

The New Metaphysics and the Deep Structure of Creativity and Cognition

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ABSTRACT

This paper examines the recent speculative outpourings of contemporary scientists, giving the oeuvre the collective title 'the new metaphysics'. In considering it as an exploration of the deep structure of human experience, the new metaphysics can be seen to fall into two camps: the reductionist and the anthropic. These have radically different implications for creativity and cognition. The differences in approach are symbolised in this paper by the formulations of Laplace and Longchenpa, respectively representing Western reductionism and Eastern mysticism. It is shown that the future development of the computer will play an important role in the development of the new metaphysics, which may lead to a first-person science.

Keywords

metaphysics, consciousness studies, first-person science, Douglas Harding, determinism, limits to computation

The four vectorial connections in the 'experience of Being':

- ineffability
- coherence
- spontaneity
- solitariness

Longchenpa, 14th century Tibetan Buddhist [1]

--- a sort of intoxicated joy and amazement at the beauty and grandeur of this world --- is the feeling from which true scientific research draws its spiritual sustenance, but which also seems to find expression in the song of birds.

Albert Einstein [2]

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INTRODUCTION

Science at its most abstract is neutral and value-free, but, as Einstein's thought shows, it is also to do with the beauty and grandeur of the world, in other words the deep structure of human experience. At no time in history have scientists written so much for the general public on science, clearly inspired by its beauty and grandeur. I term these writings the 'new metaphysics', and propose that they fall roughly into two camps: the reductionist and the anthropic. The reductionist writings by authors such as Richard Dawkins, Daniel Dennett, Frances Crick and Stephen Jay Gould are a natural extension of Laplace's determinism, though filled with the passion that Einstein calls beauty and grandeur. The anthropic approach typified by Fritiof Capra, Gary Zukav John Barrow, Frank Tipler, Dana Zohar and Rupert Sheldrake are filled with the same passion, but align themselves more easily with Eastern philosophy.

The Tibetan Buddhist Longchenpa characterised the deep structure of human experience in terms of four vectors or qualities:— *ineffability*, meaning that ultimately one cannot grasp anything; *coherence*, meaning that despite the ineffability of human experience the world is not a chaos; *spontaneity*, meaning that our experience is fresh and selfrenewing; and *solitariness*, meaning that we have access to only one consciousness, and hence that our reality is subjective and at the same time holistic. The anthropic elements of the new metaphysics seem to resonate with all four of Longchenpa's vectors, while the reductionist elements deny all except *coherence*, i.e. logic and reason. Because of this the anthropic metaphysics seems better placed to engage with questions of creativity and cognition.

THE NEW PHYSICS

The term 'metaphysics' — since its original use to describe sections of Aristotle's writings which followed 'physics' has a range of meanings, but I am using it in a specific way in this paper: as a speculation based on physics (or more broadly science). Good metaphysics in this context is a rigorous speculation based on physics, bad metaphysics an ill-thought out speculation. The origins of any metaphysics in this sense are a reaction to scientific developments, and the qualities of the metaphysics derive in part from the science that triggered it and in part from the quality of discourse generated.

The physics of Galileo and Newton is a mechanical one. Pierre-Simon Laplace characterised the Newtonian universe as one which an evil calculating genius could construct at any point in the past or future from the world's current conditions. This is in itself an interesting piece of metaphysics, as is, for example, Newton's response to his own discovery of the inverse-square law of gravitation, the logical consequence of which was that the universe would collapse under its own mutual attraction. He proposed that there was no centre to the universe, so where would it collapse to? This turned out to be poor metaphysics and was largely forgotten, but the Laplacian calculating demon survives and is entrenched in Western thought.

In looking at a metaphysics based on science I have found it useful to distinguish three forms: 'pre-scientific', 'reductionist', and 'anthropic'. Pre-scientific metaphysics was generally based on incorrect assumptions about the physical world, and is hence excluded from this paper. Reductionist metaphysics include speculations on Newtonian and Darwinian science, while anthropic metaphysics derives in turn from the 'new' physics.

The metaphysics derived from the Newtonian and Darwinian understanding of the universe is essentially pessimistic. I have pointed out in previous papers [3] that up to the time of Galileo the European world-view could be described as anthropocentric, but that the heliocentric theory knocked mankind into an anthropo-eccentric state. The coldness and indifference of this new universe was spelled out by the Laplacian formulation, and one could argue that it found its way via Nietzsche and Sartre, amongst others, into a modern form of psychological alienation, termed by Sartre as 'Iron in the Soul'. While it may be an inevitable and necessary maturation of the Western mind that this metaphysics effectively destroyed the hold of religion on society, it provided no meaningful alternative. The reductionist metaphysics is practised with vigour today, though it is significant that it derives mainly from biological science where reductionist determinism holds more strongly than in physics. The reductionist Darwinisms of Richard Dawkins [4], Daniel Dennett [5], and Stephen Jay Gould [6] are known as genetic determinism. When we consider these metaphysics against Longchenpa's vectors we recognise that they express coherence above all. The ineffable would be a contradiction of their claims that Darwinism can explain the entire natural world; the spontaneous has no part in their discourse, while the question of the solitariness of consciousness does not arise, because consciousness is understood as an epiphenomemenon. Their metaphysics cannot be holistic because it is a metaphysics of the parts.

In contrast, the anthropic metaphysics of writers like Fritjof Capra [7], Gary Zukav [8] and Dana Zohar [9] (to name just a few) seem to reflect all of Longchenpa's vectors, yet are based firmly on science. The difference arises because it is a metaphysics based on the 'new' physics that emerged in the 20th century. I have taken the term 'anthropic' from a seminal work in the new metaphysics, *The Anthropic Cosmological Principle*, by Frank Tipler and John Barrow, which set out to show that the physical laws of the universe seem to be constructed in such a way as to favour human consciousness. Their book is firmly based in the new physics.

So what is the 'new' physics? Depending on who you ask it includes one or more of quantum mechanics, relativity, and chaos theory. In rather different ways, these theories undermine the Laplacian view of the world, giving us a spectrum of new views. These range from a mild assertion that at sub-atomic levels only, measurements cannot completely describe the state of a particle (this is known as quantum indeterminacy), to a 'strong' anthropic view which places human consciousness at the centre of the observable universe. Perhaps the best formulation of this comes from Tipler and Barrow: 'Consciousness is as essential to the existence of the universe, as the universe is to the existence of consciousness' [10].

The new physics does not invalidate classical physics however. Quantum mechanical effects are only observable at atomic level, and relativistic effects only approaching the speed of light, or on very large scales. Hence both theories contradict nothing in the mechanical view of the universe at the human scale of dimensions and velocities; the classical mechanics providing the limiting case. Perhaps because of this a large proportion of contemporary metaphysics is still deterministic rather than holistic.

David Bohm, the late and eminent quantum physicist, lists four basic features of quantum theory [11]:

- 1. Indivisibility of the Quantum of Action: this is basic postulate, that wave energy cannot be divided up below a certain (very small) quantity, proportional to its frequency.
- 2. Wave-Particle Duality: all waves can be considered as particles at the quantum level, but also as waves it is up to the observer to set up the conditions for observation that give a wave or-particle description of a phenomenon.
- 3. Properties of Matter as Statistically Revealed Potentialities: the 'classical' world of discrete solid objects with deterministic behaviour is a statistical description of large numbers of quantum particles; for example the half-life of a group of millions of uranium atoms can be stated accurately, but nothing can be said about an individual atom.
- 4. Non-causal Correlations: quantum theory requires sub-atomic particles to behave as if they communicated instantaneously over large distances. This is called instantaneous nonlocality, and was one of the aspects of quantum theory that led Einstein to search for the remainder of his life for ways to disprove quantum theory. He was unsuccessful.

If one cannot *in principle* completely determine the state of particles in an atomic nucleus, then one cannot know its history: if one does not know the history of a structure one cannot predict its future. Hence the radioactive decay of a single nucleus is an unpredictable event, yielding only to a statistical analysis over large numbers of nuclei. (In fact, at a macroscopic level quantum mechanics is highly successful in predicting events.) Einstein and David Bohm, to name just two, rejected the concept of quantum indeterminacy just outlined, but the scientific community as a whole does accept it. The status quo in the scientific community is represented by the Copenhagen agreement, which neither Einstein or Bohm accepted (their approach is sometimes called the 'hidden variables' interpretation).

A third interpretation is the 'many worlds' theory which proposes that for every quantum event which could resolve itself in more than one way there is a bifurcation of the world into parallel universes. As a scientific theory it has been neither proved nor disproved to date, but is argued for by physicist David Deutsch in his book *The Fabric of Reality* [12]. Deutsch's thesis is also interesting in that he relies heavily on the possible properties of a universal virtual reality generator — a computer. Deutsch's metaphysics depends on the future development of computing, a theme that we will return to later.

A large proportion of the anthropic metaphysics arises from quantum theory, but relativity is also important. The origins of Einstein's relativity are twofold: firstly a denial of any absolute frame of reference (which Newton believed in), and secondly an assumption of the invariance of the speed of light. The first proposition is more of a metaphysical statement than a scientific one, and is significant because it allows again for a more anthropocentric view of the world (though this was not Einstein's intention). The second one made the famous null-result of the Michelson-Morely experiment into a premise for the new theory. Briefly, Einstein showed in the Special theory of relativity that as bodies approach the speed of light they would undergo mass and time dilation. In the General theory these ideas were extended to provide a new theory of gravitation.

The general theory of relativity does not fit well with quantum theory however, and one of the great remaining puzzles of modern science is to reconcile them.

Apparently Einstein was just as uncomfortable with his own version of gravitation as was Newton, and developed an equally flawed pseudo-physical explanation for why the universe should not collapse on itself: a form of negative gravity. When Edwin Hubble was able to demonstrate that the universe is expanding, Einstein dropped his theory as 'the greatest blunder of his life.' The merits of the science are not as interesting in this context as the human dimension of the problem: both of these great scientists were not detached and aloof from their science, but sought to harmonise it with their intuition about the deep structure of their experience. Chaos theory, the third new scientific theory of the 20th century, operates at more human scales than either quantum theory or relativity; its metaphysics less dramatic, but its influence may yet prove more pervasive. Chaos theory stands apart from both quantum theory and relativity as a science of complex systems, requiring as its basis nothing more than classical dynamics. Chaos theory suggests that we cannot understand the dynamics of complex phenomena 'in principle' by extension from a simpler system. There is a qualitative and quantitative leap in characteristics from simple to complex systems, typified by the onset of turbulence in the flow of liquids. Chaos theory holds a gun at the head of determinism, without recourse to quantum mechanics or relativity: it proposes that complex systems are ineffable simply because, though 'in principle' deterministic, they are in practice unpredictable. What then of Laplace's demon of infinite calculating power? The metaphysics of this debate then boils down to whether or not a computer can be built 'in principle' that can accurately predict complex systems, a practical example being the weather. We will return to this question later on in the context of predictions for the far future.

THE NEW METAPHYSICS: THE NEW ROCK'N'ROLL?

The new metaphysics attempts in one way or another to say something about the deep structure of human experience. The reductionists would prefer to say the deep structure of the universe, and to leave out the subjective human element, but perhaps despite themselves the reductionists write endlessly about the human *implications* of their science. It is my contention that all three of art, science, and religion deal with the deep structure of our experience, the fundamental givens of our world. Clearly they do it in different ways, but at the heart of the anthropic metaphysics is a willingness to cross traditional boundaries and seek common ground with other disciplines.

We have seen that quantum mechanics itself, a highly successful predictive science, operates only at the atomic level. The question then arises as to whether it can be translated into the macro-world, the human world.

It is Schroedinger's cat that propels quantum mechanics from the micro- to the macro-world, and has become the paradigmatic experiment of the anthropic metaphysics. Erwin Schroedinger, quantum scientist and something of a philosopher, proposed a gedanken-experiment where the unpredictability of a quantum event was amplified into the human world, resulting in the possible death of a cat. The idea is that a quantum event results in a single sub-atomic particle triggering a detector (even the dark-adapted eye can detect a single photon) which causes the death of a cat kept in a closed and opaque box. In some versions of the experiment the quantum event consists of a photon travelling through a half-silvered mirror, where, according to the wave theory of light it must be split into two. The particle theory of light indicates that the photon may only travel through or be reflected, the former situation resulting in the death of the cat. Mathematically the scenario is described by a wave function, and the final position of the photon is determined by the 'collapse' of this function. Nothing in the history of the apparatus can determine the outcome. Schroedinger argued that, until the human intervention of observing the state of the cat, it lived in a superposition of two states: dead and alive, indicated mathematically by the wave function. This is the most serious challenge to determinism yet, and contains within it all four of Longchenpa's aspects: ineffability (we cannot predict the outcome), coherence (we have a precise mathematical description of the situation); spontaneity (it could go either way), and solitariness (the collapse of the wave function is holistically related to the observer).

Does genetic determinism necessarily have to be against the anthropic principle however? There is no doubt that Darwinism as presented today is a beautiful and powerful description of part of the deep structure of our experience --- the part that Longchenpa calls coherence. But Dennett in particular believes that Darwinism is a 'corrosive acid' which can dissolve all competing world-views. He doesn't seem to realise however that his work is a metaphysics, and that, although a statement in science is subject to proof or disproof via experiment, a statement in metaphysics has a more complex life-cycle. Dennett's book Darwin's Dangerous Idea, is subtitled Evolution and the Meanings of Life, which immediately poses the question, why should one draw one's meaning of life from Darwinism, however elegant a theory? What Dennett does do, and does very well, is to knock down a range of badly-thought out metaphysics. These include all the so-called scientific proofs of the existence of God (which can be refuted on philosophical or comparative religion grounds), Teilhard de Chardin's idea of the Omega Point (which can be argued against from a number of perspectives including the anthropic one), and Roger Penrose's belief that the brain is a quantum computer to be explained by a yet undeveloped physics (which rules itself out of our metaphysics as it is not based in existing science). Dennett's arguments are valid, but, like Dawkins', seems to be fighting an army of ghosts that few intellectuals take seriously anyway. While the metaphysics of the genetic reductionists may be elegant, its protagonists cannot demonstrate that it is sufficient.

A committed determinist may also be a quantum scientist, and Einstein himself is a good example. His work on the photoelectric effect established the basis of quantum physics, but he vigorously objected to the principle of indeterminacy, famously protesting that 'God does not play dice'. More surprisingly Schroedinger himself seemed cagey about a direct link between quantum theory and mysticism. This is the thesis of Quantum Questions, a collection of the writings of quantum scientists, edited by Ken Wilber. In his introduction Wilber states: 'It is not my aim in this volume to reach the new-age audience, who seem to be firmly convinced that modern physics automatically supports or proves mysticism. It does not' [13]. Wilber also makes the point that if the 'new' physics is superseded, then what happens to the mysticism, if it hitched its wagon to it? I believe that this is a wrong view of physics however; the 'new' physics has not superseded the old, merely expanded it. And if the efforts of the

greatest scientist of this century, Einstein, and many other since and over a period of seventy have failed to demolish the basic tenets of quantum theory, it is unlikely to prove wrong as such. All the signs are that particle physics has become more paradoxical rather than less in the period. Of course, the physics to come may result in a paradigm shift that we cannot anticipate, but in the same way that the new physics did not return us to a pre-Newtonian science, it is unlikely that the next revolution in scientific thinking will return us to a Newtonian one.

Schroedinger, in Wilber's extract, is reluctant to conclude that the subjective influences the objective, drawing on the Cartesian view that mind, as non-physical, cannot influence the world of energy [14]. He then makes the point that 'the world is given to me only once, not one existing and one perceived. Subject and object are only one. The barrier between them cannot be said to have broken down as a result of recent experience in the physical sciences, for this barrier does not exist.' While sympathetic to all the points made by Schroedinger here, they need a more fine-grained treatment than he could allow.

As in many new and untried ventures, the project of the new metaphysics is at risk from some of its own practitioners, those making claims that are wildly speculative. Tipler's *Physics of Immortality* springs to mind, and will be discussed later on.

Whatever one's stand on the anthropic principle, there is no doubt that the new metaphysics is a substantial phenomenon, at least in its social dimension. The plethora of popular science titles in bookshops bears witness to this, as do their sales volumes, and also the likely presence of some of the top titles in airport bookshops and newsagents. We can consider Capra and Zukav to be the Beatles of this rock'n'roll, packaging a 'music' (the new physics) that had previously been obscure for a popular audience. Today's best-known practitioners of the new metaphysics are almost superstars, commanding high lecture fees and book royalties. The oddest phenomenon of this rock'n'roll is the sudden willingness of the scientists to pronounce on religious issues, and in particular to write on God. There is no space here to explore this particular issue, though it is worth mentioning that the British-born physicist Paul Davies received the one million dollar Templeton prize for the advancement of religion in 1995. The basis of his popular work is the contention that 'science is a surer path to God than religion.' (I consider this issue in more detail elsewhere [15].)

The new metaphysics is a recent and on-going phenomenon, and we are interested in this paper to consider its possible implications for the new millennium; in the first instance whether a first-person science may develop from it, and more generally its implications for creativity and cognition.

A FIRST-PERSON SCIENCE

Perhaps the most significant impact of the new metaphysics to date has been the development of Consciousness Studies as an emerging discipline (the Journal of Consciousness Studies [16] charts the debates over the last few years). At the end of the 19th century philosophers like William James were confident that the new science of psychology would be a first person science, a science of consciousness, but the prevailing reductionism favoured the rise of the behaviourists, and it was not until the end of the 20th century that it became at all acceptable to study consciousness. The shift in attitude is mainly due to the anthropic implications of both relativity and quantum mechanics. While the anthropic metaphysics of recent years seems to be the background to studies in consciousness there is a project to directly link consciousness with quantum effects in the brain, the chief protagonists of which are Roger Penrose and Stuart Hammerof [17]. It has been suggested that consciousness studies is divided into the 'easy' questions, amenable to conventional science, and the 'hard' questions, which include the problem of qualia (e.g. the redness of red and the painfulness of pain) and the question of holism (how the consciousness seems to create a whole out of disparate sense impressions).

The vulnerability of consciousness studies at present lies in the probability of the brain turning out to be a quantummechanical device. If this were proved true then it would provide a possible unifying arena for the sciences and humanities with undreamed of intellectual fall-out. However, its possible failure should not bring down the edifice of the anthropic metaphysics. It is being suggested in Consciousness Studies that a first-person science is needed, and I believe that this may well be the real fruit of the new metaphysics.

To understand what a first-person or subjective science might be we need to remind ourselves of the methodologies of conventional or third-person science. Third-person science is based on observation of the natural world, selection of phenomena within it for measurement, construction of hypotheses that these measurements may or may not confirm, a rigorous regime of measurement, recording and analysis, and dissemination of results to the scientific community for corroboration through peer-review and publishing. The first person is the object of investigation, the second person the scientist, and the third person the corroborator, or perhaps the whole community. A topical example illustrates this process: biologist Arpad Pustai made experiments on rats in 1998 to discover the effects of genetically modified potatoes on them. Because his results alarmed him he published them before the scientific community could either examine his methods or repeat the experiment, and therefore his results were rejected as unscientific. Different areas of science proceed in slightly different ways however: in some cases an experiment may never be repeated because either the results were so convincing to the community, or because of cost, I am emphasising the community in third-person science, because in this respect it is true that science is a social

construct: the results are not, but the process is. A person stranded on a desert island with all the ability and resources in the world cannot do science, because there is no corroboration.

With this preamble in mind, what might a first-person science be? It starts out as a conflation of the first and second persons in the conventional model. The object of the experiment, and the experimenter, become the same person. The results, as in third-person science, are corroborated by the relevant community (meaning a community of those trained in the first-person science). The subject matter for this proposed science is, in the first instance, mind and consciousness, or to put it another way, aspects of the deep structure of human experience. The problems of qualia and holism do not seem amenable to third person science, on the other hand a methodology based on measurement may not be appropriate to a first person science.

It is my contention (only to be touched on here) that some forms of mysticism are effectively first person sciences of the deep structure of human experience. Examples might include the Yoga system of Patanjali (India, possibly 5th century), Buddhist approaches such as those of Longchenpa (Tibet, 14th century), and the neo-Platonism of Plotinus (Europe, 3rd century).

I first came across the term 'first person science' from the British spiritual teacher Douglas Harding. Harding was trained in architecture but has spent the last fifty years teaching a system of personal growth based on mainly visual observations of the deep structure of experience. His first book was favourably reviewed by C.S.Lewis, and the first chapter of his best-known work *On Having No Head* [18] has been reproduced in Hofsdatter's *Minds I* anthology [19].

Harding's methodology is based on a relinquishing of memory and imagination in favour of observation, usually in the context of simple exercises or 'experiments' [20]. He characterises this approach as prioritising *percept* over concept. His teachings pivot around a central observation: that one has no head, and that in its place the whole universe rests. This is a first-person observation, and for most adults, when treated as a proposition, is fiercely resisted. However, Harding is making the point that as a first-person percept it is not merely true, but available to anyone willing to suspend memory and imagination. One could make an analogy with the Michelson-Morely null result: it took the genius of an Einstein to take it at face value and derive what turned out to be one of the most significant advances in physics from it. A certain innocence and willingness to suspend so-called rationality was required by Einstein (some have commented on his childlike nature in some respects), and I would contend that a similar genius is at work with Harding. But where does his science take him? His work resonates better with Longchenpa than with Laplace, but at the same time it raises the spectre of solipsism, the idea that one's self is at the centre of the universe, the only certain reality. Longchenpa merely includes it as the fourth characteristic of being (*solitariness*), but to the West it remains a problematic concept. Sartre took the trouble to refute it, as has Deutsch more recently. Buddhist theory would call it an empathetic solipsism, as an empathetic faculty seems an important part of the deep structure of our experience (more usually termed compassion in Buddhism however). There is not space here to pursue this debate, but merely to say that if a systematic enquiry into the deep structure of human experience shows a kind of solipsism to be part of that structure, then we should not avoid it out of distaste, any more than Newton avoided his inverse square law of gravitation (though his distaste was palpable, as was for that matter Kepler's for the elliptical orbits he discovered, or Einstein's for quantum indeterminacy).

If we look again at the extraordinary discovery of Einstein that the speed of light is invariant, and consider it stripped of its scientific language, then is not a clear statement of solipsism? The speed of light relative to oneself never varies, whatever speed one is travelling, and whatever speed the source is travelling — has not Einstein said something extraordinary about the self, rather than light? Is it not an anthropic statement? As a scientific statement obviously not, but as a metaphysical statement, yes.

We can characterise the two sciences (one established and the other putative) as two epistemologies with different relationships between concept and percept. The role of percept in classical science has been neglected, only to come to the fore in the new physics. Percepts in conventional science are related to the technologies of measuring instruments, starting with Galileo's telescope and ending with today's vast array of instruments which mainly deliver a *visual* reading of some king.

The mind-brain problem is the archetypal discourse between physics and metaphysics (or science and metascience if you prefer). The problem is not one of antiquity however, because the function of the brain was not understood until relatively recently. (Apparently the ancient Greeks thought that the brain was an organ for cooling the blood, while the medievals thought that it produced the mucus in the nose.) It was Descartes who started the Western preoccupation with brain and mind, while today the innovative and radical thinking on this issue is to be found in Studies in Consciousness. Returning to Schroedinger's points about subject and object: in third person science it is correct to say that mind cannot influence matter, because mind is nowhere to be found, i.e. it is not measurable. In first person science it is correct to say that subject and object are one, because matter cannot be found. But without a clear distinction between the two sciences, and a thorough apprenticeship in both epistemologies, it is merely confusing to place the two statements together.

If a first-person science were to develop, then its power would be the way it interlocks with third-person science. In a first-person science one of the objects missing from its discourse is the first-person brain, while, as mentioned, in third-person science it is the third-person mind that is missing. Hence the mind-brain problem boils down to the relationship between the epistemologies of the two sciences, and the problem cannot be located entirely in one science or the other.

CREATIVITY AND COGNITION

Can we consider art as a discipline for the exploring the deep structure of experience? The sculptor Constantin Brancusi certainly saw his work in that way, and it is perhaps no coincidence that his favourite reading was The Life of Milarepa, another Tibetan Buddhist. Art expresses more directly the third of Longchenpa's qualities: the spontaneous, and Brancusi was very much concerned for a freedom in which to explore his art — a freedom from the obligations of previous centuries to represent the 'religious'. Brancusi wanted 'an art of our own', a modern contemporary art that belonged to artists, and not to the church. Roger Lipsey [21], in a survey of the spiritual in 20th century art, concluded that the birth of modernism and abstract art was in fact an expression of the spiritual, rather than the rational that some modernists proposed (he took Brancusi's theme of an art of our own as part of the title to his book). He also believed that there was a relationship between modern art and the new physics.

Brancusi and other modern artists can be seen to have explored the deep structure of their experience in many ways, geometry being one (a continuation of the Renaissance interest in 'divine proportion'), the structure of light and composition being others. Recent work by Leonard Schlain has suggested a more radical role: that artists unerringly anticipated the major developments of science through history, and in particular anticipated all the elements of the 'new' physics [22].

More recently artists have turned to the computer as a tool and even partner in the creative process. The role of the computer in creativity has been explored at the philosophical level by Margaret Boden [23], while perhaps Harold Cohen has made the most significant commitment of artistic intention and practice to an artificial intelligence (AI) system yet [24]. I have explored the idea of algorithmic art as a way of exploring part of the deep structure of the visual experience [25].

What does the anthropic metaphysics imply for the deep structure of creativity and cognition? Whether quantum indeterminacy is related to creativity in a causal sense will probably depend on the outcome of the ongoing investigation into quantum effects in the brain. Schroedinger was certain that quantum indeterminacy was not a window in a determinist universe for free will, and others have also argued the point that randomness is a far cry from purposive will. Writers like Dana Zohar are more certain that decision-making and creativity involve the collapse of the wave function in the brain. I believe that the real value of the anthropic metaphysics lies in what Capra and Zukav spotted in the seventies: a resonance with Eastern thought, a relatively untapped store of approaches to creativity and cognition.

In the index to Guenther's translations of Longchenpa the word 'cognition' has one of the largest number of entries, ranking with 'being', and way ahead of 'Buddha'. Although we don't generally recognise Buddhist writings as a science, even Einstein was sympathetic to it (as far as he knew it from Schopenhauer). Creativity is also a vital part of Tibetan Buddhism, in the form of a structured imagination used as a tool in meditation. It is not however the uncritical adoption of Eastern philosophy and techniques that the anthropic metaphysics suggests, but a synthesis of East and West. The East has denied the material world, resulting in poor technologies and democracies, while the West has denied the subjective — at least until the new physics forced an about turn.

THE FAR FUTURE

The computer itself has however brought about its own metaphysics, including speculations on the possibility of an artificial creativity and artificial cognition or consciousness. In fact the work is being done to create the artificial human, even though I don't believe that any one laboratory would admit to it. It is more that all the pieces are being researched and developed around the world: the computational side including AI, artificial creativity, artificial autonomy, even artificial consciousness; and the engineering side including cybernetics, audio and vision systems, and robotics. One could call this a Frankenstein syndrome, the desire to create an artificial human, but some are playing at God in a grander way still: the creation of virtual worlds. The metaphysics of Frank Tipler in his Physics of Immortality [26] depend on the ability of a computer to simulate the real world to the tiniest detail, a vision shared by David Deutsch.

Tipler and Deutsch's visions of the future are predicated on exponential growth in computing power, and Tipler also requires the ability to upload consciousness to computers. These are two separate issues, and both are central to the new metaphysics and to the discussion here. I have explored Tipler's proposals in previous papers [27], but suffice to say here that as a computer artist working with virtual spaces I am unconvinced that computer power will ever be able to generate a copy of the universe, let alone the multiple universes of Deutsch. It is only a hunch at this point, but I suspect that to model a universe well enough to live in it you need a computer the size of the universe.

The new physics suggests the end of Laplace's calculating demon, certainly in any circumstance where quantum phenomena scale up to the macro universe of people. If it turns out that the brain is a quantum device then we have another nail in the demon's coffin. But, it seems that chaos theory may also challenge the clockwork universe. If it can be proved that there are theoretical limits to computing power, then systems above a certain complexity are *always* intractable, and the little devil has to slink back into his box. It is perhaps the contribution of the artist to demonstrate that the visual richness of our experience will also be beyond any computer to generate in real-time.

CONCLUSIONS

We have seen that the metaphysics of classical science is inevitably pessimistic, and while leading to the material triumphs of the modern era it also brings an inner sense of futility, 'iron in the soul'. The new metaphysics, perhaps the new rock'n'roll of the Western intellectual, is a rich multidimensional set of implications for us as human beings, and is rightly associated with the post-modern mind, and an optimistic sense of the human experience.

The challenge for the new metaphysics in the new millennium is to establish a first-person science, one that explores the deep structure of creativity and cognition, and one which throws into sharp relief the proper boundaries of third-person science. It should prevent the past mistakes of eugenics and nuclear warfare from being repeated, and also prevent known future dangers in the fields of genetic engineering and the as yet all unknown dangers of a deterministic utilitarian science which places the human experience as 'subjective', 'unquantifiable', and ultimately irrelevant.

It is only right to finish on a note of caution: spiritism and phrenology were two meta-sciences at the end of the 19th century which captured the imagination of Western intellectuals, but have since been relegated to the catalogues of crankiness. The far shores of contemporary metaphysics will almost certainly suffer the same fate, but what cannot be clear at this point is how significant the broad thrust of the new metaphysics will be into the new millennium. Will a first person science flourish? Only history can decide.

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