmers, 2010)

We saw in the preceding section why we think that an emergentist model is insufficient. It cannot explain the many cases of apparent rich experience during documented inactivity of the cortex. It cannot explain non-local elements of perception during such NDE states, and from the parapsychological database, such as in remote viewing experiments. It also cannot explain precognitive experiences and direct mental interactions of consciousness with other systems, mental and material, as documented by experiments in healing, PK, and telepathy.

Thus, any model of consciousness that wants to be true to this phenomenology and to the full set of data which we have, needs to allow two minimum conditions: it needs to allow consciousness as an ontologically and causally active element of reality (Kelly, Crabtree, & Marshall, 2015; Kelly et al., 2007). And it needs to make provisions for a model in which consciousness can have non-local interactions with the material world and with other mental systems.

A minimum model is a kind of dual-aspect or complementarity model of body/matter-mind relationship.[4] Such models have been developed and described ever since Spinoza, and arguably Leibniz, developed the first types of models of its kind, because they were not satisfied with the implicit dualism of the Cartesian philosophy. Spinoza saw mental and physical attributes as two sides of one divine substance (Buckley, 1987; Epperson, 2009; Hoche, 2008; Jonas, 1980; Kennington, 1980; Spinoza, 1977). Leibniz saw his monads as psycho-physical unities but contested the implicit pantheism of Spinoza. He allowed for an implicit non-locality (Antognazza, 2009; Holz, 2013; Leibniz, 1966a, 1966b; Rescher, 1981; Walach, 2017a; Walach, von Stillfried, & Römer, 2006). Many modern authors have, explicitly or implicitly returned to these seminal insights, and we are not going to provide a full list.

Carl Gustav Jung and Wolfgang Pauli proposed such ideas (Atmanspacher & Primas, 2006; Atmanspacher, Primas, & Wertenschlag-Birkhäuser, 1995; Jung, 1952a; Laurikainen, 1988; Mansfield & Spiegelman, 1991; Meier, 2001; Primas, 1996). They assumed that a underlying transcendental unity they called "*unus mundus* – one world" presented itself phenomenologically to us as material and psychical. Both realities, psyche and matter, are of equal relevance and reality in this model. The underlying unity allowed for such strange experiences as synchronicity, whereby material events seem to behave in a way as if they were triggered by mental events but in fact the whole arrangement is a synchronous correlation and not a causation (Combs & Holland, 1990; Jung, 1952b, 1984; Mansfield, 1995; Peat, 1992). This explained for Jung the many personal experiences he had (Jung, 2009; Shamdasani, 1998, 2003), and for Pauli it was a minimum condition, because he was quite convinced that physics would only be complete once the theories of physics can accommodate consciousness or psyche, as he called it in Jungian terminology (Atmanspacher & Primas, 2006; Pauli, 1954).

Other versions of such dual-aspect models have been published (Hoche, 2008; Römer & Walach, 2011; Velmans, 2002, 2007, 2009; Walach, 2005; Walach & Römer, 2000, 2011). They are in essence revivals of this old idea with the additional feature that they make use of complementarity as a concept that was used by Bohr to describe the fact that a quantum can be seen as a particle or a wave, and that both concepts need to be employed conjointly to understand the reality of a quantum-particle (Bohr, 1937, 1966). This concept seems useful, as it conveys a structurally similar problem: how can one and the same thing have two completely different aspects? Bohr saw the potential extension of his concept into broader areas of philosophy, and explicitly named the relationship between mind and body as a potential wider application of his idea (Bohr, 1958).

Dual aspect or complementarity theories of conscious and material events are a minimum consensus. As Jung and Pauli have shown, they can explain non-local effects as observed in parapsychology, because they can easily be shown to set up correlations between mental states and

[4] There may be the need for a stronger model, where consciousness is even more fundamental than matter. But in such cases the more fundamental reality is likely not what we call "consciousness" here. We also suspect that such a transcendental monism is even more difficult to communicate than the model advocated here. This is the reason why we think it is sufficient to start on a minimum-model, leaving open other options, except a materialist model.

physical states within and across systems. What is likely necessary for this is a certain partitioning or preparation of reality within and through consciousness, for instance by conscious intention, intense focusing, perhaps strong psychological needs, as Jung thought, or perhaps through ritual aided types of focusing (Radin, 2018). Whether they would be able to explain non-local perceptions without apparent brain activity such as in NDEs would have to be studied.

It might be necessary to move towards more substantial theories of consciousness as have been proposed by some who see no escape from a dualist or panpsychist model of reality (Beauregard, 2014; Beauregard & O'Leary, 2007; D. J. Chalmers, 2010; Van Lommel, 2011, 2013; Whitehead, 1978), or even an idealist model (Goswami, 1990, 1994; Squires, 1990, Alexander, 2018), where consciousness is the primary reality and material reality derived from consciousness. This would be just a reversal of the relationship as in our current Science 2, where consciousness is secondary to and derived from material reality. At any rate, the argument that our most basic theory of reality, quantum theory, presupposes conscious observation and hence cannot be used to derive consciousness from matter, seems to us to be valid and powerful (Schwartz, Stapp, & Beauregard, 2005). Whether one has to subscribe to some idealist interpretations of quantum theory, like some do, is quite another matter. It certainly resonates with all those that have a leaning towards Vedanta and similar models (Cornelissen, Misra, & Varma 2014; MacPhail, 2017; Rao, 2005). But it seems to us that the history of Western science, especially in its 19th century successes in Germany, has moved away from the once popular idealist philosophy of Hegel and Schelling exactly because those idealist models had difficulties explaining the reality of matter in the same ways as materialist models have difficulties explaining the reality of consciousness.

We propose that turning the wheel back from a materialist concept of Science 2 to a potentially revamped idealist concept of a future model is not a good solution, historically and conceptually speaking. Hence we leave it at that and suggest a dual aspect model of consciousness, potentially enriched with the idea of complementarity as a minimum consensus model that would be able to incorporate most, if not all those phenomena which have been discussed in this section. This would actually be a comparatively small step. It would use a concept that is foundational for physics (I. Kim & Mahler, 2000) and apply it to the conceptual structure of the relationship between consciousness and physical reality, as had already been foreseen by Bohr. It would not require a major revision of accepted scientific theories or data, but it would allow for incorporating hitherto excluded data.

It might be possible to develop new concepts from an analysis of how information is at the foundation of the physical reality, and hence some mental or consciousness-like reality. This might be in fact a new way of reviving the old idealist stance in a scientifically more responsible and fruitful way, and some such ideas have recently been published which posit that information is at the bottom of our reality and will be the outcome of evolution, in which the universe will have come to a conscious realisation through human consciousness (Currivan, 2017; Elgin, 2009).

Holistic Concepts to Complement Analysis and Reductionism

Analytical thinking and reductionist methodology go together, and they are both very useful methods, as our scientific insights demonstrate. And we hasten to add: in no way would we want to see the abandonment of analytical methods and reductionism as a methodological tool. But it might be helpful if analytical methods were complemented by synthetic thinking in places, and reductionism would be suspended where the phenomena clearly refuse to be reduced to simpler ones. Reductionistic thinking is useful to overcome prejudices, for instance that it is impossible to do this or that, understand this or that. It has taught us now and again that it is possible to understand complex phenomena by breaking them down into smaller bits. But this is not always the case, and even reductionistic-analytical thinking would have been and still would be more successful, if we complemented it, at the same time and without giving it up, with holistic-synthetic thinking.

Let us use some examples to illustrate this point. Using reductionistic analytical thinking pharmacology has discovered lipid-lowering drugs. Whether it is actually useful to lower lipids in the blood is a matter of intense debate between the majority who think it is (Cholesterol Treatment Trialists' (CTT) Collaboration, 2015; Collins et al., 2016) and those who are dissenters and think it is a bad idea for various reasons (Hamazaki, Okuyama, Ogushi, & Hama, 2015; Harcombe, 2016; Harcombe et al., 2015; Okuyama et al., 2015). Mostly, those reasons refer to information *outside* the strict analysis of lipids and their relationship

Elisabeth Kubler Ross (1926-2004)

to heart disease. For instance fake correlations between heart disease and fat, as discussed above, are invoked and other functions of lipoproteins are emphasised such as their important role in immune defence against viruses. This is the reason, the dissenters suggest, why in one of the largest studies there is actually a survival benefit for people with high levels of lipoproteins and hence lipids in blood (Hamazaki et al., 2015).

Another argument against the clinical usefulness of statins, except in special cases of familiar hyperlipidemy is the following: lipid-lowering drugs block coenzyme Q10 (Littarru & Langsjoen, 2007), which is essential for mitochondrial functioning, and this blocking is the reason for the comparatively frequent statin side effects of muscle pains. Apart from that, statins change the balance between the essential fatty acids omega 3 and omega 6 (Farooqui, Ong, Horrocks, Chen, & Farooqui, 2007), and induce insulin resistance (de Lorgeril, Salen, Defaye, & Rabaeus, 2013). Lack of Q10 seems to also be associated with cognitive problems, and supplementation of Q10 can reverse some pathological signs of dementia, as Alzheimer mouse models demonstrate (Dumont et al., 2011). Long-term effects of coenzyme Q10 depletion are not studied well, because it became focus of research only recently, but one does not need a lot of phantasy and await hundreds of studies to venture forward with the educated guess that an enzyme that is vital for mitochondrial functioning is blocked at one's own peril. The changing of the balance between omega 3 and omega 6 fatty acids towards more omega 6 is a serious long-term problem. Ideally, the ratio between omega 3 and omega 6 polyunsaturaded fatty acids should be 1:1 and has been like that for a long time up until the end of the 19th century (Eaton, Eaton, Sinclair, Cordain, & Mann, 1998; Simopoulos, 2008, 2011).

This is important, because omega 3 fatty acids are, among others, precursors for anti-inflammatory cytokines, and omega 6 fatty acids are precursors for pro-inflammatory cytokines. The enzymatic pathways, however, through which they are converted, are the same (Féart & Barberger-Gateau, 2011; Moffett, Ives, & Namboodiri, 2009). Thus, a shifting of the balance leads to a pro-inflammatory immunological situation in the long-term. Epidemiological studies have shown that the omega 3 to omega 6 ratio already is at a problematic 1:15 to 1:20 in industrial countries due to our nutritional habits (Simopoulos, 2011). Indeed, a tilting of the balance towards more omega 6 fatty acids is associated with attention deficit disorder (ADHD) (LaChance, McKenzie, Taylor, & Vigod, 2016), and a low omega 3 to

6 ratio is protective against dementia (Loef & Walach, 2013).

Thus, the pharmacological intervention meant to lower one potential, and contested, risk factor for heart disease, cholesterol, has multiple knock-on effects which have not so far been well studied and from what we already know might be even more problematic than the effect they were meant to address in the first place. This emphasis is likely due to the high financial stakes: the studies to prove the efficacy of statins were huge, because they had to demonstrate clinically speaking tiny effects which require high statistical power and hence large numbers of patients (Penston, 2003). Such studies typically included 10,000 patients or more and thus cost multi-million dollars to conduct. By lowering clinical intervenion thresholds, targeting ever lower "high lipid" profile patients, the potential market is expanding correspondingly, and serious concerns have been voiced about fraud in studies and unreliable results, because of conflicts of interest (De Lorgeril & Rabaeus, 2016; de Lorgeril et al., 2010).

This example shows how one compartmentalised perspective - a result of analytical thinking and a reductionistic stance - and its corresponding logic has led to a certain insight, followed by policies which will have reverberations in other fields – increased pain, increased dementia problems, increased inflammatory diseases, potentially increased diabetes incidence figures. Those reverberations are not considered, or are considered late in the process, because the analytical stance also leads to a blinkered vision of the situation: only one problem, the influence of fat on cardiovascular disease, is highlighted, while other perspectives are not considered. This stance has been seen in many areas and has been bemoaned by senior members of the research establishment with the consequent call for being "adversarial", i.e. think against the prevailing intuition (Dorn, 2016).

A way forward would be to not rely exclusively on analysis and reduction of problems, but to complement analytical thinking with holistic or synthetic thinking, and to not teach and assume that only analysis and reduction is a valid scientific procedure. As we said above: Ockham's razor needs to be balanced by Plato's lifeboat in order to save the phenomena and not overlook important cross-fertilisations and connections.

A lot of detours could have been avoided, had this been implemented earlier. For instance, the dogma that the immune system and the neuronal system are completely separate systems is also a child of this analytical stance. Once the systems were functionally isolated they were kept conceptually isolated. Yet we know now that they are not. If one reads the early documents of the pioneers of the psychoneuroimmunological movement one gets an impression about the fierceness of the resistance they encountered and the intellectual battles they had to wage for something which we now know was a huge progress in science and would have been quite evident earlier on, had not a certain way of thinking banned the cross-fertilisation and made it "fringe science" (Ader & Cohen, 1975, 1991; Ader, Felten, & Cohen, 1991; Blalock, 1984; Blalock & Smith, 1985).

As the binding problem in consciousness research and neurobiology shows, our brain processes information in separate and seemingly isolated areas, but our conscious experience of, say a barking dog, is that of a unitary object (Uzan, 2011). We do not hear barking, and see a raging dog, sense the slight uneasiness associated with it, separately, but together as one percept "dog barking scary", although we know from neurobiology that all those elements of the single percept are taken apart by our neuronal system and processed in quite distant areas of the brain. Exactly how they are united is still a mystery, although ideas about frequency modulated processing seem to offer a solution (Pöppel, 1997). But also here the complementarity of holistic and analytical processes seems to be a good heuristic approach (Pöppel, 2005).

The same is true for medical approaches in general. We interpret the cultural move towards complementary and alternative medicine interventions that has been observed in Western cultures since the 80s as the expression of consumer dissatisfaction – perhaps even doctors' frustration – with the largely analytical and compartmentalised thinking of conventional medicine. Interestingly, really successful medical models overcome that in practice by close collaboration of specialists and cross-fertilisation (Gawande, 2009). But it is not the rule. Many patients feel that the specialisation in medicine - a result of the analytical stance and its overemphasis - is doing them a disservice and so they turn to models that offer them a "holistic", "complementary" approach, by looking not only at their diagnosis and symptoms, but also at other aspects of their physiology, psychology or social life to find an optimal diagnosis and treatment. This would likely by sufficient if there were mechanisms to integrate extant knowledge and coordinate different therapeutic approaches

into one coherent model (Social Care Institute for Excellence, 2017; Wales, 2012).

These examples might suffice to make our point: analysis without synthesis, reductionism without looking at the whole is a lopsided boat in danger of capsizing. We think that this stance is due to an overemphasis of the background assumptions elucidated above, and thus are a direct result of Science 2, the currently active world model which is propagated and implicitly transferred through the way science is conducted, how students and young researchers are tutored, what research is funded and what studies are published. A broadened view on science, or a reformed Science 3, would place more emphasis on synthesis and holistic or systemic viewpoints.

Towards a Science of Introspective Knowledge

The current world view of Science 2 allows only one useful function for introspective knowledge of consciousness: reports of inner affective, volitional or cognitive states. This is how standard psychology operates. Questionnaires ask about attitudes or well-being, thereby presupposing introspective access to those inner states. Cognitive paradigms, for instance in problem solving, probe mental strategies by having participants voice aloud what they are currently thinking or trying out mentally. Clinical psychologists ask their clients about how they feel, what they think, what they assume other people feel, say or think about them.

In all these examples introspection is an important and necessary tool for the research process and in that sense already part of the standard scientific methodological arsenal. In fact, no part of science would be functional, were it not for the fact that scientists can observe their own mental states and report correspondingly and accurately what they observe. Whether it was Galileo looking through his telescope and reporting seeing the phases of Venus or the moons of Jupiter, or Koch looking through his microscope and reporting seeing the tuberculosis bacillus: all scientific observations and their reporting are based on introspection. We have no other access to our sense perception than observing ourselves seeing, hearing, tasting, etc. As Brentano realised: consciousness is intentional – as a rule – i.e. is directed towards something else, namely a percept, a thought, an emotion, a volition or its respective object (Brentano, 1982).

Thus introspection seems to be a normal and uncontested part of the research process. But the referent of such states is always an object in the sense of something that is either "out there", as in every perception, or "in me" as in a part of the psychological field, such as an affective state, a wish, a thought, an attitude, or idea. Science proper has developed strategies to purify these perceptions and control for error: observations have to be intersubjectively verified, i.e. someone else also has to be able to see the phases of Venus or the moons of Jupiter, or the bacillus needs to be visible also in other microscopes and not only in Koch's. This is the reason why science likes to forget about the fundamentally subjective source of its knowledge.

Psychologists have moved from imitating this scientific stance by only looking at observable data like behaviour and physiological measurements, as the behaviourists would have it (Baars, 2003; Leahey, 1987; Skinner, 1989), to allowing cognitive concepts to enter their theories and practice (Meichenbaum, 1977; Neisser, 1973). But, as a rule, it is still introspection as if an object were observed. Questionnaires are supposed to objectify and "measure" cognitive or affective constructs, as if they were some describable objects.

Recent methodology has seen a qualitative turn in psychology and social science: Interview methods and reconstructive methods such as discourse analysis have become acceptable, if not a boom (Averill, 2002; Braun & Clarke, 2006; Broughton, 1991; Craig et al., 2006; Sager & Andereggen, 2012; Strauss & Corbin, 1990; van Maanen, Dabbs, & Faulkner, 1982). All these methods rely on introspection on the part of the participant *and* the researcher, as the researcher is his or her prime instrument, to be precise, the researcher's conscious experience is the instrument. These methods make the irreducibility of subjective experience the hub of their vantage point and do not try to depict an allegedly objective reality, which is illusory in psychological and social research, and probably in all research, anyway. Instead, they want to explore subjective worlds of meaning and individual construction of reality.

To that effect, introspection has already entered the stage and we seem to be on a fool's errand by demanding a special place for introspection in science. The point is a bit trickier, though. *Our point is the following: if consciousness is not only a contingent consequence of brain architecture or an emergent function of neurological anatomy of a complex neuronal system, but a real aspect of our world complementary to matter, then under certain circumstances consciousness would be able to access*

aspects of reality directly, without a detour through the senses and sequential analysis.

If we visualise a complementary dual aspect model of reality or body-mind-relationship as in Figure 4, then we can imagine that we have two routes of knowledge about the world: we can access it through the conventional and well known paths of sense perception and its sophisticated aids that science has developed. But we can also imagine that through turning consciousness inwards, as in contemplative and meditative practices, or perhaps some other extraordinary states of consciousness, we might have direct access to and introspect some deeper aspects of reality.

Figure 4

Graphical Representation of Body and Mind as Complementary Aspects of Reality in a Dual-Aspect Theory

This is of course the traditional way of contemplative, meditative or mystical traditions. It might also have been a way of knowledge that shamans used through specific states of consciousness induced through certain drugs, rituals or hypnotic states. Our proposal amounts to integrating at least part of this potential access route into an expanded Science 3. It presupposes, we repeat, that we see consciousness as a reality in its own right, certainly intimately connected to our body, at least under ordinary circumstances, but phenomenologically and perhaps even ontologically different. If that is so, then a turn of mind or consciousness inwards should be able to touch reality and disclose some truthful knowledge.

While other aspects of introspective knowledge, such as the qualitative methods referred to above, have had quite some time to develop and discuss their methodology and quality criteria and how to arrive at valid results, this type of contemplative introspection has not had any tradition in the West at all. Let us call it *radical* or *direct introspection* to distinguish it from standard qualitative methodology. Standard or indirect introspection of qualitative methods or scientific introspection always has something to refer to, which can be shared with others: Galileo could lend his telescope and point someone else to observe the phases of Venus. Koch could let his assistant and his colleagues look through his microscope and present his probes. A qualitative researcher can provide the transcript of his interviews, the log

of his observations, a video clip, or text samples, etc. There is always some presentable referent that refers to something else, and hence this type of introspection, although in principle private, also has some intersubjective aspect.

Radical or direct introspection has no such referent except its own experience, and potentially a written or narrated account of it. Hence it is prone to the subjective bias to which we are all and always subject: our predilections and prejudices, our likes and dislikes, our cultural, historical and political conditioning, and our verbal efficiency in describing what we experience. It is obvious that we do not have any methodology for ascertaining anything like truth value or probability in such cases, and hence such reports are normally considered at best interesting, but of little scientific value. It would be the task of a future methodology of first-person experience to establish this. Some ideas have already been presented (Ferrer, 2002; Velmans, 2007, orig. 1993; Walach & Runehov, 2010). The methodological keys are that the experience is recordable or reportable, that it is communicable and to some extent shared or potentially intersubjectively available.

If we assume, for instance, that spiritual experiences are at the base of religious teachings, then we can consider these teachings results of repeated experiences. To the extent that others have similar experiences, they will share the core of the teaching or reject it. In that sense a transposition of first person singular statements of experiences into first person plural statements represent a vital step. This is the route from "I" to "we". For instance, if one person has the experience of universal interconnectedness and derives the moral injunction from it to not harm others, because there is no real difference between oneself and others, this might be an inspiring experience for this person, but of little wider consequence. Should, however, many people have similar experiences, following a particular contemplative practice or just spontaneously, should they report and share the experience and someone condenses the core elements of these experiences into a shared core, then we would have witnessed the transformation of first-person-singular statements of experience into first-person-plural statements.

Structurally, such first-person-plural statements have a similar status to repeated scientific observations or intersubjectively shared perceptions: they report an experience of reality that was shared by many. The only, and important, difference is that the *referent* of this experiential statement or the experiential reality is a subjective experience and has no material subsistence, as far as we know.

It may be useful to remind ourselves that long traditions in the East, Buddhist psychology (Bankart, 2003; Barendregt, 1996; Buddhaghosa, 1952; Goleman, 1975; Wallace, 2000; Wallace & Shapiro, 2006), and Vedanta (Cornelissen et al., 2014; MacPhail, 2013, 2017; Rao, 2005; Sedlmeier & Kunchapudi, 2016; Wilber, 2000, 2001) have used such approaches. The difference of our proposal is not in kind, but in degree and in method. While Eastern approaches have nearly exclusively focused on spiritual experience and development of inner knowledge, understanding the workings of the mind and relief from suffering, and neglected material reality, it is a hallmark of Western approaches of science to emphasize our material existence, research it and make it useful (Nisbett, Choi, Peng, & Norenzayan, 2001). It is another aspect of complementarity that both, inner approaches to consciousness and outer approaches of studying our material reality go together and need not exclude, but rather complement each other and enrich our knowledge.

Such an approach of radical introspection was also at the beginning of modern psychology: Franz Brentano, who can be considered one of the founding fathers of Western psychology, wanted to build psychology, and indeed philosophy, on such a basis of introspection and shared experience (Albertazzi, 2006; Brentano, 1895, 1995a, 1995b; Guttmann, 2002; B. Smith, 1994). He was only indirectly successful in two ways and unsuccessful in his direct approach. He was indirectly successful, because he inspired Freud and the whole development of clinical psychology (Merlan, 1945, 1949), which rests genuinely on introspection of both patient and therapist. And he was indirectly successful in a second sense, because he inspired the phenomenological movement, as Edmund Husserl was one of his students (Husserl, 1919; Kraus, 1919; Zahavi, 2009).

But directly he was unsuccessful for a variety of reasons. One was private: he had been a Catholic priest and was in charge of drafting the German bishopry's theological recommendation against papal infallibility. When the pope declared infallability nevertheless in 1869 he left the church and his priesthood. When he wanted to marry a Jewish heiress to a big Viennese banking business, he had to renounce his chair in Vienna and move to Saxony to be able to marry. When he came back he was not allowed to resume his chair by the government, and so gave up after many years of struggle, frustrated and tired of fighting

Hypatia of Alexandria by Masolino da Panicale (1383 - 1447)

(Brentano, 1895). He never wrote his "Magnum Opus" that he had promised in which he wanted to show how such a "Descriptive Psychology", based on introspection, would work. A more systematic reason for his lack of success may well be the fact that it is important to have trained and dedicated participants who have learned how to introspect, how to focus attention inward and be able to hold it there for any length of time. This, rather than the impossibility of transcending the conceptual nature of introspection (Lyons, 1986), was the reason for Brentano's lack of success. After all, radical introspection consists of more than observing concepts arising in front of one's mind's eye, as Lyons seems to assume.

Another Western forefather of this concept of radical introspection is of course William James with his concept of "radical empiricism" (W. James, 1912). He wanted to make everything which occurred within the experiential stream of consciousness part and parcel of psychological science. Indeed, he defined psychology as the study of "states of consciousness as such" (W. James, 1984, p. 9). James' attempt was not developed further, as it was cut short by the rise of the behaviourist movement in the US which rapidly ostracised all references to internal states as "unscientific", following the positivist turn in science. It only allowed introspection as ways of accessing internal behaviour, such as thoughts (Boring, 1953). This positivist turn, although theoretically and conceptually long left behind, is still very powerful in the practice of the life-sciences and psychology in particular. Our call is an attempt at linking back to those aborted attempts at a modern, Western concept of radical introspection, as exemplified by Brentano and James. It starts with acknowledging that we have actually not had any methodology of radical introspection in the West to speak of and the need to develop one, potentially also drawing on other traditions.

Hence, taking direct introspective knowledge seriously will not mean going back to older traditions, as some type of New-Age science suggested in the 80s and 90s, but will mean developing a new methodology. Perhaps this new methodology will borrow some insights from older traditions and will draw inspiration from them. But the difference will be that the methodology should be distinctively secular, embedded in the scientific tradition. This scientific tradition, in consequence, will have to change and give up its ties with a materialist ontology. In our terminology, it will have to develop from Science 2 to Science 3.

Chartres Cathedral, The School of Chartres was a major centre of scholarship in the 12th century

A Historical Reminder: Direct Introspection in Roger Bacon in the 13th Century

It is interesting to note that such a comprehensive view of experience – directed to the outside world as sense experience of science, and directed to the inner world as mystical experience – was present in the very cradle of Western science. Roger Bacon, the Franciscan friar and one of the forerunners of a scientific approach in the West, was requested by the Pope to write down his ideas for a reform of university teaching and learning for the Western church in the 13th century, as the Pope agreed with Roger Bacon's assessment that it was in dire need of reform. So, in haste, and probably also in secrecy - because at his time of writing there was a general publication ban active for all Franciscan authors except for what was approved by the head of the order, Bonaventure - Bacon put together his thoughts and had them sent to Rome in 1267.

What he had written he called "Opus Majus", his larger work, to differentiate it from a postscriptum, the "Opus Minor", the smaller piece, which he sent later, and still a third book, in which he put together what he thought he had forgotten, the "Opus Tertium". It is noteworthy that Bacon conceived of these four volumes only as sketches for his "Scriptum Principale" or his Main Text, which he offered to write on Papal orders, should the Pope like his ideas and move forward with his suggested reforms. Unfortunately, such a move never happened, because the Pope died shortly after having received Bacon's books, probably without even having had time to read them; a ceiling came down and killed him.

So Bacon's ideas went largely unheard, except for some excerpts regarding mathematics, optics and other parts which were copied in his order and read eagerly in Paris (Clegg, 2003; Easton, 1971, orig. 1952; Hackett, 1995, 1997a, 1997b; Lindberg, 1983; Mandonnet, 1910; Moorman, 1968; Power, 2012). Along some convoluted paths Roger Bacon's ideas found their way, via Pico della Mirandola, back to England, where they were taken up by Francis Bacon in the 17th century, otherwise no relative. Francis Bacon's teachings of the idols, for instance, can already be found in the older Bacon's writings.

This text of Roger Bacon contains many suggestions. In the main, Bacon wanted to ground learning in experience; scientific experience and mathematical analysis for the sciences, thorough knowledge of languages, especially Greek and Hebrew including good grammar, and inner

mystical experience to inform practical life, political decision making and governance and individual happiness.

He writes: "*Duo enim sunt modi cognoscendi, scilicet per argumentum et experimentum. Argumentum... non certificat neque removet dubitationem ut quiescat animus in intuitu veritatis, nisi eam inveniat via experientiae; ... ergo argumentum non sufficit, sed experientia ... Sed hic loquor de experto, qui rationem et causam novit per experientiam. ... Sed duplex est experientia; una est per sensus exteriores, et sic experimenta ea, quae in coelo sunt... et haec inferiora... experimur.... Et haec experientia est humana et philosophica, quantum homo potest facere secundum gratiam ei datam; sed haec experientia non sufficit homini, quia non plene certificat de corporalibus propter sui difficultatem, et de spiritualibus nihil attingit. Ergo oportet quod intellectus hominis aliter juvetur, et ideo sancti patriarchae et prophetae, qui primo dederunt scientias mundo, receperunt illuminationes interiores et non solum stabant in sensu... secundum quod Ptolemaeus dicit in Centilogio quod duplex est via deveniendi ad notitiam rerum, una per experientiam philosohiae, alia per divinam inspirationem quae longe melior est, ut dicit. Et sunt septem gradus hujus scientiae interioris, ... Septimus consistit in raptibus et modis eorum secundum quod diversi diversismode capiuntur, ut videant multa, quae non licet homini loqui. Et qui in his experientiis vel in pluribus eorum est diligenter exercitatus, ipse potest certificare se et alios non solum de spiritualibus, sed omnibus scientiis humanis.... necessaria est nobis scientia, quae experimentalis vocatur. Et volo eam explanare, non solum ut utilis est philosophiae, sed sapientiae Dei, et totius mundi regimini* -

There are two ways to gain knowledge: experience and argument. Argument does not give us certainty and does not remove doubt so that our mind might rest in the intuition of truth, except it finds it in experience [He then explains how we only know about fire through experience, not argument]... Consequently, argument is not sufficient, but experience. But here I am talking about someone who has made an experience, and thus knows about reason and cause through experience... But experience comes in two modalities. One is experience through the exterior senses, and through those experiences we experience what is in the heavens and what is below... And this is human and philosophical experience. We can have as much of it as is given to us by grace. But this experience is not sufficient for us humans, because it does not give certainty about material bodies, because of their difficulty, and in spiritual things it does not attain anything.

Therefore the human intellect needs support from elsewhere. And this is exactly the way the holy patriarchs and prophets, who have first given knowledge to the world, received inner illuminations and have not just remained in the outer senses... Ptolemy says, in his book Centilogion, that there are two kinds of attaining knowledge about things, one through philosophical (i.e. scientific) experience, one through divine inspiration, which is much better, as he says. This inner science has seven steps [he now goes on to explain them; this is the classical Franciscan path of contemplation]... The seventh consists in ecstatic enlightenment and its various modes of understanding, according to which various people understand various things, such that they see a lot, about which humans are not allowed to speak. And whoever has a lot of careful practice in these experiences or in many of these, can assure himself and others, not only about spiritual matters, but about all human sciences... We need such a science, that is called a science of experience. And I want to explain it, not only how useful it is for philosophy, but also for Divine wisdom, and for the governance of the whole world." (Bacon, 1897, vol 2, p. 167 ff.)

Hence we can see: at the very origin of Western science there was an idea of a holistic type of experience, directed outwards to experience the world, what we today call science proper. In addition, though, there is also experience directed inwards, called spiritual or mystical experience in the language of the time, called pure introspective knowledge by us in our context. Both are necessary, both belong together, Bacon says. Well, we think he is correct, and had the Pope lived on and had read Bacon's text, he might have enacted his ideas, and might have asked him to move forward with his idea of reform; in that case we might have had another, even more comprehensive science today. But history is as it has developed and there is no point in moaning and wishing otherwise. But historical reflexivity can actually teach us that such ideas have been around, even in the West, for a long time, buried in archives and dusty volumes, but present nevertheless. Perhaps it is now time to revisit them and take them seriously?

At any rate, what we have in mind, a direct or radical introspection, is not a novel or outlandish idea. It only sounds like it in the context of Science 2 as we have it currently, in our materialist scientific world view. This, we have argued, is neither a necessary, nor a particularly useful stance.

Looking into current scientific practice, we can actually see some first attempts. The movement of "*Contemplative Neuroscience*" is such an attempt.

It tries to parallel third person perspectives of neuroscientific approaches, through MRI, EEG, MEG, with phenomenological, first person accounts of such experiences, thereby enriching the otherwise somewhat sterile data (Beauregard & Paquette, 2006; Dor-Ziderman, Berkovich-Ohana, Glicksohn, & Goldstein, 2013; Jo et al., 2015; Jo et al., 2014; Lancaster, 2011; Naranjo & Schmidt, 2012; Singer & Klimecki, 2014; Trautwein, Naranjo, & Schmidt, 2016; Walach, 2011; Wittmann et al., 2015). While these studies use traditional approaches of introspection and pair them with neuroscientific methods of observation from a third-person perspective, they still point to a rehabilitation of conscious phenomenological viewpoints as postulated by Varela, Thompson, and Rosch (1991) and demanded more recently by Bitbol and Petitmengin (2013).

The point of radical or direct introspection takes matters one step further. It is the suggestion that we include systematic approaches of meditation or contemplation in the scientific arsenal and develop methods to share, discuss, and potentially verify the resulting experiences in order to distil out common and potentially intersubjective elements. The first step would be towards openness and acceptance of such approaches and a common understanding that this is an important potential new development. Whether it will then be followed by activity such as publications and insights worth sharing remains to be seen.

Inclusive Thinking and Classical Logic

This move may well have a further beneficial consequence: it will complement logical thinking with inclusive thinking, which again, are not opposites, but actually complementary pairs of one global rational approach to our world. Logic, we repeat, is a necessary basis for science, as without it we would be prone to all kinds of incoherent statements. But logic is not enough. It only applies to sentences and to predicative structures, as elaborated above. And our bias towards this kind of thinking is very likely a cultural bias which is preventing innovation, creativity and insight (McGilchrist, 2009). Aristotle emphasised that the final reality, has to be "seen" in what he called "noesis" thinking. But this kind of "thinking" is not, what we mean when we say "thinking". It is more akin to insight and the result of direct introspection as formulated above. In that sense, what we have in mind here is very much akin to the ancient Greek notion of "thinking" or intuiting (Bouratinos, 2018). Such an insight or intuition of reality is of course something that then needs to be spelled out, developed in detail, narrated or related in language. This is, then, when logic is called for. The transposition of first-person-singular experiential statements into first-person-plural common statements will require the application of reason and basic logic. But it is important to realise that the basic intuition of reality itself might actually transcend classical, binary logic. This has already been observed regarding the structure of quantum mechanics, which is a description of the deep structure of reality (Isham, 2005; Putnam, 1985).

While classical logic operates via the exclusion principle "either-or", an inclusive type of thinking or a more-valued logic operates via "both-and" inclusion, recognising that there may be situations where logically exclusive alternatives *appear* to be applicable, but are actually wrong. Everyday experience is rich in examples. For instance, in human relationships we rarely have clear cut alternatives, where we either like others, or hate them. Most of the time our attitudes are mixed, and clear cut division is actually a sign of psychopathology, where grey shades or the contradictions in the perception of others are missing, or cannot be integrated (Kernberg, 1985, orig. 1975). For instance, most of the time our parents were both helpful and supportive, as well as sometimes unempathic and unsupportive. It is the task of growing up to integrate these experiences into a rich and realistic image of our parents which is a hallmark of an adult perspective on one's childhood (Main & Goldwyn, 1996). In the same sense, reality is likely to offer many situations where inclusiveness is a better heuristic than the application of exclusive logic. Politics offers a rich field of application as well, where it is only in rare cases helpful to condemn the actions of others or to separate other nations into those that are "good" and those that are "bad".

In science, inclusive thinking is also useful, mainly in the context of discovery. As already mentioned, the strict application of exclusive thinking has hindered progress in many fields. Neurotransmitters, for instance, can have different, even opposite effects, depending on the receptors they bind to. It took a long time to realise this, because of an overly active application of exclusive reasoning. Hormones can also act as neurotransmitters, depending on where they operate and what receptors they interact with. Peptides can have both immunological and transmitter functions, depending on the context. These discoveries would have been arrived at sooner, had there been more openness to inclusive reasoning.

The application of more inclusive thinking is already common in many branches of social science. It would likely produce more sustainable solutions in politics and economics and would be more helpful in science and various other areas, especially in discovery and in the context of solving problems or finding creative solutions. In fact, Reich has found in an empirical study that young people often develop beyond the stage of formal logic which was considered the highest cognitive developmental stage by Jean Piaget (Reich, 1999, 2003). He called this type of thinking at first "complementaristic" thinking, and later "relational-contextual reasoning", because it is a reasoning that considers the context of situations and understands that there often is no clear cut solution, and hence problems cannot be solved by stating "either" this, "or" that, but by structures like "if-then", or "both-and". It is interesting to see that adolescents seem to grow into this by themselves and that classical developmental psychology has so far not integrated this finding.

Inclusive thinking can also be applied to the proposals made here. It is not either "science, objectivity, materialism" or "spirituality, introspection, consciousness". It is both. We need both a clear intersubjective study of matter, as in science. But we *also* need an enlarged set of background assumptions that allows the study of consciousness, direct introspection and the intersubjective scrutiny of first-person accounts of direct experiences of reality. It would be a large step forward for our culture and for all kinds of developments, from political peace keeping missions to economic developments, from education to university training, if more inclusive and systemic thinking were employed and the logical "either-or" structure relegated to situations where it belongs: to predicative structures of decidable observations or statements.

Many seemingly irreconcilable opposites would then dissolve, for instance the opposition between economy and ecology, growth and sustainability, freedom and peace, taking care of oneself and being responsible for others. In fact, it is arguably a sign of psychological development if someone is able to hold what appears as opposites as belonging together. For instance, if the exclusive logic of either-or is applied to child-rearing, disaster is pre-programmed. Children always need both: freedom and structure, love and challenge. If they are left to their own devices entirely, they will create havoc, become unhappy and challenge adults with their behaviour into showing them borders and stop signals. If they are always kept within safe borders, not allowed to explore and also overstep some boundaries every now and then, they will develop into anxious, fearful, but also uninspired individuals with little creativity. So it is the combination of two opposites together that is necessary. It would be an interesting task for a broader Science 3 to explore the contexts in which a certain type of logic is appropriate. We expect that whenever we touch the deep structures of our world we will need to fall back on a more inclusive logic. Whenever we are moving at a surface structure we can apply the either-or of exclusive logic. It would be an important task of a more comprehensive and inclusive science to explore these issues.

But in order to do this, it will be necessary to move beyond the exclusive connection of Science 1, the practice and everyday business of science, to Science 2, the materialist world view which comes with a narrow methodology and an overreliance on a certain type of rationality.

If spiritual experiences, or direct introspection, are going to be taken seriously, then such inclusive thinking or a transcendence of binary logic will be inherent. We saw already with Bacon, in the text quoted above, that what is experienced in such types of spiritual experiences "men are not allowed to speak of". This we take to mean that the content of such experiences is too rich to be pressed in the structure of simple sentences, and to be submitted to exclusive logic. This is also the reason why many religious texts are full of contradictions, or work with paradox in a systematic manner, such as in Zen practice (Miura & Fuller Sasaki, 1966).

Whenever we consider the phenomenology of such experiences, for instance in scholarly or personal accounts (Barendregt, 1996; Bucke, 1901; Forman, 1999; W. James, 1985; MacPhail, 2017; Wirtz, 2014), we find that the content is not expressible in simple structures. Experiences are said to be "too big" to be expressed. They are often clear but need time to be spelled out, as Ignatius of Loyola said of his own experience in his retrospective autobiography (Loyola, 1977). They often contain seemingly contradictory elements, like pain and joy, dread and liberation at once (Wirtz, 2014).

This may be due to the fact that such direct, radically introspective experiences of reality touch upon the deep structure of reality from within. Here is a modern example of such an experience from a prominent astrophysicist who calls himself an atheist, who had this experience spontaneously, when he travelled to his island residence in a boat, switched off his engine and looked at the stars from his boat:

"*I lay down in the boat and looked up. A very dark night sky seen from the ocean is a mystical experience. After a few minutes, my world had dissolved into that star-littered sky. The boat disappeared. My body disappeared. And I found myself falling into infinity. A feeling came over me I'd not experienced before. Perhaps a sensation experienced by the ancients at Font-de-Gaume [a cave with Paleolithic paintings he had described earlier]. I felt an overwhelming connection to the stars, as if I were part of them. And the vast expanse of time - extending from the far distant past long before I was born and then into the far distant future long after I will die - seemed compressed to a dot. I felt connected not only to the stars but to all of nature, and to the entire cosmos. I felt a merging with something far larger than myself, a grand and eternal unity, a hint of something absolute. After a time, I sat up and started the engine again. I had no idea how long I'd been lying there looking up*." (A. Lightman, 2018, p. 6)

We see here many elements of such an experience also reported by others: an experience of unity with something much larger; an experience of timelessness compressed into a dot; a feeling of connectedness with the whole cosmos. A modern introductory text on Zen contains quite a few such experiences from Japanese and Western practitioners (Kapleau, 1969). Here is, as a complement to the experience of Lightman, an astrophysicist and self-professed atheist, the experience of a young modern day Zen practitioner. He reported, as part of his Kensho-report, which he had to submit to his teacher after acknowledgement of his first break-through experience, also an earlier experience which he had in a completely different context many years previously:

"*Suddenly it appeared as if a door opened. Reality broke asunder, or, to be more precise, it did not break but it was as if a curtain was drawn apart. The very same reality showed itself in a completely different light, as it were, and it was clear as the sun, in the truest sense of the word, for, at the same time, I saw a miraculously bright light which was as bright as the sun but still did not blind me. It made everything appear clearly. It was clear as the sun that this is exactly the reality and at the same time separated from us by a wall of paper, although it is not separated... In Zen-terminology it was the true being - and I am identical with it. Within me and within everything else, there lives the very same light and I am it, completely identical with it. An incredible wave of joy, never experienced before or after, literally washed me from the path I was walking on... And I knew: this reality is reality itself; it is always there, only we do not see it. Suddenly I understood a lot, with an understanding that is happening, as it were, in a huge lightening of the now, and whose explication is still ongoing...*" (Walach, 2017b)

We see here similar structures: insight and connectedness, suddenness and understanding, light and the metaphor of a bright light like the sun, the compression of the experience into a seeming dot or moment, and in addition to the experience beyond the experience of joy. In both experiences – and the examples could be multiplied – we see seemingly contradictory structures: here and everywhere, individual and the whole, now and eternity, time and duration, separation and connection, all of which do not fit a structure of a simple, exclusive, bivalent logic.

While physics and quantum mechanics touch on the deep structure of reality from an outside approach as it were and reveal a rich reality that does not obey the bivalent logic, radical introspection or spiritual experiences seem to do the same, using the route via consciousness. We posit that systematic training of such practices, through meditation, contemplation or any other practice of a culture of consciousness will enhance people's capacity to think in more inclusive and less exclusive terms and use a richer structure of rationality to approach our reality and other people.

Abductive Reasoning – The Scientific Equivalent to Direct Introspection

A similar process is already in fact inherent in scientific discovery, one which is little studied and little known. This is the process of abduction: the way scientists order disparate pieces of information and data creatively into a new theoretical structure. The term "abduction" or "abductive reasoning" was coined by Charles S. Peirce who called abduction "*facts in search of a theory*" (Peirce, 1931, VII p. 218). Abduction in science is similar to the way the detective pieces together snippets of evidence to gain a full picture (Caprettini, 1985; Eco & Sebeok, 1985; Hintikka & Hintikka, 1985; Nickles, 1980; Sebeok & Umiker-Sebeok, 1985). Peirce showed that it is always the first step in a circle of scientific reasoning (Hulswit, 2000; Nickles, 1980). In fact, this idea was already present at the beginning of Western theory of science and had been formulated by Aristotle in his Organon (Aristoteles,

1990), where he called this particular type of reasoning "*anchinoia* – sharp sightedness", which Grosseteste made prominent at the beginning of the 13th century (Crombie, 1953; Grosseteste, 1981).

It refers to the peculiar first step in theory building: the actual finding and formulating of a potentially rich scientific theory. This is a step that cannot be formulated algorithmically (Wirth, 1996). This is also the reason why strange terms were invoked, from Aristotle, via Grosseteste to Peirce. Its essence is a creative insight into a deeper, underlying pattern that combines the data points on the surface, which is then spelled out in scientific terms. It somewhat resembles the process of connecting the dots in children's drawings, only that there is no numbering of the dots that would pre-specify the image.

This direct insight into a deeper pattern has much in common with what we have described as the core element of radical introspection. In science the experience is often reported as "receiving ideas". I refer back to the autobiographical statement of Einstein, quoted above, that ideas "come from God", as a way of speaking that those insights are not made and fabricated, but "received" through a process of radical and deep insight into a theoretical structure, in this case of empirical data.

Numerous accounts of prominent scientists about their discoveries testify to this. Nobel Prize winner Barbara McClintock, for instance, the discoverer of "jumping genes", spoke about the fact that she had a participatory insight, because she "merged" and became one with her cells (Comfort, 2001; Keller, 2003, orig. 1983). In an autobiographical account she reported about working with her cells: *"...'and when I was really working with them I wasn't outside, I was down there. I was part of the system. I was right down there with them, and everything got big. I even was able to see the internal parts of the chromosomes - actually everything was there. It surprised me because I actually felt as if I were right down there and these were my friends.' In telling this story McClintock.... was talking about the deepest and most personal dimension of her experience as a scientist.... 'As you look at these things, they become part of you. And you forget yourself. The main thing about it is you forget yourself.'"* (Keller, 2003, orig. 1983, p. 117).

Heisenberg reported in his autobiographical accounts how the insight about ordering the data

Barbara McClintock FRS, Nobel laureate (1902-1992)

into the matrix formalism of quantum mechanics came to him after long walks and talks at the beaches of the island of Sylt in the North Sea (Heisenberg, 1977). His daughter confirmed this recently (Mann & Mann, 2017). We mentioned the similar insight process of Einstein. A rich array of data and information is processed subconsciously and suddenly the underlying pattern appears (Bowers, 1984). In many cases of scientific discovery this can certainly be reconstructed as a cognitive process utilising all the available information as a function of the pattern recognising activity of the right hemisphere discussed above. But in some instances, such as the one described by McClintock, there also seem to be elements of direct intuition of reality. At any rate, abduction and direct introspective insights seem to have a similar phenomenological structure, and thus direct introspection and scientific understanding have a common basis.

Towards a Science of Ethics and Values

Taking this thought further, we suggest that radical introspection or spiritual experience is also a way to discover the moral deep structure of reality and moral absolutes, if there are any. Individual and personal meaning normally arises from insights into the structure of one's life, making peace with events that were not in one's power, forgiving oneself for having made mistakes, forgiving others for having been unjust or unhelpful - in short, the experience of meaning is dependent on introspective experiences.

Something similar happens when we intuit values or ethical norms as absolutes. This is certainly how one might read the "discovery" of ethics in our classical religions. Although figuratively speaking, and understood literally by fundamentalist followers of religion, the "commandments" were given to Moses by God, this is a chiffre for an experience of the deep structure of reality, we suggest. Other religious or spiritual traditions have such ethical codices as well, without recurring to a divine law giver. So it is natural to assume that at some point a deep intuition of ethical structure happened to some individuals who then reported about their experience and installed the divine source of the ethical code. Certainly people with near-death experiences report often that they have intuited moral absolutes and the framework of ethics to be derived from universal interconnectedness of all beings (Alexander, 2012; Lorimer, 1990), and the same is true for people with deep spiritual experiences (Full, Walach, & Trautwein, 2013). The essence of such experience seems to be that all beings are interconnected in a unity of being and as such what we do to others we do to ourselves, and the other way round. This is the experiential basis for the traditional ethical statement: 'Love your neighbour as yourself.'

At this point, however, it is completely unclear whether this approach is at all viable as a general strategy for everyone, and will produce moral absolutes as results of a diligent radical introspection. But as long as this path has not been actively tried, we cannot tell. Currently there are two more or less separated worlds, and in the middle a rather confused public. One world still sticks to the religious and divine source of ethical commandments. This still holds some sway in our Western cultures. It is likely that its power will wane as secularisation spreads. Another world, inspired by science is trying a reductive approach to understand moral and ethical behaviour as a result of evolutionary principles, and sometimes this can also be convincing (Bowles, 2009; Campbell, 1976; Melis et al., 2006; Norenzayan & Shariff, 2008; Pinker, 2018; V. Sommer, 2008).

This dispute has a long tradition (Dupré, 2004). For instance, Ashley Cooper, the 3rd Earl of Shaftesbury (1671-1703) and opponent to the empiricist tradition suggested a "moral sense", a kind of intuition of moral absolutes. In his "Inquiry concerning virtue and merit" he speaks of a "natural moral sense" (Shaftesbury, 1800, orig. 1699, vol. I. p.262) and he holds: "*we should then see beauty and decorum here, as well as elsewhere in Nature; and the order of the moral world would equal that of the natural. By this the beauty of virtue would appear; and hence... the supreme and sovereign beauty, the original of all which is good or amiable*." (Shaftesbury, 1800, orig. 1709, vol II. p. 69) Here an interesting intuition, we think, has broken through the dispute between empiricists – mainly Locke – and the intuitive tradition of the Cambridge Platonists whose representative Shaftesbury certainly was (Uehlein, 1996, 2017). In essence it stipulates that there are moral absolutes that can be intuited and this intuition is the source of our morality.

Again, there need not be an "either-or" dispute between evolutionists, who think that values and morals have developed out of a biological a priori of evolution (Oeser, 1987), and those that, following the tradition of Shaftesbury, think there are moral absolutes that need to be understood and enacted. Both might be right. Insight and radical introspection might open direct routes to understanding moral absolutes. During

human history there were only few extraordinary individuals who seemed to have had this gift of radical introspection, making the discovery of moral absolutes and bringing them into the cultural, political and religious arena of their time. In that sense it would neither be necessary nor likely that everyone needs to have the same experience and make the same discovery. It is also not necessary that everyone understands Einstein's equations and knows how to build aircraft. It is sufficient if a few people do and the others trust them.

In the same sense it would be sufficient if some people devote effort to radical introspection and if processes were installed to critique, communicate and translate such insights. Although something like moral absolutes seem to exist, the way they are expressed and enacted changes through a complex interaction with cultural and political forces. For instance, a little disputed moral absolute, which is likely deeply rooted in our biological and evolutionary make-up, is the respect for life, especially the life of other human beings. Nevertheless, it was comparatively easy in earlier times, and still is in our time, for people to be killed, in wars, through a judicial system that allows capital punishment, or through crime. But over time it seems to have become more and more clear that killing someone else is not only a problem, when it is connected to murder and base motives, but more generally; so this moral absolute is being enacted more universally. This does not change the moral injunction, but the way it is expressed and enacted.

Hence moral absolutes, their intuition, expression and their concretisation will change with time, but not their nature, if there are any moral absolutes. The intuition of moral absolutes through radical introspection would be part of a broader remit of a science that starts integrating spirituality and its insights. This might happen through a more diligent type of researching phenomenal accounts of such experiences and transferring them from first-person singular to first-person plural statements, submitting them to public critique in an open discourse, where values are being discussed, and entering a public dialogue about which values should be publicly sanctioned and which are open to private decision.

A good example is marriage and the special status of committed relationships. It seems to be a moral absolute that after a commitment to a partner one should not separate easily and without much consideration. This might have a biological basis, because sexual intimacy and joint shared experiences contribute to intense feelings of binding and belonging, among others through the oxytocin system (Brüne, 2012; Heinrichs, von Dawans, & Domes, 2009; Kanat, Heinrichs, & Domes, 2014). Humans of most cultures and times have honoured this by special rituals of marriage. Because such commitment does not always work out well, even with well intentioned couples, some cultures also have developed rituals of separation. But even a ritual of separation acknowledges the special status of a marital relationship, otherwise it would not be necessary.

The state, following religious teaching, which may be an expression of such a moral absolute, has sanctioned marital relationship in most cultures by special rights and tax status. However, while in former times heterosexual sexuality was intimately and exclusively tied to formal marriage and everything else was sanctioned, including homosexual sexuality, the bond between sexuality and marriage has loosened over the last five decades, especially since the discovery of effective pharmacological contraception, following various scientific insights. Now there seems to be a broad spectrum of how intimate relationships can be lived out in our culture, from comparatively loose, uncommitted sexual encounters, or deep relationships without sexual component to individually committed but socially undeclared intimate relationships to formal marriage.

It can be observed that young people who shun the traditional ways of marrying nevertheless enact their own rituals, for instance exchanging rings, which are then, however, worn on the middle finger as opposed to the ring finger, in order to demonstrate some commitment but perhaps in a different way. Locks are fixed to bridges and banisters, and keys thrown away to signify the seriousness of the attempt, where earlier lovers might have cut their names into a tree. Thus, there seems to be a common intuition of the moral absolute of attachment, binding commitment and fidelity. This also has, of course, a biological and evolutionary side to it. A couple that is firmly committed will have an easier time raising offspring, even when it gets demanding, and a child that is born into a stable relationship has an easier and supportive environment to grow up in.

Thus, evolution will likely have selected for such traits in the first place. But whether such a reductive reasoning will suffice to explain, for instance, the moral nature of attachment and fidelity, is another question that needs exploration. It will be more beneficial for genetic variety, for instance, if men look for new partners, once their

children are grown up and engender new offspring with younger partners. And this is indeed, what a few men do nowadays. But if commitment and attachment were completely biologically determined, then it is difficult to understand why this is not a universal societal rule that is built into the fabric of legislation and law giving. Then one would expect laws and structures that take care of old, deserted mothers and special processes of transition into a new family for fathers that want to start a new family, etc. This seems to be not the case in most societies. Thus, some other intuition must be at work here, and not just a biological a priori.

It would be a matter of a combination of classical empirical research – studying certain types of relationships and their outcomes long term through qualitative and quantitative research – with radical introspection to figure out what the right type of moral absolute is here, how far it reaches, what kind of liberty it allows, what is most conducive to general human flourishing, etc. Again, these methods would complement each other. Such methodology could also clarify to what extent moral absolutes are universal across cultures or culturally dependent in their expression, whether they are universal and temporally unchangeable or not.

For instance, in most cultures and for a long time there was a moral absolute of the divine status of a leader – king, emperor, duke or group leader. This is no longer the case in modern democracies, where leaders are elected and demoted, as the political situation demands. Although they have a special status while they are in office, a faint reverberation of their erstwhile status of holiness, they lose this status when they move out of office. Thus, the presumed moral absolute of a divinely installed leader has changed drastically. A thorough and radical introspective approach might reveal other moral absolutes, for instance the sovereignty not of states but of the whole of humanity including animals and vegetation and then demand a different type of political structure as we have today (Laszlo, 2003; Meyer-Abich, 2005), and it might be the case that such absolutes are sometimes only temporarily valid, very much like absolute presuppositions that are stipulated by our scientific activities.

In fact, our absolute presuppositions might just be such types of absolutes that can be experienced through direct introspection, intuitively, and negotiated through a process of discourse and reflection that currently does not exist. It may in fact be the case that the current assumption of radical constructivism is also only a temporally transient phenomenon until we find methods of intuiting or experiencing the underlying deep structures, such as co-creation (Ferrer, 2002, 2018). Those deep structures might be the inner scaffold of our world which, like the deep structure of matter, is more complex than previously thought and complementary to it. Our call is to open up the debate about this and perhaps even commission methodologies and collect reports.

This is clearly a minefield, as morals structure human behaviour. Whoever can define morals exercises a degree of power over social behaviour, as the negative example of dictatorships, from Nazi-terror to less obvious examples of today show. Thus, it would not be wise to approach this field naively, assuming moral absolutes hang around at a kind of spiritual rack where they can be intuited by specially gifted moral experiencers and brought back to the netherworld of ordinary humans. Such "spiritual positivism" and misplaced objectivism can be dangerous at worst, and extremely naïve at best (Ferrer, 2000, 2002). But the fact that there are dangers lurking around the corner and that we might make mistakes should not prevent us from approaching this issue with an open, yet critical mind. Again, a double, complementary stance might be called for: curiosity and a critical stance, openness and scepticism.

Perhaps such an approach will also work out that ethical behaviour should include other elements, such as the dignity of animals, or the rights of the biosphere, and curb human impulses of destruction and exploitation. This is already beginning to be enacted, mainly because of political pressure and out of some economic considerations. Ecologists have pointed to the necessity of respecting the full range of biological life with their respective rights and critically discuss the anthropocentric viewpoint (King, 2003; Kubiszewski et al., 2013; Laszlo, 2003; Meyer-Abich, 2005). This anthropocentric stance is, by the way, wrongly associated with religious teaching and rather an outcome of the complex development of science and uncritical progressionism (Buckley, 1987; Dupré, 2004). It would be the task of a more enlightened moral stance to use direct insight into moral structures to come up with appropriate suggestions after a thorough process of discourse.

7 TOWARDS A NEW SCIENCE AND A CULTURE OF CONSCIOUSNESS

The discourse we are opening up concerns the unreflected absolute presuppositions of our current science, Science 2. Often, as we have shown, Science 2 or the "scientific world view" is taken to be materialistic in ontology, empiricist and reductionist in method, and tied to a restrictive type of rationality to recap only the most important elements. We have argued that this need not be the case. Science 1, the scientific method, or science as it is practised by working scientists and taught at universities, could easily incorporate elements of what we have argued here. And indeed, it is often already the case and it is only our attempt at increasing contrast that has veiled this fact. Many practising scientists are already working according to an enlarged set of assumptions and are incorporating methods suggested above. Many progressive branches of science have already moved towards incorporating such methods, from some areas of social science, ecology to positive and transpersonal psychology. This will complement current science and lead to a new set of background assumptions. We have used the cipher of "spirituality" or "spiritually informed science" to express the most important element: taking consciousness in its own right seriously. We have also called it "post-materialist science" and have suggested to advance Science 2 to what we call Science 3.

By acknowledging consciousness in its own reality – without presuming any idealist or dualist ontology, but simply taking it as fundamental together with matter – one opens up a separate route to understanding through radical or direct introspection. This offers, in contradistinction to already used qualitative methods of introspection, *direct* access to reality via a type of experience that is often termed "spiritual experience". This is why we call this type of enhancement of science into Science 3 "post-materialist" or "spiritually informed science". It does in fact not have any particular faith, creed or ideology in its bag, except the belief that the purely reductionist approach does not do justice to the full phenomenology of reality. Its only commonality with various types of religious teachings is the belief that consciousness cannot and should not be considered an epiphenomenon or a complex emergent property of neuronal functioning. If that turns out to be the result of scientific research and theory building, so be it. But currently this is neither a fact, nor is it likely to become one any time soon, but it is a creed and statement of faith as any other religious statement. And hence we call for openness and the acknowledgement that this scientistic creed does us a disservice.

Acknowledging that consciousness cannot be reduced to brain activity is in fact the most important element and the single most decisive step towards a Science 3, a post-materialist science and its according methodology. For it would allow for direct access of introspection to structures of reality via the route of direct or radical introspection. This is a term that we offer as replacement for the somewhat loaded term "spiritual experience". It means that we might "see" or "experience" reality directly through a contemplative or meditative training, sometimes even spontaneously. This would include the experiencer and his or her personal practice (Bouratinos, 2018). While such insights and experiences have been relegated to the domain of religion, we suggest taking them seriously, secularising them, and including the methodology in the scientific arsenal. This is a step of naturalising religion to some degree, at least regarding the methodology of introspective access to reality, and thus follows the naturalistic injunction of modern day science. It is interesting to observe that at decisive points in history this process happened now and again: it happened at the beginning of philosophy in classical Greece; it was central to the Scholastic reform and the incorporation of Aristotle in the 13th century; and it seems to be a necessary step now.

The outcome is neither a scientific crypto-religion, nor a religious science. The outcome will likely be a broadened science that has integrated some elements that have formerly belonged to the remit of religion through a secularised form of radical introspection. This will change both science *and* religion. Science will become broader in outlook and remit, integrating direct experiences of reality in its insights. Religion will become less dogmatic and more open to dialogue and discourse. For it will remain the domain of religion how to interpret, express and enable these experiences. And it will remain the domain of science to discuss critically, scrutinise and purify experiential statements about reality, whether they come from sense experience and its derivatives, or from direct inner experience. But this latter branch of experience, which was already present in the cradle of our Western scientific awakening with Roger Bacon, will become a proper element of the methodology of science. While it was hitherto relegated to the fringe, it might take on a more active and a more prominent role in the future.

The only real change and serious shift that has to be made is taking consciousness seriously, as consciousness studies have already done over the last 20 years or so, and everything else will follow from it. Another way of saying this is that the implicit materialism in scientific ontology has to be given up as a compulsory ontology. There is a host of arguments and data that we have laid out that speaks against the viability of a materialistic ontology as the only possible ontology associated with science, as is currently the case with Science 2, or the supposedly scientific world view. Scientists might still be atheists and materialists, if they choose to be, as they may be Buddhists, Hindus, Muslims, Jews, Catholics, or follow any other creed. But it will no longer be taken for granted, or it will no longer be a discerning element between "real scientists" and religious people having jobs as scientists. To quote again the adage of an anonymous colleague: "A Catholic knows he is Catholic, a Hindu knows she is a Hindu, a Jew knows he is Jewish, a Muslima knows she is a Muslima. But a materialist thinks he is a scientist." This implicit equation will have to be given up. In fact, it would be good scientific practice to give up the equation Science 1 = Science 2, or the assumption that good scientific practice presupposes belief in a materialist world view. Data, arguments and phenomenology militate against it and speak in favour of opening science up.

If that happened, nothing would be lost. Materialists doing science might still follow their research programme of proving that consciousness is nothing-but-matter. Nothing-buttery, as C.S. Lewis used to call it (Aeschliman, 1998, orig. 1983), is not a very clever heuristic stance, we feel, but still possible. It will be a matter of competition of world models then to see which one will produce more viable, more interesting and more useful results. But currently there is a monopoly of the materialist world model which needs to end. Monopoly is always a bad idea, in ecology and farming, where it leads to vulnerability of the crops, in the economy, where it leads to price cartels and lack of competition. It is also a bad idea in science, where it leads to neglect and oversight of important phenomena and to a lack of creativity, innovation and relevance of findings.

The monopoly in science can only function because it is implicit, unrecognised, unacknowledged and unreflected, as E.A. Burtt pointed out nearly 100 years ago in his seminal *The Metaphysical Foundations of Modern Science*. This needs to be discussed in open discourse, questioned and pointed out, which is our purpose in this text. As a second step, a multiplicity of world models, or Science 3, needs to be enabled. This "enablement" is not a formal process, as the acceptance of underlying assumptions into a world model is not a formal process either. It can happen through a growth in tolerance and acknowledgment of other positions by those in power and position. We can only hope that the cynical adage attributed to Max Planck is not true: science progresses funeral by funeral. In addition, the change can be helped by young researchers through refusing to buy into the current world model, and through more open and more active opposition to it. And it can be helped by the public, journalists and writers by living up to their critical role and questioning the assumptions of Science 2. Should an enlarged and widened set of assumptions of Science 3 lead, in the end, to the outcome hoped for by a more restricted Science 2, then nothing would have been lost, but much gained. For we would have then found new knowledge based on a broader consensus.

We assume that broadening out the background assumption of a new Science 3 would also lead to a new scientific practice, a kind of Science 1*, a broadened methodology with the promise of new insights. The broadening will mainly come through the new option of direct or radical introspection. This might be made easier through regular meditative or contemplative practice or a culture of consciousness (Barendregt, 1996, 2011; Velmans, 2018; Walach, 2013; Wallace, 2000; Wallace & Shapiro, 2006). It goes without saying that this must not lead to a spiritual fascism, where people are forced into a spiritual practice. But it should be enabled, supported and encouraged by the academic environment.

A culture of consciousness, where people at large start taking care of their own mind, through a regular meditative, mindfulness or stress reduction practice, is a matter of mental hygiene. And as the physical hygiene movement in the middle of the 19th century was the single most important step in medical progress (McKeown, 1976), so a new mental hygiene movement might be the necessary next step in our culture to prevent burnout and information overload, and guarantee survival of individuals and the planet. In a more controlled, systematic setting it might also lead to a more enlightened and more creative type of science. There would probably not have to happen anything special, except that the implicit ban on consciousness and spirituality would have to be lifted in scientific institutions and practice.

Some big corporations have actually already started the move: Google has installed a programme "Search Within", where company members can take some time out each day for a meditation time

during work time and a culture of introspective seeking as a means to generate new ideas is installed. Other big companies have followed suit or are in the process of doing so (Black, 2014; Fredrickson, Cohn, Coffey, Peck, & Finkel, 2008; Kersemaekers et al., 2018; Rupprecht & Walach, 2016; Thomas, Schermerhorn, & Dienhart, 2004). In the UK the report "Mindful Nation", commissioned and adopted by the British Parliament and House of Lords has alerted the public to the chances and necessity of a broader culture of consciousness (https://www.themindfulnessinitiative.org.uk/publications/mindful-nation-uk-report).

The first studies of introducing such mindfulness courses into a student setting have been successful and show promising results (Lynch, Gander, Kohls, Kudielka, & Walach, 2011; Lynch, Gander, Nahar, Kohls, & Walach, 2018). And mindfulness interventions in schools show potential for improving cognition and learning (Zenner, Herrnleben-Kurz, & Walach, 2014). Mindfulness as a broader movement has caught the imagination of the wider public and of researchers that seek out ways of helping people dealing with stress and burnout (Goyal et al., 2014; Khoury, Sharma, Rush, & Fournier, 2015; Panagioti et al., 2016). And most likely it answers a deep seated desire to find calm, peace and meaning in an otherwise hectic and often empty everyday busy life (Sauer, Lynch, Walach, & Kohls, 2011; Walsh & Shapiro, 2006).

The academic community as avant-garde of new ideas would be well advised not to close the doors of lecture rooms, laboratories and offices against such developments. A culture of consciousness is not only for people with problems of burnout and at the fringe of insanity, as some seem to think, but can be a very healthy exercise to enhance insight, creativity and cognitive capacity also for academics. It will certainly be necessary for those who want to explore such modes of radical introspection and direct spiritual insight in order to broaden the view towards Science 3 and enrich methodology of Science 1 into Science 1*. This will certainly not be a necessary demand for every scientist or member of the academic community, but it might become a development that we would hope is seen with openness, even benevolence, in the future.

Thus, the only really distinctive element that will help transform Science 2 from a purely materialistic world view into a more open Science 3 is the acknowledgement of the special role of consciousness. This will automatically entail the acknowledgement that a particular direct introspective methodology, radical introspection as we call it, or spiritual practice, can become part and parcel of the arsenal of science in a broadened out methodology of Science 1*.

These developments can neither be forced nor will this be necessary. As soon as an open discourse about Science 2, the supposedly materialist foundations of science, is opened and these assumptions openly and repeatedly challenged, all those who feel uneasy about this will be able to voice their opinion. A broadened set of assumptions and a widened view will automatically have its consequences in what people study, find and publish. All that is necessary, then, is that editors, reviewers, funding agencies and other deciding bodies do this with a well informed knowledge about the limitations of Science 2. This will then slowly, perhaps even swiftly, change scientific culture and practice.

New journals and scientific groups might emerge and should be greeted with respect. Universities might decide to allow options for meditative and contemplative practice, if they choose to, without being sneered at. They might provide the necessary infrastructure and trainings. Lecturers and academics might consider offering respective courses as part of university curricula thereby starting to train young academics. Young researchers might be tutored and encouraged to use respective methodology and publish their findings (e.g. Lemke, 2018). Special interest groups within scientific associations and societies might emerge to discuss and deepen the respective questions and improve methodology. Within the UK Royal College of Psychiatrists the Spirituality and Psychiatry Special Interest Group has been active for nearly 20 years and is the largest SIG within the College. And within the British Psychological Society there are special interest groups in Consciousness and Experiential Psychology as well as Transpersonal Psychology. There are many ways that can be imagined will open up, once the implicit equation Science 1 = Science 2, that science must use background assumptions of materialism, reductionism and empiricism, is dropped.

We have shown that this would be a rational next step. The data speak for it. There is no empirical or theoretical ground for holding on to the current concept except an old fashioned and barely understood ideology. We have argued that it should be set aside and broadened out into a spiritually informed science. And we are excited about new options that will arise from it. For it is the rule, rather than the exception, that new methods generate new insights whose content cannot be predicted, and integrating radical introspection would be such a new method for science.

The Galileo Commission

TOWARDS A POST-MATERIALIST SCIENCE

Afterword - David Lorimer

Our world view is not simply the way we look at the world. It reaches inward to constitute our innermost being, and outward to constitute the world. It mirrors but also reinforces and even forges the structure, armouring, and possibilities of our interior life. It deeply configures our psychic world. No less potentially, our world view—our beliefs and theories, our maps, our metaphors, our myths, our interpretive assumptions—constellate our outer reality, shaping and working the world's malleable potentials in a thousand ways of subtly reciprocal interaction. World views create worlds.

Richard Tarnas

I am very astonished that the scientific picture of the real world around me is very deficient. It gives us a lot of factual information, puts all of our experience in a magnificently consistent order, but it is ghastly silent about all and sundry that is really near to our heart that really matters to us. It cannot tell us a word about red and blue, bitter and sweet, physical pain and physical delight; it knows nothing of beautiful and ugly, good or bad, God and eternity. Science sometimes pretends to answer questions in these domains but the answers are very often so silly that we are not inclined to take them seriously.

Erwin Schrödinger

I regard consciousness as fundamental, matter is derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness. There is no matter as such; it exists only by virtue of a force bringing the particle to vibration and holding it together in a minute solar system; we must assume behind this force the existence of a conscious and intelligent mind. The mind is the matrix of all matter.

Max Planck, 1931

The world today is dominated by science and by its underlying assumptions, which are seldom articulated even though they generate not only a methodology but also a world view or philosophy. While scientific methodology is a set of evolving rules, socially negotiated among scientists, this scientific world-view has become a quasi-religious set of assumptions about the world, an ideology generally known as 'scientism'. We fully support scientific methodology, but we are critical of scientism - those philosophical assumptions that underpin the current scientific world-view.

Metaphysics and Science

Work on the metaphysical foundations of modern science goes back nearly 100 years to the book originally published by Edwin Burtt of Cornell in 1924, a copy of which I found in a second-hand bookshop in Plymouth for 90p in May 1976. Robin Collingwood, the Waynflete Professor of Metaphysical Philosophy at Oxford published his *Essay on Metaphysics* in 1940, partly as a response to the positivism of the 1930s asserting, fallaciously in his view, there was no such thing as metaphysics. Collingwood defines metaphysics as the science which deals with the presuppositions underlying ordinary science.

He continues that metaphysics represents 'the ultimate goal of the scientist's pilgrimage through the realms of knowledge' and the 'ultimate logical ground to anything that is studied by any other science.' It is important to stress that the priority affirmed by the word presupposition is a *logical* priority that its logical efficacy does not depend on the truth of what is being supposed, *but only on its being supposed*. In that sense, it is assumed, taken as read, and this accounts for what he calls 'being ticklish in one's absolute presuppositions' when they are questioned – they are not verifiable, but simply taken for granted, like the notion of law or cause.

Perhaps Collingwood's key insight is that absolute presuppositions are not propositions as they are never answers to questions, which themselves contain presuppositions. Think, for instance, of David Chalmers' 'hard problem of consciousness' when he asks how the brain generates consciousness. This question in itself presupposes that the brain does indeed generate consciousness, so this is an absolute presupposition, as it is for most neuroscientists, philosophers and psychologists. As Collingwood states, 'the answer to any question presupposes whatever the

question presupposes… And because all science begins with a question (for the question is logically prior to its own answer), all science begins with a presupposition.' Hence the inescapability of presuppositions, even if the majority of working scientists remain unaware of this fact.

The job of the metaphysician is to establish the nature of absolute presuppositions as historical facts. In this respect, a special characteristic of modern European civilisation is its denial of the existence of absolute presuppositions. This is exemplified in what he regards as the fundamental logical fallacy of positivism - its denial of absolute presuppositions - that '*what are in fact suppositions they consistently misunderstood as propositions*.' (my italics)

The classic textbook example is A.J. Ayer's *Language, Truth and Logic,* published in 1936 when the author was only 24. Ayer maintained that any proposition which cannot be verified by appeal to observed facts is a pseudo-proposition; and since metaphysical propositions cannot be verified by appeal to observed facts, they are pseudo-propositions and therefore nonsense. Collingwood remarks that this attack on metaphysics is in fact an attack on pseudo-metaphysics on the grounds that Ayer commits the blunder of mistaking suppositions for propositions. This is characteristic of the whole Vienna School and has morphed into modern scientism that continues to deny its own status as a presupposition or belief system. Ironically, then, any attack on metaphysics in this true sense is an attack on the foundations of science. Proof depends upon presuppositions, not presuppositions on proof. I have laboured this somewhat technical point as it is of central importance in the current context.

Scientism, Values and the Human Being

Following up the work of C.S. Lewis, Michael Aeschliman observes (Aeschliman, 1983/97) that the debate between those who assert the primacy of metaphysical knowledge and those who argue for the priority of physical reality has been going on for centuries. However, as we have already argued and Aeschliman points out, the procedures of science are derived from the rational method of philosophy and are dependent on it for assessments of the meaning and value of what is proposed, observed, or discovered. This means that 'issues such as the procedures and validity of rational thought and argument are presuppositions on which scientific thought and experiment rest, but they are themselves not scientific: they are philosophical. Science depends upon philosophy for the validity of its terms and procedures and the determination of the uses to which scientific knowledge will be put. To say that only factual statements have validity is to be not only dogmatic but self-contradictory, since the statement itself is not factual.'

The case against considering man a material thing only lies at the heart of the critique of scientism in C.S. Lewis (*The Abolition of Man*) and also in Martin Buber with his distinction between I – it and I – thou relationships: persons are not things. Moreover, the ideas of truth, meaning, purpose, goodness are not scientific facts, but belong to a different realm characterised by wisdom (*sapientia*) rather than knowledge (*scientia*). Edward Said sums this up by saying that 'scientism mistakes the truth about quantities, material and spatial realities for the Logos, the Word of sapientia, the realm of qualities, purposes, values, ends.'

Aeschliman distinguishes two kinds of knowledge corresponding to *homo sciens* [using the senses and reason] or matters of fact, quantity, matter, and the physical realm. However, as *homo sapiens* [using intuitive insight or spiritual perception – *noesis* in Greek], 'he shows his interest in the qualities of meaning, purpose, value, idea, and the metaphysical realm.' He adds that if we are to attain truth, neither kind of knowledge can be denied or ignored. However, he asserts that the ultimate effect of scientism 'is to dissolve the absolute qualitative distinction between persons and things – the very heart of the metaphysical tradition, of *sapientia* - reducing persons to things, denying man's rational soul and his transcendence of the physical, giving him a value no higher than that of a camel or a stone or any other part of nature.'

This reduction of the human category to the natural 'runs parallel with a whole series of reductions from quality to quantity, from value to fact, from rational to empirical. If the doctrine of man as a rational moral being, qualitatively distinct from and incommensurate with nature, is weakened or destroyed, the grounds for expecting or encouraging moral conduct are similarly weakened.' This seems to us a critical point in view of what the historian Arnold Toynbee called the morality gap (Toynbee and Ikeda, 1975): 'technology gives us material power - the greater our material power, the greater our need for the spiritual insight and virtue to use power for good and not for evil. The 'morality gap' means that, since we first became human, we have never been adequate spiritually for handling our material

power. Today it is greater than ever.' Or as E.F. Schumacher put it, 'humanity is now too clever to survive without wisdom.'

Aeschliman identifies the danger of 'the development of expertise (*scientia*) in the accumulation and manipulation of technical power, without a corresponding development of knowledge (*sapientia*) as to the right uses, purposes, goals or values which that power ought to serve' as the distinctively modern form of *science sans conscience* that can lead to dehumanisation and even barbarity. He reiterates, rightly in our view, that the human being 'is not a common object of the seashore, but rather embodies and reveals something unique and draws us beyond all physical, natural categories, draws us into a realm of value and meaning, a realm qualitatively distinct from and logically prior to scientific procedures and terms, a realm from which they derive whatever rational coherence, validity, and application they have.' And he quotes Hans Jonas formulation of the inevitable and decisive contradiction: "the scientist does take man to be determined by causal laws – but not himself while he assumes and exercises his freedom of enquiry and his openness to reason, evidence and truth.' His own working assumptions necessarily involve 'free will, deliberation, and evaluation as aspects of himself, but those qualities and capacities are stripped away from and denied to the human object or thing that he is inspecting.'

Aeschliman and Lewis observe that modern scientistic doctrine holds all facts to be objective and all value to be subjective, a position that, as pointed out above, is

internally inconsistent and false. For Lewis, the good is the basis not only of morality but of validity: 'every rational person acts as if validity and morality are real. Morality and validity cannot be derived from scientific analysis and empirical knowledge. We assume in ourselves rational attributes, free will, rational consistency, openness to evidence, desire for truth, and in short, those non- quantifiable qualities that we rigorously exclude from human objects of our inspection.' Hence, 'scientism itself derives rational consistency and validity from philosophy'; not only validity, though, but also the moral sense.

The Consciousness Revolution

In the 1990s, Willis Harman of Stanford University and President of the Institute of Noetic Sciences followed up the earlier work on metaphysics and science with a major project on causality that included a re-examination of the metaphysical foundations of modern science (Harman, 1992) and an edited volume *New Metaphysical Foundations of Modern Science* (Harman and Clark, 1994). When speaking on this topic at our inaugural Beyond the Brain Conference at St John's College, Cambridge in 1995, he used the apt quotation attributed to the physicist Richard Feynman that 'the philosophy of science is to scientists what ornithology is to birds.' Around the same time John Cornwell arranged a series of meetings on Science and the Human Dimension at Jesus College, Cambridge attended by many distinguished scientists and philosophers including Freeman Dyson, Sir Roger Penrose, John Barrow, Margaret Boden, Oliver Sacks, Gerald Edelman and Mary Midgley (Cornwell, 1995). In addition, 1994 saw the establishment of the *Journal of Consciousness Studies* with a wide remit on the relationship between science and consciousness. More recently, in 2014, a group of scientists formulated the Manifesto for a Post-Materialist Science (Beauregard, 2014), which can be found on www.opensciences.org - almost all the signatories can be found on our list of advisers.

If the first scientific revolution in the 17th century ushered in an era focusing on the outer, matter, experiment, quantity, mathematics, mechanism and linear thinking, then the contemporary 'consciousness revolution' redresses the balance in terms of the significance of the inner, consciousness, quality, experience, systems and complexity. 17th-century scientists and philosophers defined the former set of qualities as primary and the latter as secondary, which also influenced the direction of causality with the arrow pointing matter > mind and therefore brain > consciousness.

Both the Institute of Noetic Sciences, founded by astronaut Edgar Mitchell in 1971, and the Scientific and Medical Network (SMN), founded in 1973, were cultural responses to the dominance of scientific materialism. The founders of both organisations all had direct spiritual experiences that led them to question the limits of an exclusively reductionist and materialist understanding of reality and seek a wider and deeper understanding of life.

Scientism and Impossible Facts

Over a hundred years ago William James warned of the dangers of scientism, the conviction that only the material world is real and only physical causation is scientifically respectable: 'Science taken in its essence should stand only for a method and not for any special beliefs, yet as habitually taken by its votaries, Science has come to be identified with a certain fixed general belief, the belief that the deeper order of nature is mechanical exclusively, and that non-mechanical categories are irrational ways of conceiving and explaining even such a thing as human life.'

Some great scientists have been acutely aware of the importance of underlying presuppositions, for instance Prince Louis de Broglie: 'History shows that the advances of science have always been frustrated by the tyrannical influence of certain preconceived notions that were turned into unassailable dogmas. For that reason alone, every scientist should periodically make a profound re-examination of his basic principles'. The fact that no philosophy or sociology of science is taught to the majority of science students does not encourage the kind of re-examination recommended by de Broglie, but the emerging science of consciousness may demand it.

The co-originator of the theory of evolution, Alfred Russell Wallace warned that 'My first great lesson in the enquiry into these obscure fields of knowledge, never to accept the disbelief of great men, or their accusations of imposture or of imbecility, as of any weight when opposed to the repeated observation of facts by other men admittedly sane and honest. I assert that whenever the scientific men of any age have denied the facts of investigators on a priori grounds, **they have always been wrong**. Wallace himself was interested in psychical research and spiritualism, much to the dismay of his scientific contemporaries, but he knew that their prejudice was based on ignorance of the field. He wrote: 'to put the matter in a simple form, the asserted fact is either possible or not possible. If possible, such evidence as we have been considering would prove it; if not possible, such evidence could not exist.' (Smith, 1991)

This point has been taken up more recently by Lawrence LeShan, who quotes Gustav Fechner as saying: 'the actual cannot be impossible'. He himself adds that 'impossible events do not occur. Therefore, if a scientist is faced with the fact that an impossible event has occurred - our daily fare as psychical researchers - the paradox must be resolved.' The danger is that we accept our definition of reality as a fact when it is in fact a theory. Hence 'if an event is a major violation of our theory about reality, a major revision of that theory is necessary.' Logically, 'an event either occurred or did not occur, and labelling it is not going to change that fact. Faced with a white crow, 'you can hold onto your theory about reality and declare that the event did not occur since it *could* not occur. Here the facts violate your theory, and we can say that your theory of how reality works is invalid or limited in scope and must be revised in terms of the fact that the event occurred. This is thinking scientifically. He concludes that 'in science we need to be clear about which is the theory and which is the fact that violates it, and that in science theory must *always* bow to the fact.' (LeShan, 2009)

Philosophical materialism with its associated concept of a purposeless universe and the inherent meaninglessness of life is correlated with economic materialism with its emphasis on consumerism and the exploitation of people and natural resources. This translates into the idea that consumption and economic growth are the route to happiness and well-being. Many leading thinkers such as Martin Seligman (Diener and Seligman, 2004) are now questioning this association between consumption and well-being, with a renewed emphasis on quality of life rather than quantity of possessions, on being prioritised over having. Moreover, no coherent and altruistic ethic can be derived from a materialistic world view. Deeper study furthermore suggests that the ultimate human experience is one that unifies love, knowledge and bliss – this is inherently meaningful and valuable as well as providing a basis for the Golden Rule in the oneness of life and consciousness (Lorimer, 1990).

As Richard Tarnas points out in the quotation at the beginning of this afterword, our world view is absolutely fundamental to the way we think and act. Hence and expanded science would have a liberating effect in areas such as health and education and, even more importantly, this could lead to a recovery of meaning and values, and a planetary ethic of interconnectedness based on a felt sense of the oneness of life and consciousness, which is consistent with some of the most advanced science in terms of quantum entanglement, systems theory, symbiosis and ecological interdependence, not to mention the communication connectedness implied by the Internet.

Conclusion

If we worked on the assumption that what is accepted as true really is true, then there would be little hope for advance.

Orville Wright - 1871-1948, Inventor and Aviation Pioneer

We must conclude, I think, that there is no room for telepathy in a materialistic universe. Telepathy is something which ought not to happen at all, if the materialist theory were true. But it does happen. So there must be something seriously wrong with the materialist theory, however numerous and imposing the normal facts which support it may be.

H.H. Price, Hibbert Journal, 1949

H.H. Price was A.J. Ayer's predecessor as Wykeham Professor of Logic at Oxford, was also President of the Society for Psychical Research. He puts the matter logically and directly, as we do in this report. Facts are only regarded as implausible or impossible within a particular theoretical framework, as LeShan implied above. If the facts cannot be denied - and we do believe they cannot - then it is the materialist worldview that needs revision in spite, as Price indicates, of its apparent consistency with a host of normal findings.

In his classic work on scientific revolutions (Kuhn, 1962), Thomas Kuhn discusses the role of anomalies in violating paradigm-induced expectations, in the present case evidence indicating the insufficiency of the materialist approach to consciousness. The anomaly is not regarded as a counter-instance or falsification of the existing paradigm and is frequently ignored, swept under the carpet or denounced; another more sophisticated response is *ad hoc* modifications in order to eliminate any apparent conflict. Organised scepticism has gone even further by taking over parapsychology related pages on Wikipedia then rewriting them from a sceptical angle. This includes the personal pages of researchers such as Rupert Sheldrake, Pim van Lommel, Charles Tart and Peter Fenwick and many others - and even the official page of the Society for Psychical Research, where up to a third of the entry is on fraud. Those attempting to rectify this slanted view are threatened with a lifetime ban from Wikipedia editing. (www.sheldrake.org) Although the group claims to be defending science and reason, they are in fact defending a narrow and dogmatic scientism. This intervention represents a form of epistemological censorship as well as being a deliberate slander on the character and integrity of the scientists concerned.

The economist and diplomat John Kenneth Galbraith once quipped: *Faced with the choice between changing one's mind and proving that there is no need to do so, almost everyone gets busy on the proof.* Employing the useful language of Alfred North Whitehead, people are very reluctant to change what he calls their Conceptual Order (Whitehead, 1967) He explains: 'coordinated knowledge is formed by the meeting of two orders of experience. One order is constituted by the direct, immediate discriminations of particular observations. The other order is constituted by our general way of conceiving the Universe. They will be called, the Observational Order, and the Conceptual Order. *The first point to remember is that the observational order is invariably interpreted in terms of the concept supplied by the conceptual order* (emphasis added – in other words believing is seeing)... We inherit an observational order, namely types of things which we do in fact discriminate; and we inherit conceptual order, namely a rough system of ideas in terms of which we do in fact interpret....' He warns: 'The Certainties of Science are a delusion. They are hedged around with unexplored limitations. Our handling of scientific doctrines is controlled by the diffused metaphysical concepts of our epoch', in other words by the existing materialistic Observational Order.

We hope that you have found this Galileo Commission Report useful and that it will encourage open-minded scientists, philosophers and psychologists to look through the telescope at the evidence reviewed and to expand their world view as a result. Then, perhaps, we will see a vindication of Nikola Tesla's alleged remark that 'The day science begins to study non-physical phenomena, it will make more progress in one decade than in all the previous centuries of its existence."

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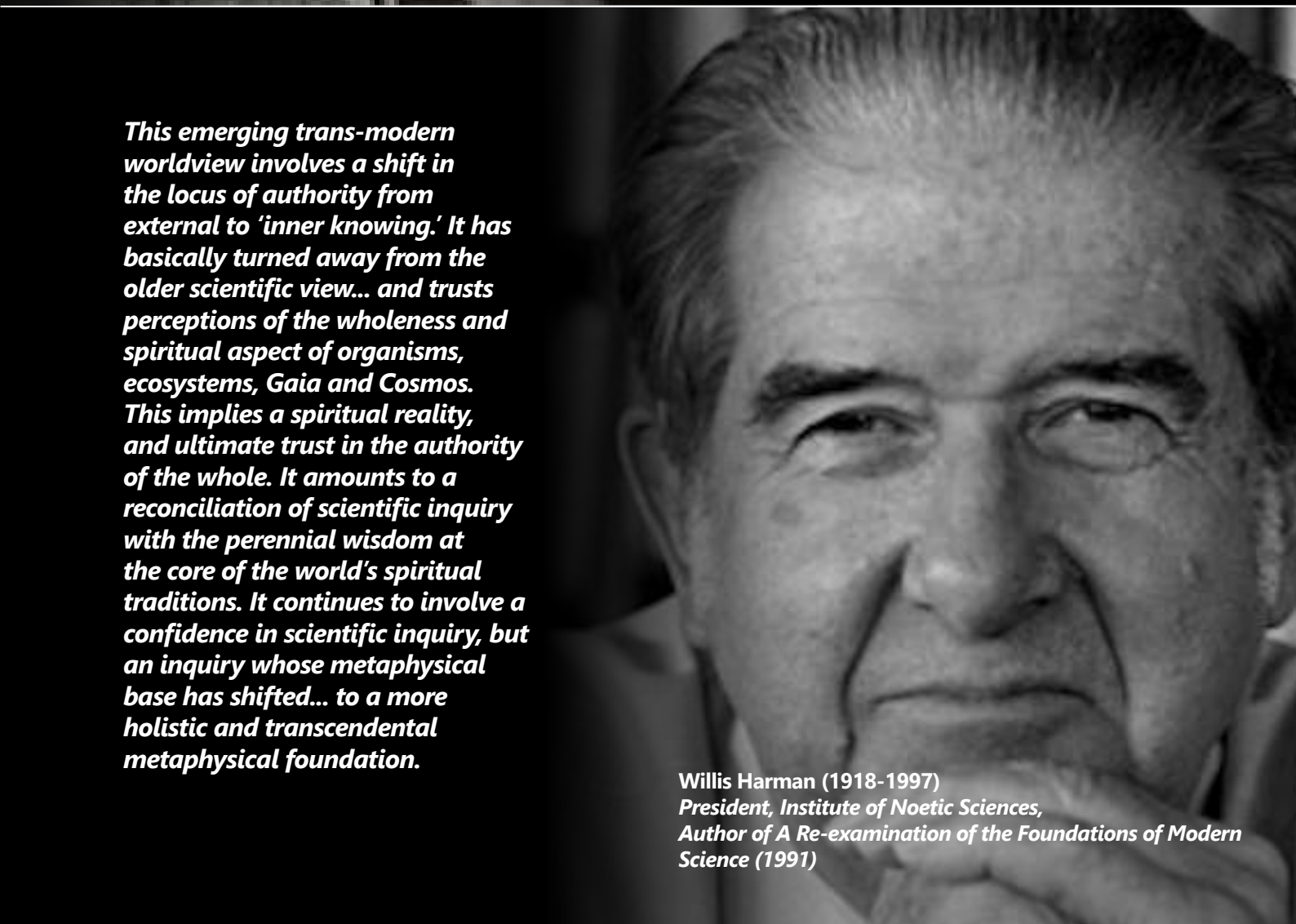
Edwin Arthur Burtt (1892-1989)

Even the attempt to escape metaphysics is no sooner put in the form of a proposition than it is seen to involve highly significant metaphysical postulates. Hence there is an exceedingly subtle and insidious danger in positivism – this metaphysic will be held uncritically because it is unconscious… and it is propagated by insinuation rather than by direct argument.

From The Metaphysical Foundations of Modern Science (1926)

This emerging trans-modern worldview involves a shift in the locus of authority from external to 'inner knowing.' It has basically turned away from the older scientific view... and trusts perceptions of the wholeness and spiritual aspect of organisms, ecosystems, Gaia and Cosmos. This implies a spiritual reality, and ultimate trust in the authority of the whole. It amounts to a reconciliation of scientific inquiry with the perennial wisdom at the core of the world's spiritual traditions. It continues to involve a confidence in scientific inquiry, but an inquiry whose metaphysical base has shifted... to a more holistic and transcendental metaphysical foundation.



Willis Harman (1918-1997)
President, Institute of Noetic Sciences,
Author of A Re-examination of the Foundations of Modern Science (1991)

Glossary

This glossary explains some technical terms that have been used in the text.

Bayes analysis or **Bayes factor**: Bayesian statistics assumes that each empirical finding changes our prior probability about some event. If initially we are completely undecided about a question, our prior probability is 0.5. If we then conduct an experiment which has a certain outcome, this prior probability changes and our posterior probability will be lower or higher than this prior probability, dependent on the result. If our prior probability for some result is very high, because we expect it, for instance as a prediction from a very well supported theory, then we need only a small significance to change our posterior probability to virtual certainty. Conversely, if we hold a very low prior probability, for instance like the mainstream opinion about the likelihood of anomalous cognition, we need a very strong result to change this. Conventionally one assumes a Bayes factor of 100 to get a robust result, even if the prior probability is low. A Bayes factor is a factor which we multiply the significance with to account for a low apriori probability. Thus a Bayes factor of 100 would still keep a result significant, if it were originally p = 0.0001 or smaller (as 0.0001 * 100 = 0.01). The normally applied frequentist statistics is a special case of a Bayesian analysis, where we assume a prior probability of 0.5. This is clearly only the case if there is no prior expectation, which is not true for any contentious area or for any well researched area. Bayesian analysis is nevertheless unpopular, because it is more complicated than standard statistics and it is not trivial to spell out prior probabilities.

Clairvoyance: knowledge of occurences, objects or events that are spatially or temporally separated from the clairvoyant subject.

Effect Size: Effect sizes are dimensionless measures of effects, independent of statistical significance. An effect can be large, and still not statistically significant, or very small and still be statistically significant. This is entirely dependent on statistical power, the likelihood to discover an effect, if it is there. And this, again, is dependent on the size of the study, or its power. If an effect is small, but the study large, statistical power can be big enough to render an effect statistically significant. This is also the reason why meta-analyses are popular, as they pool effects from smaller studies, which often do not have enough statistical power and hence enhance power and can render small effects significant. Effect sizes can be expressed as a family of difference measures, or d; a variant is Hedge's g. Here, effects in a treated or experimental group are subtracted from effects or measures in the control group and standardised by the pooled standard deviation. Hence an effect size d is in fact a dimensionless measure of difference in terms of standard deviations. Another type of effect size is the correlation measure r, which documents a correlation between two variables. If the correlation is perfect, r = 1.0. If there is none, r = 0. The measure can vary between r = -1.0 and r = 1.0. Correlation measures in social science research are typically in the range between r = .3 and r = .5. The reliability of typical measurements of, say blood pressure or personality inventories, is around r = .7 to r = .8. In meta-analysis r is often used as an effect size measure. It can be converted into d and vice versa. Other measures are deviations from expectancy values.

Ganzfeld: a field of homogenous sensory stimulation in which usually eyes are shielded and irradiated with mild colourful light and hearing provided with pink noise and the participant is resting in a relaxed state; thought to be conducive to telepathy

Heuristic: A method, way or stance for finding results. The word is derived from the Greek "heurein – to find". A heuristic is not a clear method, but rather an overall way to arrive at a preferred outcome. A heuristic for finding the reason why a car broke down might be to first check the fuel, then the ignition, then the carburettor, then the fuel pipe, etc. in a certain sequence. A heuristic for finding mushrooms in the forest might be to first go to places, where they normally grow and check whether anything is visible and if to walk in ever deeper zig-zag lines into the forest, and if none are visible in the first place to go to the shops.

Locality: refers to the fact that according to Einstein's theory of Special Relativity no signal in the universe can travel faster than light. Hence the speed of light sets up causally connected regions of the universe. Whatever can be covered by a light signal is causally connected. This also entails that there is no possibility within the model of locality to receive signals from the future. This makes precognition theoretically impossible, and if it is seen as an empirical fact then either something else than causal signals must be responsible or our physical theories have to be adapated.

Meta-Analysis: A statistical procedure to pool the results from individual studies and calculate a joint effect. This is normally done by calculating a mean value and the significance of this value. The mean value is the pooled effect size, the significance indicates whether this effect size is significantly different from zero. Apart from that a meta-analysis also allows investigating moderators of the effect, such as type of study, type of population or the importance of subgroups.

Non-locality: The opposite of locality; it means that there are connections between domains of space and time, or between conscious minds across space and time, that do not rely on kown signals or occur without signal transfer. Exactly how this is possible in our current world-model is unclear. Some contend that we need a different type of physics to accommodate such hyper-fast "signals". This can be achieved at the cost of restructuring our physical view of reality, which nobody is particularly keen on. Others argue that by extending already known modalities of non-local correlations as known from physical entanglement correlations a coherent model can be achieved.

Power, statistical power: The likelihood with which an effect can be discovered statistically, if it is empirically present. The statistical power, 1-beta, is the inverse of the Type 2 mistake beta, the mistake to overlook a phenomenon, although it is present. The reason for this is that the effect is smaller than the size of the study allows to discover. Power is related to the notion of a study size: If an effect should be detectable at a certain level of significance, or by limiting the Type 1 mistake of rejecting the Null hypothesis or level of significance with a certain statistical power, which is usually set to be at least 80%, then a certain study size is necessary to be able to do this. Often effects go unnoticed, because they are small and studies have been too small or underpowered. Meta-analyses are ways to remedy this situation, because they pool the effects across studies, thus increasing the power to detect the effect.

Precognition: Foreknowledge of events that will occur in the future, often experienced in dreams or imagery.

Presentiment: A physiological or subconscious reaction to a future stimulus that is either threatening or in another way emotionally important.

Remote viewing: a special type of clairvoyance, where remote viewer is "seeing" events or objects that are at distant locations, sometimes together with a known person, or alone

Significance/sigma: the probability of making a mistake if something is said to be the case; the result of a formal statistical test. Often significance is expressed in "sigma", i.e. standard deviations (which are sometimes notated with the Greek symbol "sigma") of the standard normal distribution or Gaussian distribution, which has a normed standard deviation of 1. Conventional statistical significance of $p < 0.05$, or 5%, starts at a $z = 1.96$ or roughly 2 standard deviations or sigma. Physics often demands "5 sigma", i.e. highly significant effects of the size of $p < 0.0001$ or 10^{-4}.

Telepathy: cognitive or affective knowledge of mental content of another, usually spatially or temporally remote person

Psychokinesis: influence of intention in the material world without any known causal interaction or signal transfer

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Harald Walach, Ph.D.

Professor Harald Walach is a researcher at the interface between medicine, psychology and consciousness studies. Currently he is affiliated as a professor with Poznan Medical University in Poznan, Poland, where he teaches mindfulness to the international medical students, and as a visiting professor with the University Witten-Herdecke's psychology department in Germany, where he teaches philosophical foundations of psychology to psychology undergraduates. He is founding director of the Change Health Science Institute in Berlin.

Dr. Walach holds a double Ph.D. in Clinical Psychology, and History and Theory of Science. He has authored more than 170 peer reviewed papers, 14 books and more than 100 book chapters. After a career building up a research group in complementary medicine at the University Hospital in Freiburg he held a research professorship with the University of Northampton, UK from 2005-2009 where he directed the MSc Program of Transpersonal Psychology and Consciousness Studies. From 2010 until 2016 he worked with the European University Viadrina in Frankfurt (Oder), where he headed a postrgraduate Master program training doctors in complementary medicine and cultural sciences. His research interest is in methodology and evaluation of complementary medicine, the impact of consciousness on health, and a scientific approach to consciousness and spirituality. He is editor of the Journal "Complementary Medicine Research", associate editor of the journals "Mindfulness", and editor of the Springer book series "Neuroscience, Consciousness, Spirituality".

The Scientific & Medical Network

The Scientific and Medical Network
www.scimednet.org

The Scientific and Medical Network is a worldwide professional community and membership organisation for open-minded, rigorous and evidence-based enquiry into themes bridging science, spirituality and consciousness. It brings together open-minded and discerning people who are inclined to a non-materialist interpretation of the universe and who have a sympathetic interest in parapsychological and spiritual matters covered in the Galileo Commission Report. The existence of the Scientific and Medical Network is an indication that there is a significant minority among professional people who wish to take fully into account the existence of a fundamental spiritual reality and the implications of the spiritual capabilities that we all possess.

The Network is part of the contemporary quest for a more spiritual mode of thinking and being that is compatible with science. *Hence it promotes a greater acceptance by science and medicine of the human being's spiritual essence, as consistent with science*. As such the Network challenges the adequacy of an exclusively materialistic approach to reality as a sufficient basis of knowledge and values.

The Network is committed to advancing human perceptive abilities and acknowledges the complementary roles of scientific, artistic and mystical ways of knowing. In its work it seeks to harmonise intuition and logical analysis, heart and head, emotion and reason, subjective and objective, contemplation and action, the experiential and the intellectual.

This process of integration leads to a widening of experience and awareness resulting in a corresponding widening of our framework for understanding reality. The Network believes that growing knowledge and understanding can be attained by a more profound exploration and disciplined examination of key questions. This also requires deep sharing through creative listening and communication through silence, leading to a fellowship based on mutual trust and respect.

The Network seeks to provide a forum for pursuing truth, wherever it leads, to widen the intellectual horizons of science and of society as a whole, to stimulate research at the frontiers of human knowledge and experience, and to make the results of such research more widely known through its educational programmes.

The Network is committed to no dogma or creed. It encourages intellectual discernment and is wary of the ill-founded and sensational claims of 'pseudo-science'. In asking searching questions about the nature of life and the role of the human being, the Network abides by its guidelines of open-minded, rigorous thinking and care for others at all times.

The founders believed that neither orthodox religion nor conventional science were, in their current forms, sufficient to answer pressing questions about our existence and about the mysteries of the cosmos, and that new ways of thinking, and new interdisciplinary approaches were needed to build bridges and to search for new approaches.

Resources

Manifesto for a Post-Materialist Science
www.opensciences.org

Institute of Noetic Sciences
www.noetic.org

The Society for Scientific Exploration – SSE
www.scientificexploration.org

Alister Hardy Centre for the Study of Spiritual Experience
www.studyspiirtualexperiences.org

British Psychological Association – Transpersonal Psychology Section
www.bps.org.uk/networks-and-communities/member-microsite/transpersonal-psychology-section

British Psychological Association – Consciousness and Experiential Psychology Section
www.bps.org.uk/networks-and-communities/member-microsite/consciousness-and-experiential-psychology-section

Royal College of Psychiatrists Spirituality and Psychiatry SIG
www.rcpsych.ac.uk/workinpsychiatry/specialinterestgroups/spirituality.aspx

The Society for Psychical Research – SPR
www.spr.ac.uk

The Parapsychological Association
www.parapscyh.org

The Academy for the Advancement of Post-materialist Sciences
www.aapsglobal.com

Galileo Commission

CO-ORDINATORS

Prof Dr Dr Harald Walach (Germany)
David Lorimer (France), Chair, Programme Director SMN
Richard Irwin (UK), Director SMN

ADVISERS

Dr Bo Ahrenfelt (Sweden), psychiatrist, author
Dr Eben Alexander III (US), neurosurgeon and author
Prof Chris Bache (US), philosopher, Youngstown State University
Dr Anne Baring (UK), Jungian analyst and author
Dr Daniel Benor (US), physician, doctor-healer network
Prof Imants Baruss (Canada), psychologist, King's University College
Dr Vasileios Basios (Belgium), physicist, Free University of Brussels
Dr Mario Beauregard, (US) neuroscientist, University of Arizona
Prof Carl Becker (Japan), social scientist, Kyoto University
Dr Laurin Belgg (US), ICU physician
Dr Edi Bilimoria (UK), consultant engineer and author
Dr Arie Bos (Netherlands), physician and philosopher of science, University of Utrecht
Emilios Bouratinos (Greece), philosopher, author of "Science, Objectivity and Consciousness"
Prof Stephen Braude (US), philosopher, University of Maryland
Prof Etzel Cardeña, (Sweden), psychologist, University of Lund
Prof Bernard Carr (UK), physicist and cosmologist, Queen Mary College, University of London
Dr Deepak Chopra, (US), physician, author
Prof. John Clarke (UK), historian of ideas, Kingston University
Dr Apela Colorado (Canada), systems and indigenous scientist
Dr Ulisse Di Corpo (Italy), statistician
Dr Jude Currivan (UK), cosmologist, healer and author
Prof Christian de Quincey (US), philosopher, The Wisdom Academy, formerly JFK University
Dr Larry Dossey (US), physician, Executive Editor: Explore: The Journal of Science and Healing
Brenda Dunne (US), PEAR Lab, Princeton
Duane Elgin (US), writer and futurist
Federico Faggin (US and Italy) physicist, President of Federico and Elvia Faggin Foundation.
Dr Peter Fenwick (UK), neuropsychiatrist, University of London
Prof Jorge Ferrer (US), psychologist, California Institute for Integral Studies
Dr Paul Filmore (UK), physicist, University of Plymouth
Dr David Greenwood (UK) theologian, University of Wales, Trinity St David
Prof Bruce Greyson, (US), neuropsychiatrist, University of Virginia
Dr Stan Grof (US), psychiatrist, California Institute for Integral Studies
Dr Neal Grossman (US), philosopher, University of Illinois
Prof Michael Grosso (US), philosopher, Jersey College, New York
Nicholas Hagger (UK), philosopher, mystic and cultural historian
Paul Hague (Sweden), systems architect and author
Prof Stuart Hameroff (US), neuroscientist, University of Arizona
John Hands (UK), philosopher of science and author of Cosmo Sapiens
Dr Stephan Harding (UK), biologist, Schumacher College
Prof Janice Holden (US), chair of counselling programme, University of North Texas

Prof Brian Josephson FRS (UK), physicist, Nobel laureate, University of Cambridge
Dr Madayo Kahle (Spain), philologist, Universidad Complutense de Madrid
Prof Ed Kelly (US), cognitive neuroscientist, University of Virginia
Dr Emily Williams Kelly, (US) cognitive neuroscientist, University of Virginia
Paul Kieniewicz (Poland), physicist and geologist
Prof Stanley Krippner (US), psychologist, Saybrook Institute
Dr Ervin Laszlo (Italy), systems theorist and President of the Club of Budapest
Prof Les Lancaster (UK), psychologist, Liverpool John Moores University
Dr David Leech (UK), philosopher, University of Bristol
Prof Martin Lockley (US), palaeontologist, University of Denver
Dr Paul Marshall (UK), philosopher, co-editor of 'Beyond Physicalism'
Nicholas Maxwell (UK), philosopher of science, University College London
Dr Iain McGilchrist (UK), neuropsychiatrist and philosopher
Dr Lisa Miller (US), psychologist, University of Columbia
Prof Marilyn Monk (UK), biologist, University College London
Dr Raymond Moody (US), physician, philosopher, author
Dr Julia Mossbridge (US), cognitive neuroscientist and futurist, Fellow, Institute of Noetic Sciences
Prof AK Mukhopadhyay (India), physician and consciousness researcher, All India Institute of Medical Sciences
Dr Jeremy Naydler (UK), philosopher and historian of ideas
Dr Roger Nelson (US), psychologist, Global Consciousness Project
Prof Kim Penberthy (US), cognitive neuroscientist, University of Virginia
Dr Andrew Powell (UK), psychiatrist, Founding Chair of Royal College of Psychiatrists Special Interest Group
Prof John Poynton (South Africa), zoologist, University of Natal
Prof Dean Radin, (US), parapsychologist, Institute of Noetic Sciences
Prof K. Ramakrishna Rao (India), psychologist, philosopher and parapsychologist Chair, Indian Council for Philosophical Research and former Vice-Chancellor of Andhra University
Prof Ravi Ravindra (Canada), physicist, University of Halifax
Dr Alan Rayner (UK), biologist, University of Bath
Prof Peter Reason (UK), social scientist, University of Bath
Dr John Reed (US), physician, editor, World Institute of Scientific Exploration Journal
Prof Kenneth Ring (US), psychologist, University of Connecticut
Dr Oliver Robinson, (UK), psychologist, University of Greenwich
Prof Chris Roe (UK), psychologist, University of Northampton
Peter Russell (US), physicist, author
Dr Shantena Sabbadini (Spain), physicist, Pari Center and Schumacher College
Dr Marilyn Schlitz (US), anthropologist, parapsychologist, Institute of Noetic Sciences
Dr Gary Schwartz (US), neuropsychiatrist, University of Arizona
Stephan Schwartz (US), scientist, futurist, historian
Dr Rupert Sheldrake (UK), biologist, University of Cambridge
Julie Soskin (France), spiritual director and facilitator of consciousness studies
Dr. Bobbie Stevens (US) psychologist, author, coach, co-founder and CEO Unlimited Futures LLC
Prof Richard Tarnas (US), philosopher, California Institute for Integral Studies
Prof Charles Tart (US), psychologist, parapsychologist, UC Davis
Dr Steve Taylor (UK), psychologist, Leeds Beckett University, author
Hardin Tibbs (UK), futurist
Dr Natalie Tobert (UK), medical anthropologist
Dr Pim van Lommel (Netherlands), cardiologist
Prof Max Velmans (UK), psychologist, Goldsmiths, University of London
Dr Cassandra Vieten (US), psychologist, Institute of Noetic Sciences
Dr Alan Wallace (US), physicist and Tibetan monk, Santa Barbara Institute
Dr Joan Walton (UK), consciousness researcher, York St John University
Prof Marjory Hines Woollacott, (US), neuroscientist, University of Oregon
Dr Michael Wride (Ireland), biologist, Trinity College, Dublin

Selected Report Endorsements

Modern science has accomplished unprecedented goals in demonstrating the potential for humanity to understand and manipulate the world around us. However, much of its effect (i.e. science and technology used to wage war or enable injuring and killing others, as well as the wanton wreckage of our environment to the point of threatening great numbers of species with extinction, etc.) has greatly diminished the quality of life on our fragile planet, as opposed to enhancing it. The Galileo Commission report illuminates a refreshing path forward, all based in the modern science of consciousness, which offers hope for a more promising and fruitful future for all of humankind. Thanks to this report and the direction to which it points, scientific pursuits may once again lead the charge in achieving the grand aspects of human potential, through the wedding of human knowledge with the reality of human spirit.

Eben Alexander, MD
Neurosurgeon, author of *Proof of Heaven* and *Living in a Mindful Universe*

Harald Walach does a superb job in arguing for a broadening of science's self-conception beyond mainly materialistic paradigms and means. His reasoning is as useful for the future of science in time of deep change, as it is a huge challenge for all of us! A must-read for everybody interested in the future of our profession and the values and perspectives underlying it.

Roland Benedikter
Co-Head, Center for Advanced Studies, Eurac Research Bolzano/Italy, and Research Professor of Multidisciplinary Political Analysis, Willy Brandt Centre, University of Wroclaw/Poland.

I applaud the Galileo Report for emphasizing that there's no such thing as a purely empirical science, and I support its call for self-critical reflection on the foundations, aims, and scope of the scientific enterprise.

Professor Stephen Braude PhD
University of Maryland, Past President, Parapsychological Association and Executive Editor-in-Chief, *Journal of Scientific Exploration*

In the future, if we have one, our descendants will surely look with astonishment on a hallmark of our age: how we were duped by materialism, how our most brilliant scientists enthusiastically used their minds to prove that minds do not exist, and how they employed their consciousness in the task of proving that no one is truly conscious. A condition for our species' survival is, first and foremost, to survive the dehumanizing, paralyzing, suicidal scourge of materialism. ***The Galileo Commission Report*** is a powerful move in this direction.

Larry Dossey, MD
Author: *One Mind: How Our Individual Mind Is Part of a Greater Consciousness and Why It Matters* and other books.
Executive Editor: *Explore: The Journal of Science and Healing*

Anyone seeking a thorough understanding of the controversy at the growing edge of science will find it in the Galileo Commission Report – it is a real tour de force! As humanity stands on the precipice of that growing edge, the Report will help to ensure that we will not fall back to the limited perspective that currently dominates Western culture but will move forward to a more holistic perspective that includes all the evidence at hand.

Professor Janice Holden, PhD
Professor, Counseling Program, College of Education. University of North Texas

The Galileo Project is an enterprise whose time has come. A careful look at the evolution of the cosmos will discern the role of intention and agency in all creation, from the planets, stars, and galaxies. to amoebae, molecules and subatomic particles. This self-organization belies the materialistic paradigm and affirms the primacy of what, for lack of a better term, we call "consciousness."

Stanley Krippner, PhD
Professor of Psychology, Saybrook University

If science means careful, systematic investigation of phenomena, and the knowledge and theories that follow from it and feed into it, then so far so good. But unexamined presuppositions have too often imposed limits on the phenomena investigated, methods employed, and conclusions drawn. Walach's Galileo Commission Report provides a stimulating, richly detailed critique of those presuppositions and their regrettable consequences, and above all invites us to do better, more open-minded science.

Paul Marshall, PhD
Author of *The Living Mirror* (1992) and *Mystical Encounters with the Natural World* (2005), and coeditor of *Beyond Physicalism* (2015).

The Galileo Commission Report is a revolutionary work that serves as a "wake-up call" to humanity that there is more to this universe than our physicalist notions currently allow. This report is a well-written, comprehensible, yet thorough introduction to the big concepts and ideas surrounding a world view beyond physicalism and the necessity for humankind to broaden and deepen our understanding of consciousness. This report is a compelling call for us to re-examine the impact of our belief systems and assumptions on our work and to expand our scope, deepen our introspection, and apply our scientific curiosity towards a more comprehensive understanding of consciousness. The ramifications of such are too big to ignore.

Jennifer Kim Penberthy, PhD, ABPP
Chester F. Carlson Professor of Psychiatry & Neurobehavioral Sciences, Division of Perceptual Studies, Center for Contemplative Sciences, Department of Psychiatry & Neurobehavioral Sciences, University of Virginia School of Medicine, Charlottesville, VA, USA

The Galileo Commission, of which I am a part, is one manifestation of an emerging critical consensus in science; not a refutation of the past but an extension and expansion into the future. One that Max Planck, Einstein and others tried to tell us about a century ago: consciousness is causal and fundamental -- a post-materialist worldview.

Stephan A. Schwartz
Distinguished Consulting Faculty - Saybrook University
Author of The 8 Laws of Change, Columnist - Explore

In this Report, Harald Walach has summarised and synthesised his work of the last two decades. He points out the severe limitations of strictly materialist background assumptions that unnecessarily narrow down the scope of science. Among other suggestions for an improved way to conduct empirical research, especially research dealing with humans, he suggests giving more emphasis to inner experience when exploring issues related to consciousness. Changing the underlying assumptions of science as well as respective research methods might not be equally important for all scientific areas; but to really advance our understanding of areas such as meditation research or research on psi-phenomena, an increased openness to alternative background assumptions and research methods as competently advocated in this Report is absolutely necessary.

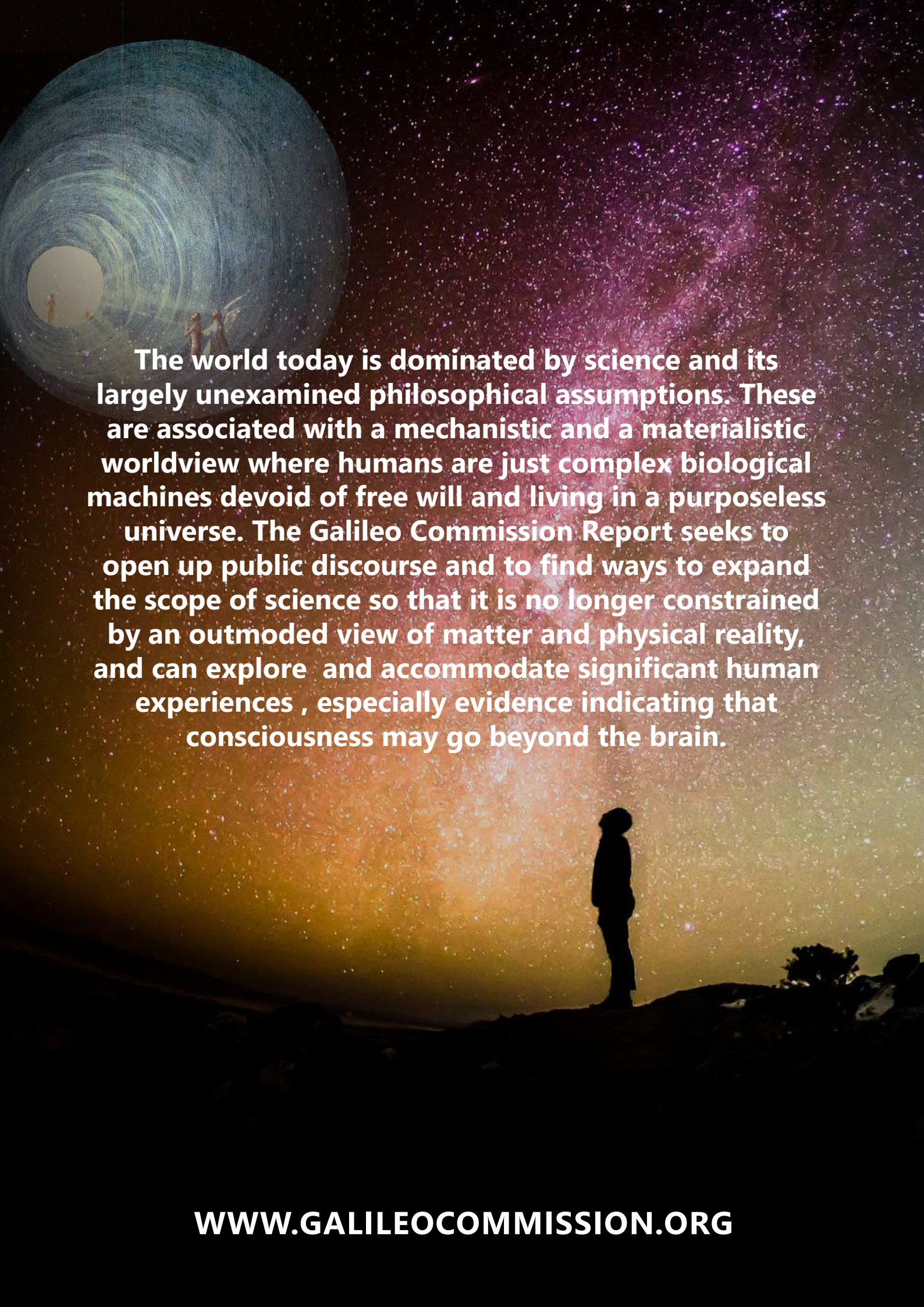
Professor Peter Sedlmeier
University of Chemnitz (Chair of Research Methods in Psychology)

We are living in a time of crisis, largely as a result of the materialist worldview which underpins our culture, which sees living beings as chemical machines, and the mind as nothing more than a product of the brain. This worldview has created a background atmosphere of nihilism, a sense that life is purposeless and meaningless, and also fuels our reckless abuse of the environment. As the report of the Galileo Commission clearly shows, a great deal of contemporary scientific research shows that the assumptions of this worldview are false, and points towards a more holistic and spiritual perspective. As a culture, we urgently need to embrace this new perspective in full, so that we can begin to live more harmoniously with each other and the natural world. The report of the Galileo Commission is an important part of the movement towards this goal.

Steve Taylor PhD
Senior Lecturer in Psychology, Leeds Beckett University, Chair of the Transpersonal Section of the BPS, author of *The Leap, Spiritual Science, Waking From Sleep*, etc.

When I read the Galileo Commission Report, which includes the names of many highly respected advisors from the general scientific community, I was encouraged to see that the materialist view that consciousness is solely the product of brain activity has been challenged in a detailed, clear, and very convincing document. My hope is that the scientific community at large will consider this body of research, which is based on an emerging post-materialist scientific framework, in a thoughtful and professional way, and conclude that it makes a powerful case for consciousness as a primary element of nature rather than a product of biological processes.

Marjorie Woollacott, PhD
Professor Emeritus, Institute of Neuroscience, University of Oregon, President, Academy for the Advancement of Post-Materialist Sciences (AAPS).



The world today is dominated by science and its largely unexamined philosophical assumptions. These are associated with a mechanistic and a materialistic worldview where humans are just complex biological machines devoid of free will and living in a purposeless universe. The Galileo Commission Report seeks to open up public discourse and to find ways to expand the scope of science so that it is no longer constrained by an outmoded view of matter and physical reality, and can explore and accommodate significant human experiences , especially evidence indicating that consciousness may go beyond the brain.

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