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Article

Quantum Mind: Matrix of the Universe

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Abstract

In this work we present a notion of God as the infinitely creative source and sustainer of the universe ("Quantum Mind"), a creative dimension of Being that, seemingly with purpose, fragments an infinite primordial awareness into a vast multitude of experiencing sentient beings. In fact the metaphysical model of the creation and functioning of the universe presented in this work has truly awe-inspiring and deeply significant implications for our understanding of and our engagement with the process of reality. In particular it must be pointed out that in actuality the account presented rules out a particular picture of God, the picture generally associated with naïve and fundamentalist views of theistic religion. However there are much less naïve and more philosophically coherent images of the notion of God which are associated with the mystical dimensions of theistic religions. The Theory of Everything outlined by Stephen Hawking and Leonard Mlodinow in their book *The Grand Design: New Answers to the Ultimate Questions of Life* is remarkable in a way that probably goes beyond the comprehension of the authors. Far from being a mere possible addition to the Hawking-Mlodinow metaphysical model, we shall see in the course of this paper that such a 'mystical' vision of the creative source of the process of the universe is required in order for the proposed TOE to get off the ground.

Keywords: creative source, sustainer, GOD, quantum mind, matrix, universe, Buddhism, theory of everything.

Our first point of leverage is the fact that according to the Hawking-Mlodinow Theory of Everything (hence forth abbreviated to HAM-TOE):

> Bodies such as stars or black holes cannot just appear out of nothing. But a whole universe can. (p180)

The reasoning offered for this rests on the following observations: 1) the energy of the entire universe must remain constant with a total energy of zero and 2) the creation of matter requires expenditure of energy so matter has positive energy whilst gravitational energy is negative. From this basis the HAM-TOE asserts that:

> On the scale of the entire universe, the positive energy of matter *can* be balanced by the negative gravitational energy, and so there is no restriction on the creation of whole universes. Because there is a law like gravity, the universe can and will create itself from nothing as described in Chapter 6. Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we

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> exist. It is not necessary to invoke God to light the blue touch paper and set the universe going. [p180]

The glaring issue contained within this assertion is what may be called the inappropriate Deification of the Power of Mathematics, for it is indeed the case that Hawking & Mlodinow have replaced God by making the assumption that if something is mathematically possible on paper then it must be the case that it actually happens. In other words the HAM-TOE requires the assumption that mathematics has within its own nature the power to 'breath fire' into its own equations. But one must ask what actually guarantees that just because 'the positive energy of matter *can* be balanced by the negative gravitational energy' it *must* follow that the universe '*will* create itself from nothing.'

The glorification of the power of mathematics is endemic within physics. Roger Penrose for instance writes in his tour de force *The Road to Reality* that:

> …mathematics is a kind of necessity, virtually conjuring its very self into existence through logic alone.[1]

In which case it is also a necessity to ask 'what breaths fire into the logic'[2] such that it is enabled to perform such a remarkable feat? Max Tegmark takes this glorification of the efficaciousness of mathematics to the ultimate extreme with his claim that ultimate reality *is* mathematics. This proposal leads to the highly counter-intuitive notion that when you eat your breakfast then *all* you are doing is eating a bunch of mathematical equations, or one bunch of mathematical equations is eating and digesting (or performing mathematical 'automorphisms' upon) another bunch of mathematical equations. There is, perhaps, a very weak sense in which this may be true, but the notion that this is the entire truth of the matter surely automorphs counter-intuition into absurdity, an absurdity that Penrose wisely retreats from:

> My own position on the matter is that we should certainly take Plato's world as providing a kind of 'reality' to mathematical notions …, but I might baulk at actually attempting to actually *identify* physical reality with the abstract reality of Plato's world.[3]

For, as Penrose is clearly aware, one of the central and crucial issues which must be resolved in any TOE is that of the nature of the 'physical' substance of reality. In pre-quantum, or classical, physics the notion of the 'physical' was clearly identified with materiality, but in the quantum era this simplistic, and for some cozy, identification is no longer possible. For, as physicist Henry Stapp has pointed out, classical type matter does not exist:

> One might try to interpret the 'matter' occurring in this formula as the 'matter' that occurs in classical physics. But this kind of 'matter' does not exist in nature.[4]

This ontological conclusion has been 'forced,' to employ the term use by John Wheeler, upon the community of physicists by the experimental evidence which clearly suggests that consciousness is in some way entangled at the quantum level so that the material world, which was once assumed to be completely independent of observing minds, cannot be so. Thus the physicist Anton Zeilinger, who with his team has carried out some of the most precise and subtle quantum experiments currently possible, has referred to the 'obviously wrong notion of a reality independent of us'.[5] This is a situation which Penrose for one is not happy with:

> Quantum theory was not wished upon us by theorists. It was (for the most part) with great reluctance that they found themselves driven to this strange and, in many ways, philosophically unsatisfying view of the world.[6]

The metaphysical situation has indeed become murky. In the era of post Cartesian classical philosophy the candidates for the ultimate substance of reality were limited to Mind and Matter. But now that Matter has failed in its allotted task it seems that many minds are suspicious of Mind and would prefer anything with a whiff of plausibility, however slight, in its place; hence the co-opting of mathematics into the arena of candidature for ultimate status. However as we shall see this assumption of the innate motive power of mathematics is not only desperately implausible, it is also unnecessary when all the evidence is taken into account.

As indicated above the magical mathematical manifestation of the universe is supposed to take place through the operation of the mathematical creative machinery acting upon 'Nothing.' Here again the HAM-TOE presses credulity towards a nonmathematical limit. For as the term 'nothing' is generally understood one would have to say that nothing can come from Nothing, even if we do put a capital 'N' in front of the word. This is because in the West 'nothing,' or 'nothingness,' generally indicates not only the complete lack of any entity but also the lack of potentiality for the manifestation of entity or entities. However, it is illuminating in this context to trace one of the forerunners of the mathematical notion of 'zero,' which derives from India. The Sanskrit term *sunya*, is the zero point, the cosmic seed of emptiness which is 'swollen' with potentiality, an egg of potentiality which is about to burst into manifestation. Thus for Buddhist philosophy the ground of the manifested universe is not 'Nothingness' but s*hunyata* or emptiness, which is not a blank void of pure nothingness but, rather, an infinite ground of potentiality from which all things may arise but which in itself is no-thing, precisely because it provides the possibility for the manifestation of any particular 'thing.' The HAM-TOE version of nothingness as it stands would surely not allow anything of 'substance,' be it mind or matter, to emerge from its pristine lack of entity or potentiality so it is necessary to assert that the use of the term 'nothing' in the HAM-TOE can only make sense if it is akin to the Buddhist notion of emptiness: a nondual, which is to say undivided and unitary, ground of potentiality for manifestation which is 'swollen' with the possibility for 'spontaneous creation' of 'entire universes.'

According to Hawking and Mlodinow 'we do know that the origin of the universe was a quantum event,'[7] so it must follow that the nature of the field of potentiality which must exist prior to the 'spontaneous creation' must be a quantum field. This view is supported by the fact that the quantum field is clearly identified as being exactly a field of potentiality from out of which the 'classical' world somehow emerges. Henry Stapp for instance describes the functioning of the quantum realm as follows:

> …this evolving quantum state would represent the 'potentialities' and 'probabilities for actual events. … the 'primal stuff' represented by the evolving quantum state would be idealike rather than matterlike, apart from its conformity to mathematical rules.[8]

This fragment, which describes the development of a quantum field within the realm of manifestation, shows us exactly that the quantum realm is a realm of potentiality which functions according to 'mathematical rules'. However, whereas in the HAM-TOE the

substantial nature of the 'primal stuff' upon which the mathematical rules operate is left in limbo, Stapp's depiction indicates that it must be idealike; a suggestion that, as we shall see, is implicitly supported by the HAM-TOE. This view is supported by the views of a significant number of physicists. To give just one example, in his recent book *Decoding Reality* Vlatko Vedral asserts that:

> The Universe starts empty but potentially with a huge amount of information. The first key event is the first act of symmetry breaking…[9]

If we ask to which Cartesian realm the category of 'information' belongs, we can hardly place it anywhere else than the category of the idealike stuff of Mind. It is also intriguing to find that according to Vedral:

> Quantum physics is indeed very much in agreement with Buddhistic emptiness.[10]

So Vedral identifies the field of information, which he considers to be the nature of the quantum ground, with the Buddhist concept of emptiness, the field of potentiality which underlies the manifestation of all phenomena. The crucial issue is the nature of 'the first act of symmetry breaking,' that acts upon the 'empty' informational ground of potentiality. According to the Buddhist Tantric instruction book *The Ornament of Stainless Light*:

> When a world undergoes destruction, there follows a time of emptiness.…During this time of emptiness the subtle particles … exist as isolated fragments and are not in any conventional sense objects of the sensory powers of the eye and so forth. They are known as empty particles and remain isolated in empty space. When the potential of the collective karma is ripened, the subtle air particles come together to form air whose nature is light and moving.[11]

It is worth noting here that the Buddhist metaphysical vision of the process of the universe has always been cyclic in nature. As each universe is destroyed at the end of a phase of manifestation, lasting vast time scales, it leaves 'seeds' of potentiality for the structuring of the next universe; this perspective clearly resonates with Penrose's latest proposals regarding the cyclic nature of the universal process contained in his recent book *Cycles of Time*.

The Buddhist term 'karma' is to a large extent misunderstood in the West as it is generally thought to be a purely moral concept. This is incorrect. The term 'karma' simply means an action which leaves an informational imprint in a deep level of reality which can be activated at some future point in time. This extends to all actions of sentient beings, including perceptions; any perception, of the material world for instance, will strengthen the potentiality for the same perception to be made at a future point in time. Thus according to this perspective all perceptions of the material world strengthen the potentiality for the material world to manifest at future points in time. This Buddhist perspective, contained within the Yogacara, consciousness-only, metaphysical view established around the 4th century C.E. is remarkably prescient of some aspects of quantum theory. According to the great twentieth century physicist John Wheeler for instance:

> Directly opposite to the concept of universe as machine built on law is the vision of *a world self-synthesized.* On this view, the notes struck out on a piano by the observer participants of all times and all places, bits though they are in and by themselves, constitute the great wide world of space and time and things.[12]

Here we find Wheeler, drawing his conclusion from his knowledge and understanding of quantum theory, asserting that it is the 'notes struck out' by 'observer participants,' which can only mean the actions and perceptions of sentient beings, that 'constitute the great wide world of space and time and things;' a view which exactly parallels the Buddhist Yogacara perspective:

> The entire world was created through latent karmic imprints. When these imprints developed and increased, they formed the earth, the stones, and the seas. Everything was created through the development or propagation of these latent karmic potentials.[13]

According to the Yogacara understanding of the process of reality such 'latent karmic imprints' are produced exactly by the multitudinous perceptual activities of the 'observer participants of all times and all places.' This view has a significant application within the HAM-TOE because it gives us an indication of the kind of mechanism which might operate within the informational ground of potentiality in order to trigger the creative act which constitutes the 'first act of symmetry breaking' which splits, so to speak, the unitary ground of potentiality.

The HAM-TOE uses as its central insight for its development the Feynman 'sum over histories' approach to elucidating the quantum phenomenon exhibited by the famous double slit experiment. In this quantum explanation the particles which take part in the experiments must be considered to potentially take all possible routes between their experimental starting and end points:

> In the double slit experiment Feynman's ideas mean the particles take paths that go through one slit or the other; paths that thread through the first slit, back out through the second slit, and then go through the first again; paths that visit the restaurant that serves that great curried shrimp, and then circle Jupiter a few times before heading home; even paths which go across the universe and back. This, in Feynman's view, explains how the particle acquires the information about which slits are open… [p76]

Thus by trying out every possible path the 'particle' can 'acquire' 'information' about the entire configuration of the universe! Of course one would have to say that a 'particle' that can perform such an amazing feat can hardly be considered to be a normal 'classical' type particle. In fact whilst in this explorative state it is quite clearly a quantum field of potentiality 'feeling' out the possible paths.

Remarkably there is significant evidence now, which is causing excitement in the field of quantum biology, that this is also the mechanism which underlies the phenomenon of photosynthesis, a process fundamental for the existence of life. Graham Fleming, a physical chemist holding joint appointments with Berkeley Lab and UC Berkeley, suggested that quantum mechanical effects might be the key to the ability of green plants, through photosynthesis, to almost instantaneously transfer solar energy from molecules in light harvesting complexes to molecules in electrochemical reaction centers. Recently a new collaborative team identified entanglement as a natural feature of these quantum effects:

> Fleming and his group discovered the existence of "quantum beating" signals, coherent electronic oscillations in both donor and acceptor molecules. These

> oscillations are generated by the excitation energy from captured solar photons, like the waves formed when stones are tossed into a pond. The wavelike quality of the oscillations enables them to simultaneously sample all the potential energy transfer pathways in the photosynthetic system and choose the most efficient.[14]

Previously it was known that the mechanism of photosynthesis involved the transfer of electrons, but the puzzle was how the transfer was achieved with such great efficiency. It now appears that electrons quantumly test out all possible paths and 'choose' the most efficient. In this context of course it must not be thought that such a choice indicates some sort of conscious decision but, rather, there is a mechanism through which the process of photosynthesis quantum-mechanistically 'explores' the possibilities and then, again quantum-mechanistically, 'selects' the most efficient. This, however, does leave the question of what exactly is the nature of the quantum mechanistic processes awaiting an answer.

In the formulism of Feynman's sum over histories approach each exploratory path has an associated 'phase' which is the component of an overall 'probability amplitude' which can be calculated for any particular path. Thus if we wish to find the probability amplitude for a 'particle' going through slit A and landing at point B then we must add the phases for all the possible paths which starts at A and finish at B. Some phases enhance each other whilst others cancel each other and because of this the overall result which emerges, according to the HAM-TOE presentation is, we are told, no surprise:

> Feynman's theory gives an especially clear picture of how a Newtonian world picture can arise from quantum physics, which seems very different. … when you add the contribution from paths that are close to each other the phases normally vary wildly, and so … they tend to add to zero. But the theory also shows there are certain paths for which the phases have a tendency to line up, and so those paths are favoured; that is they make a larger contribution to the behaviour of the particle. [p79]

At this point in the presentation of the HAM-TOE it appears that the connection between the quantum level and the emergence of the 'classical' everyday world is quite unparadoxical, a view which is contrary to most physicists' assessment. In a recent work *Quantum Reality: Theory and Practice* (2009), for instance, Jonathan Allday writes:

> The problem is that the small scale laws describe a way of behaving that, judged by the standards of everyday experience, is utterly bizarre. It is very difficult to see how all the business going on at the atomic scale can lead to the regular, reliable world we spend our lives in.[15]

And physicist and science media personality Jim Al-Khalili has stated that:

> For me the biggest mystery of all lies at the heart of reality: how to explain the weird behaviour of the subatomic world. We have a very powerful theory that explains the atomic world-quantum mechanics. But the problem is no one understands what it means.[16]

One can only assume that at the time he made this statement (2009) Jim Al-Khalili had not conversed with Hawking and Mlodinow on the matter, or perhaps it is only this year that Hawking and Mlodinow have decided that they have cracked the problem, which is doubtful as books generally take a while to prepare. For the moment, however, we must not be too

hasty in accepting their confidence; in particular it is noticeable that the issue of the origin of the 'favoured' paths referred to, those paths which obligingly carve out the Newtonian 'classical' world we are all familiar with, is not addressed in the HAM-TOE picture so far (did God put them there?!).

We are now approaching the dramatic and truly mind-expanding central core of the HAM-TOE, but there is just one further quantum component required. This is the much discussed but still controversial phenomenon of the quantum observer effect, which is the fact that observation of quantum state or system will transform the state or system into an experienced classical event. The source of the controversy is the fact that the phenomenon of this state change, the famous 'collapse of the wavefunction,' seems to clearly suggest that consciousness is an essential ingredient in the process. As Roger Penrose, someone who actually hates the idea, was forced to admit in his book *Shadows of the Mind*:

> …at the large end of things, the place where 'the buck stops' is provided by our *conscious perceptions*. …[17]

The exact mechanism which might possibly underlie this phenomenon is by no means agreed. However a recent proposal by Wojciech Zurek and his associates is that it is the very nature of the quantum 'dream stuff' of reality to be 'epiontic,' which means that perception creates ontology. This suggestion is clearly in line with Wheeler's self-synthesizing universe paradigm and also the Buddhist Yogacara assertion that all perceptions leave traces which make future similar perceptions more probable (thus the Yogacara proposal indicates the origin of the potentialities within the quantum realm, or the quantum wavefunction).

Hawking and Mlodinow skirt around the issue of the implied entanglement of consciousness at the quantum level. They describe the fact that when 'which way' information is collected, which tells the experimenters which path any particle has traveled, the interference pattern disappears, a result which shows that conscious intervention has a direct effect on the experimental outcome. They present their conclusion is as follows:

> Quantum physics tells us that no matter how thorough our observation of the present, the (unobserved) past, like the future, is indefinite and exists only as a spectrum of possibilities. The universe, according to quantum physics, has no single past, or history.
>
> The fact that the past takes no definite form means that observations you make on a system in the present affect its past. [p82]

And they press the point home with a description of the Wheeler cosmic delayed choice experiment and conclude:

> …the universe doesn't have just s single history, but every possible history, each with its own probability; and our observations of its current state affect its past and determine the different histories of the universe, just as the observations of the particles in the double-slit experiment affect the particles' past. [p83]

And so we come to the astonishing proposal. From the timeless point of creation a spontaneous universal creative act projects all possible futures into a universal possibility or potentiality space. At the point of creation everything that possibly can happen becomes potential, so at the point of creation all possible future histories of the universe come into being as potentialities, although not yet experienced realities. Admittedly Hawking and

Mlodinow are not very precise about their proposal and it is necessary to tease it out of their elucidations:

> In this view, the universe appeared spontaneously, starting off in every possible way. Most of these correspond to other universes …. Some people make a great mystery of this idea, sometimes called the multiverse concept, but these are just different expressions of the Feynman sum over histories. [p136]

Clearly the HAM-TOE corresponds to the multiverse scenario, the spontaneous creative burst creating the multiverse of possible worlds. But a hugely significant feature of the HAM-TOE presentation is the fact that the 'observers are part of the system' [p135] and whereas in the usual multiverse scenario, the many-worlds theory, helpless observers are haplessly and unknowingly rent asunder to occupy an exponentially increasing vast number of new 'parallel worlds,' in the HAM-TOE observers have serious work to do:

> The histories that contribute to the Feynman sum don't have an independent existence, but depend on what is being measured. We create history by our observations, rather than history creating us. [p140]

In other words the observers, or what Wheeler called 'observer-participants,' are able to weed out possible universes, and thereby select those which remain in the possibility mix, even backwards in time. Thus one of the central chapters in the *The Grand Design* is entitled 'Choosing Our Universe':

> The idea that the universe does not have a unique observer-independent history might seem to conflict with certain facts that we know. There might be one history in which the moon is made of Roquefort cheese. But we have observed that the moon is not made of cheese, which is bad news for mice. Hence histories in which the moon is not made of cheese do not contribute to the current state of our universe, though they might contribute to others. This might sound like science fiction but it isn't. [p140]

It is unfortunate that the authors decided to use such a flamboyant presentation because it is very easy to read the book and miss the dramatic implications precisely because of the cheesy popularising slant. However, it is quite clear that we are being told that the reason why the moon is not made of Roquefort cheese is because the observer participants of this particular universe have observed that the moon is not made of cheese. The observations made by the observer-participants have filtered out, *backwards in time*, the possibility of a cheese moon and also, at the same time, have determined the possibilities that are projected into the future. And, as Hawking and Mlodinow say, this is not science fiction (although I seriously doubt whether there really was ever, in any universe, the possibility of the moon being made of cheese; might it be possible to push the metaphors of popular science towards the realms of impossibility?).

However, we may as well stick with the examples used by Hawking and Mlodinow for the purposes of elucidation. Figure 1 provides a much simplified graphic presentation of the physical-metaphysical (the boundaries between the two are blurred in this context) picture of the evolution of the universe. This picture presents the situation as if it occurs at one moment in time but in 'reality' the process operates over long time scales once there are sentient beings, or observer-participants, extant within the universe to take part in the process of

universal selection and solidification. Once there is a community of sentient organisms inhabiting the universe then their perceptions, which have influence at the quantum level, affect the probabilities which have been projected at the moment of the Big Bang. If we accept the cosmic story presented by Hawking and Mlodinow then at the point of creation all possible 'alternative histories' are projected into a kind of cosmic possibility space, but none of these possibilities are 'actualized' as yet. For actualization to take place requires the presence of sentient beings to perceive and experience.

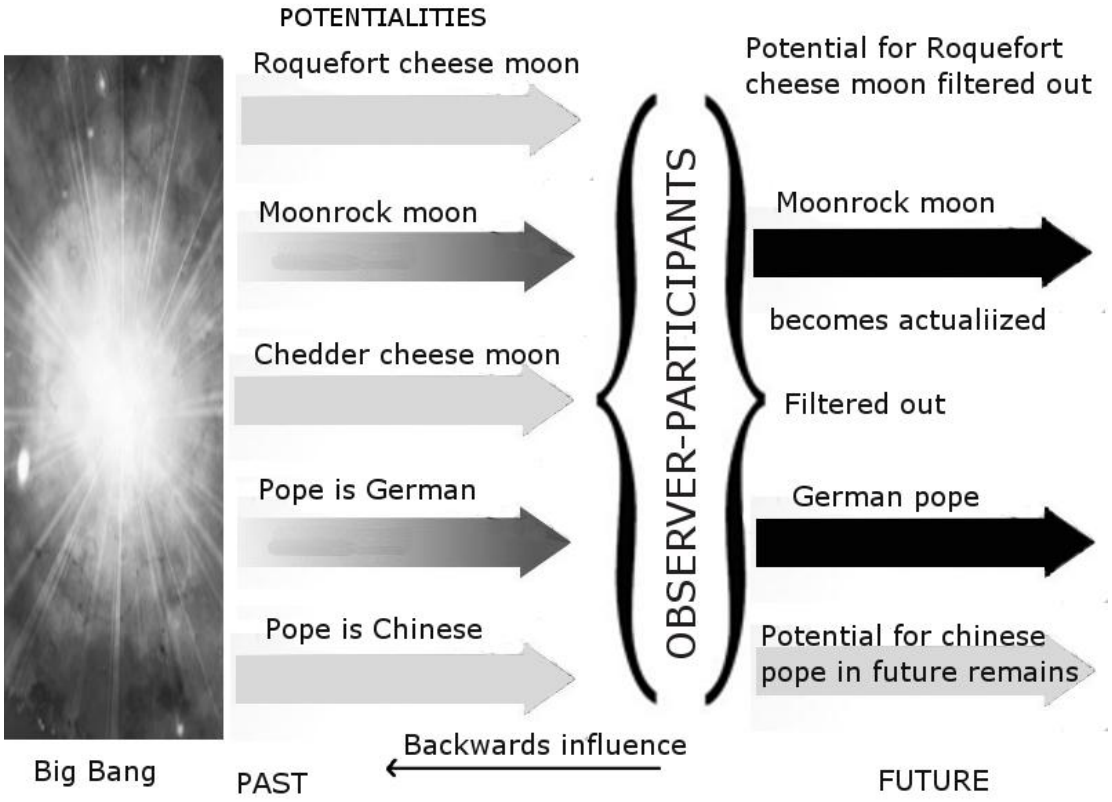

Figure 1

In this model we can visualize all the observer-participants moving through the vast cosmic pool of potentialities and as they do so their perceptions alter the probabilities of potentialities both backwards and forwards in time. For instance, at the moment of creation there is a possibility (according to H and M) that the moon might end up of being made of Roquefort cheese and also a possibility that it may end up comprised of Moon-rock, as it is in our current universe. When sentient beings get on the job of filtering through the probabilities through their perceptive activities, they somehow 'choose' to have a Moon-rock Moon rather than a Roquefort cheese Moon. Thus the possibility of a Roquefort cheese Moon is filtered out of the cosmic mix of potentialities whilst the possibility of a Moon-rock Moon is solidified into actuality. John Wheeler described this vision of the process as follows:

> Law without law. It is difficult to see what else than that can be the plan of physics. It is preposterous to think of the laws of physics as installed by a Swiss watchmaker

> to endure from everlasting to everlasting when we know that the universe began with a big bang. The laws must have come into being. Therefore they could not have been always a hundred percent accurate. That means that they are derivative, not primary … Events beyond law. Events so numerous and so uncoordinated that, flaunting their freedom from formula, they yet formulate firm form … The universe is a self excited circuit. As it expands, cools and develops, it gives rise to observer-participancy. Observer-participancy in turn gives what we call tangible reality to the universe … Of all the strange features of the universe, none are stranger than these: time is transcended, laws are mutable, and observer participancy matters.[18]

And this vision is also contained within the work of several other significant physicists, both current and recent (full details can be found in my recently published book *Quantum Buddhism: Dancing in Emptiness – Reality Revealed at the Interface of Quantum Theory and Buddhist Philosophy*). One example is the work of David Bohm which is being carried forward by Paavo Pylkkänen and Basil Hiley. Bohm calls the cosmic possibility soup the 'implicate order' and the actualized experienced world the 'explicate order:

> Bohm calls the implicate order the primary reality, this reality exists 'folded up' in nature and gradually unfolds as the universe evolves, enabling organization to emerge, in this way, the implicate becomes explicate over time.[19]

In his important book *Wholeness and the Implicate Order* Bohm gives an overview of his perspective as follows:

> Our overall approach has thus brought together questions of the nature of the cosmos, of matter in general, of life, and of consciousness. All of these have been considered to be projections of a common ground. This we may call the ground of all that is, at least in so far as this may be sensed and known by us, in our present phase of unfoldment of consciousness. Although we may have no detailed perception or knowledge of this ground it is still in a certain sense enfolded in our consciousness…[20]

This version endorses the view that there is a common fundamental nondual ground which gives rise to the entire process of the dualistic realm and it also emphasizes the necessary cognitive function of consciousness as fundamental. Thus it becomes clear that sentient beings are the 'agents' through which the universe acquires both meaning and structure. And Henry Stapp adds weight to this anthropic viewpoint with what he calls 'the two-way quantum psycho-physical bridge':

> …the connection between physical behaviour and human knowledge was changed from a one way bridge to a mathematically specified two-way interaction that involves *selections* made by conscious minds.[21]

Which requires the recognition that:

> …the quantum universe tends to create meaning: the quantum law of evolution continuously creates a vast ensemble of forms that can act as carriers of meaning; it generates a profusion of forms that have the capacity to sustain and refine themselves.[22]

All of which surely indicates that the role of consciousness is a primary ingredient within the process of the universe. Without sentient beings making 'selections' there would be no mechanism through which the potentialities flashed out at the point of universal manifestation

could ever become actualized. But this does not mean that such selections are fully conscious, it is not being suggested that there was a universal gathering of proto-consciousnesses at some primordial time to decide whether to go for a cheese Moon or Moon-rock Moon; the process operates at a level of awareness much deeper than fully individualized awareness. To suggest anything otherwise would be ridiculous. Nevertheless the necessity for the operation of a selective filtering mechanism operating through the agency of all sentient organisms that have ever been contained within the universe is clearly required by the HAM-TOE. Thus consciousness, not mathematics, must be the primary mover of the universal process, the force that breaths fire into the mathematical equations, perhaps even the creative ground of the universe that produces the equations themselves, as Wheeler intimated.

However, despite the fact that the HAM-TOE clearly requires consciousness to be an internal feature of the process of the evolution of the universe and the sentient beings within it, Hawking and Mlodinow are reluctant to commit to this conclusion. In fact, as we shall see, in their final chapter they seem to contradict the major insights of their own work. This is all the more remarkable as in their penultimate chapter they tell us that their HAM-TOE argues for the Strong Anthropic Principle (SAP).

Before their discussion of the SAP they briefly discuss the WAP (Weak Anthropic Principle). This, they say, is not controversial; the very fact that sentient beings exist in this universe clearly means that *this* universe must be fine tuned for sentient life. If this were not the case then obviously sentient life would not inhabit this particular universe. But, according to the HAM-TOE, there are many 'cosmic habitats' that exist in the universe (H and M sometimes seem to confuse the concepts 'universe' and 'multiverse' – i.e. our universe is one of the 'cosmic habitats' in the overall universe, which other writers would refer to as the multiverse). The HAM-TOE, however, goes for the Strong version which:

> …suggests that the fact that we exist imposes constraints not just on our *environment* but on the possible *form and contents of the laws of nature* themselves. The idea arose because it is not only the peculiar characteristics of our solar system that seem oddly conducive to the development of human life but also the entire characteristics of the entire universe, and that is much more difficult to explain. [p155]

Now this is a very odd formulation of the reason for the Strong Anthropic Principle. This is because if one gives it a few moments thought it is easy to see that it would be in fact very odd indeed if the entire universe, except for the tiny part which comprises our solar system, were to be such that it ruled out the possibility of life. This would mean that just our tiny, in fact incomprehensibly miniscule part of the universe was somehow conducive to life whilst the rest of the universe was militating against the possibility, so to speak. If this were to be the case then the existence of God, an omnipotent Being capable of holding back the anti-life tendencies of the rest of the universe, would surely be highly probable.

Probably the strongest argument for the Strong Anthropic Principle is the HAM-TOE itself precisely because it requires the existence of consciousness as a force internal to the process of universal and sentient evolution; it requires conscious agents to perceive the universe in order to manifest the universe as a going concern, the universe must produce sentient beings in order to be a fully experienced universe. Universes without sentient beings can not be said

to 'really' exist; they are in point of fact just failed impotent universes, hovering in a limbo of non-experienced potentiality. It must be pointed out that the term 'sentient beings' means all sentient beings not just human beings. Apparently Brandon Carter, instigator of the Anthropic paradigm, regretted the choice of term because it appeared to leave out all species apart from humans and this was not his intention.

However, Hawking and Mlodinow seem to place universes which come into an experienced fullness of being and universes which mutely hover in expectant potentiality on the same level, despite the fact that their own presentation which we have previously surveyed clearly indicates that this is incorrect:

> …our universe seems to be one of many, each with different laws … now the entire observable universe – is only one of many, just as our solar system is one of many. This means that the environmental coincidences are rendered unremarkable by the realization that billions of such universes exist, the fine tunings of the laws of nature can be explained by the existence of multiple universes. [p165]

But this conclusion is reached by ignoring the dramatic difference between universes which are given the existential thumbs up by the approval of the inhabitants and those which are weeded out by not meeting the requirements of its inhabitants (they don't like Roquefort cheese!). This difference is clearly implicated within the core details of the HAM-TOE itself, but somehow gets ignored in the closing stages of *The Grand Design*. There are universes which are actualized by the operation of consciousness acting through the sentient organisms inhabiting the universe and, on the other hand, potential universes which simply die a death, or at least remain in an existential limbo, through lack of attention! It seems that Hawking and Mlodinow want to claim that the Roquefort cheese Moon universe somehow still 'exists,' or subsists, with the same existential status as the Moon-rock universe that we actually inhabit; but this cannot be the case because on the basis of their own TOE the Moon-rock universe is experientially and thereby actually actual!

The inescapable conclusion of the above consideration is that the presence of consciousness alters the existential status of the universe in a dramatic fashion. The analytical psychologist C. G. Jung summed up his view of the crucial universal role of consciousness as follows:

> …man is indispensable for the completion of creation, … in fact he himself is the second creator of the world, who alone has given to the world its objective existence … (without consciousness) it would have gone on in the profoundest night of non-being down to its unknown end. Human consciousness created objective existence and meaning…[23]

In the light of the HAM-TOE this observation on the part of Jung was remarkably prescient, but perhaps we should not be too surprised as Jung had discussed issues of the interconnection of mind and matter implied by quantum physics with the quantum physicist Wolfgang Pauli, who was a patient of his. Jung proposed the notion of the emergence of experience from a realm of archetypes, which are preexisting modes of potential experience, a view which clearly resonates powerfully with quantum theory. Jung had conducted a meticulous investigation of the symbolic and mythological material of the world's diverse cultures and as a result he was able to demonstrate that there are recurring themes and motifs which were exemplified in different specifics. This led him to his notion of an archetype:

> There are as many archetypes as there are typical situations in life. Endless repetition has engraved these experiences into our psychic constitution, not in the form of images filled with content, but at first only as forms without content, representing merely the possibility of a certain type of perception and action. When a situation occurs that corresponds to a given archetype, that archetype becomes activated…[24]

Archetypes, therefore, can be thought of as subjective propensities to experience our experience certain ways. Furthermore, archetypes are 'created' through a long chain of repetition of experience; they are the potential forms of possible experience produced by the repeated experience of all sentient beings inhabiting a universe.

In his work as psychologist Jung was primarily concerned with working with archetypes which were relevant to the integration of the psychic functioning of his patients. Generally these would be related to what Jung termed the individuation process whereby aspects of the individual psyche were helped to integrate and co-ordinate in a harmonious fashion. But Jung also extended his interest in integration to deeper religious and philosophical levels in his investigations into alchemy with its emphasis on the interpenetration of psyche and the material world which he articulated in the concept of the *Unus Mundus*, the 'Unitary World' within which there are contained infinite paths of experiential exploration; a proposal which provides a fertile metaphor for the universal functioning described by Hawking and Mlodinow, once, that is, the cosmic force of consciousness and awareness is given its rightful central place in the process of the universe (or 'Unus Munus').

According to Jung's vision of the unified, yet at the same time infinitely diverse, 'Unus Munus,' the realms of mind and matter are different expression of a deeper underlying process, just like Bohm's implicate order, and because of this there is a possibility of 'synchronistic' events in which the realms of matter and mind seem to mimic each other. In his book *Mind, Matter and Quantum Mechanics* Stapp concludes his thoughts regarding Pauli's interpretation of the ideas of Jung in the context of quantum physics as follows:

> …if the quantum and the synchronistic processes are indeed essentially the same process, then an empirical window may have been opened on the process that had been thought by quantum theorists to lie beyond the ken of empirical knowledge.[25]

And the process that Stapp is referring to here is the creation of the experiential domains of individuated mind and the material world from a deeper level of 'archetypal' potentiality. If we apply Jung's terminology to the vision of the HAM-TOE then we could say that at the moment of the Big-Bang the universal process produces a vast cosmic maze of archetypal potentiality awaiting activation by the multitude of sentient beings traversing the web of cosmic possibility; a vision reminiscent of the Argentinean writer Jorge Luis Borges' short story *The Garden of Forking Paths*. However, in the version emerging in this investigation it would seem that, rather than all possibilities being realised as in the cases in Borges' story, the science-fiction fantasy of the popularised many-worlds quantum interpretation and the HAM-TOE, the consciousnesses of all sentient beings are likely to play a creative role by selecting pathways in the archetypal cosmic maze of possibilities. The physicist Amit Goswami describes this view:

> Suppose that the parallel universes of the many-worlds theory are not material but archetypal in content. Suppose they are universes of the mind. Then, instead of

> saying that each observation splits off a branch of the material universe, we can say that *each observation makes a causal pathway in the fabric of possibilities in the transcendent domain of reality.* Once the choice is made, all except one of the pathways are excluded from the word of manifestation.[26]

The homomorphism between Goswami's proposal and the HAM-TOE should not need labouring!

In their explorations of the analogies between the realms of the quantum world and the world of the human psyche, Jung and Pauli were convinced that mind and matter were themselves complementary aspects of a deeper level of reality in the same way that waves and particles were thought at the time to be complementary aspects of quantum reality. So in just the same way as the archetypes of the human mind could give structure to the inner world of the psyche it made complementary sense for an archetypal process involving 'subjective' propensities for experience to create, or impose, structure upon the multiple possibilities within the potentialities of the archetypal realm underlying the seemingly material world. Pauli was so convinced of the idea that the realm of the 'physical' and that of 'mind' must be seamlessly linked at a deep level of reality that he wrote in a letter to a friend:

> When he speaks of 'reality' the layman usually means something obvious and well known, whereas it seems to me that precisely the most important and extremely difficult task of our time is to work on elaborating a new idea of reality. This is also what I mean when I always emphasize that science and religion *must* be related in some way.[27]

And it is quite clear that the link between science and religion can only be located in the central efficacious role of consciousness in the process of reality. According to the HAM-TOE:

> We are the product of quantum fluctuations in the very early universe. [p139]

This conclusion clearly draws the creative role of consciousness at the quantum level centre stage, for, as we have seen, the HAM-TOE requires that consciousness plays a vital role in the evolution of the universe. If it is the case that consciousness plays such a hugely significant creative role in the HAM-TOE, drawing out experienced actuality from the quantum potentialities radiated out from the point of the Big Bang creation, then it can only make sense that consciousness is a significant, in fact probably major component of the universal process of reality. In fact a significant number of respected physicists and philosophers are now converging on the possibility that consciousness is a central feature of reality operating through the quantum ground. The physicists Bruce Rosenblum and Fred Kuttner, in their important book *Quantum Enigma: Physics encounters consciousness*, are clearly making such a claim regarding the far reaching implications of quantum theory:

> The physical reality of an object depends on how you choose to look at it. Physics had encountered consciousness but did not yet realize it.[28]

And:

> Consciousness and the quantum enigma are not just two mysteries; they are *the* two mysteries; … Quantum mechanics seems to connect the two.[29]

The majority of the founding fathers also came to such a view, a notable exception being Einstein. According to Schrödinger, for instance:

> Mind has erected the objective outside world … out of its own stuff.[30]

And Max Planck came to a similar conclusion:

> All matter originates and exists only by virtue of a force... We must assume behind this force the existence of a conscious and intelligent Mind. This Mind is the matrix of all matter.[31]

More recently, in an article in the New Scientist (23rd June 2007) Michael Brooks, commenting on quantum entanglement experiments carried out by teams led by Markus Aspelmeyer of the Austrian Academy of Sciences and Anton Zeilinger of the University of Vienna, tells us that the conclusion reached by the physicists involved is that:

> … we now have to face the possibility that there is nothing inherently real about the properties of an object that we measure. In other words measuring those properties is what brings them into existence. [32]

And Vlatko Vedral, quantum researcher at the University of Leeds commented that:

> Rather than passively observing it, we in fact create reality. [33]

The headline for the article proclaims that:

> To track down a theory of everything, we might have to accept that the universe only exists when we are looking at it…[34]

The evidence is inexorably stacking up in favour of the view that the ultimate nature of the process of reality is mind-like, or idea-like, as Stapp puts it.

However, in their final chapter Hawking and Mlodinow, despite having clearly outlined overwhelming evidence for the primacy of consciousness in earlier portions of their book, perform a staggering volte-face and start backing away from the conclusion. At the outset of this chapter we are reminded that the two fundamental questions that the authors set out to provide answers for are 1) why is there something rather than nothing and 2) why do we exist? Furthermore they claim that they can answer the questions without any need for a creator entity or divine being. Any appropriate and satisfactory model of the ultimate genesis of the process of universe must 'create a reality of its own,' which is to say that the nature of the ultimate source of the process of reality must be such that the dualistic world that we experience must be self-consistently and coherently generated by the internal nature of the ultimate principle, it is not valid to introduce aspects and entities out of the blue. As an 'example that can help us think about issues of reality and creation' we are treated to an exposition of the 'Game of Life' which was 'invented' in 1970 by James Conway (figure 2). This 'game' consists of a grid within which cells of the grid are filled or unfilled according to very simple rules regarding the state of surrounding cells, filled cells are said to be 'live':

1) A live square with 2 or 3 live neighbours survives (remains filled).
2) A dead square with 2 or 3 live neighbours becomes a live cell (gets filled in).
3) All other squares are dead (remain unfilled) or die (get unfilled).

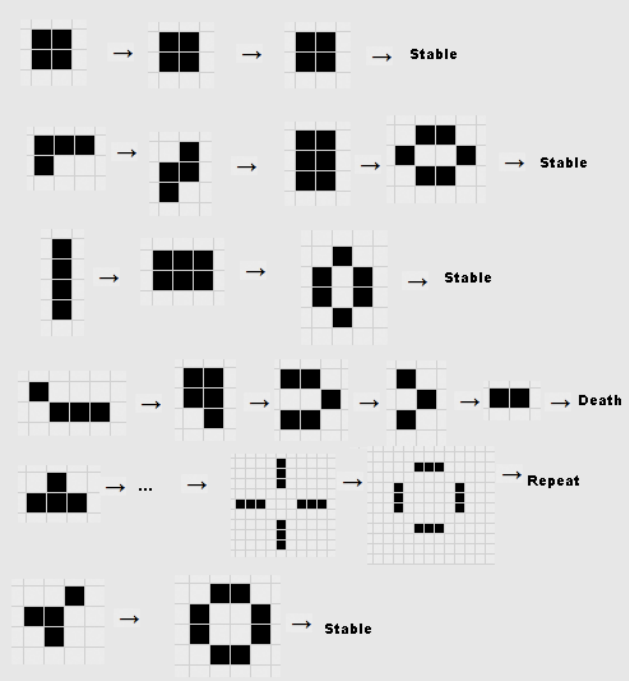

Figure 2

When the game is run on a computer it is found that various stable configurations of 'live' cells ('gliders' for instance) 'emerge' following 'rules which seem unrelated to the simple rules underlying the simulation. Hawking and Mlodinow's seeming disownment of their earlier insights emerges when they say that:

> In a physical universe, the counterparts of objects such as gliders in the Game of Life are isolated bodies of matter. [p179]

The relationship of such 'bodies of matter' to the primal 'stuff' of reality and the rules from which they supposedly emerge is simply not addressed. However Hawking and Mlodinow do say of the Game:

> However, it is easy to imagine that slightly more complicated laws would allow complex systems with all the attributes of life. Imagine an entity of that type, an object in a Conway-type world. Such an object would respond to environmental stimuli, and hence appear to make decisions. Would such life be aware of itself? Would it be self-conscious? [p178]

Perhaps a more appropriate question is would a Conway-type 'life' which was not aware or conscious or even, perhaps, self-conscious to some degree warrant the designation 'life'.

The philosopher Ludwig Wittgenstein in his later work the *Philosophical Investigations* warned against being 'bewitched' by certain uses of language to unwittingly jump to inappropriate conclusions. In the above case for instance is it really appropriate to describe the completely mechanical rule-driven patterns of *apparent* interaction as a *response* to environmental *stimuli*? In this sleight of mind, probably unconscious on the part of the authors, words which can have application across the domains of the purely mechanical (the 'response' of a servomechanism) and the intentional (as in giving a 'response' to a question)

are used as an illicit and unjustified bridge from the purely mindless realm of rule-driven mechanism into the assumption of the possibility of *mindful* intentional behaviour from a basis of mindlessness. This in itself can lead to appalling mindlessness, as when Daniel Dennett asserts that:

> An impersonal, unreflective, robotic, mindless little scrap of molecular machinery is the ultimate basis of all the agency, and hence meaning, and hence consciousness, in the universe.[35]

As the philosopher Gregg Rosenberg, in his book *A Place for Consciousness*, has pointed out the 'Game of Life' is driven by 'bare differences' ('on' and 'off') and the qualitative world of consciousness cannot 'emerge' from relationships of bare difference; any qualitative aspects one might think lurks in the pure mechanism is purely in the mind of the beholder. But, in point of fact, we do not need Rosenberg's, or any one else's, refutation of mind emerging from complete mindlessness because, as we have seen, the HAM-TOE requires potentiality and consciousness to be hovering in the wings of creation expectedly waiting, as it were, to make a bid for full existence and thereby produce 'the greatest show on earth,' to borrow a title of one of Richard Dawkins' materialism-centered books on evolution.

In his book *Life Without Genes* Adrian Woolfson presents us with a poetic vision of the sort of field of potentiality that he imagines must have 'existed' before the dawn of life within the universe:

> In the beginning there was mathematical possibility. At the very inception of the universe fifteen billion years ago, a deep infinite-dimensional sea emerged from nothingness. Its colourless waters, green and turquoise blue, glistened in the non-existent light of the non-existent sun … A strange sea though, this information sea. Strange because it was devoid of location …[36]

Ignoring the apparently endemic misguided notion that a vast realm of experience can magically arise from complete absence, Woolfson's, strangely haunting, suggestion is that there must have been some kind of field of potentiality at the inception of the universe. Although there was not a fully manifested and experienced reality there was, according to his picture, which clearly echoes aspects of the HAM-TOE, what he calls a 'mathematical possibility'. This field can only be the quantum wavefunction of the universe, a universal wavefunction of potentiality that contains:

> …all possible histories … through which the universe could have evolved to its present state…[37]

In the beginning, of course, the wavefunction of the universe would contain all the future evolutionary possibilities:

> The information sea is thus a quantum mechanical sea, composed from infinite repertoires of entangled quantum descriptions.[38]

But as evolution proceeds some possibilities must be weeded out, as in the HAM-TOE. Within this all encompassing wavefunction all possibilities for evolutionary manifestation are encoded. From out of the vast entangled web of infinite possibilities for manifestation only certain privileged members will actually make it into reality, so to speak:

> An information space of this sort would furnish a complete description of all potentially living and unrealizable creatures…[39]

It therefore follows that there is a sort of design woven into the potentialities for evolution; it is a vast complex design of all possible manifestations written into the quantum wavefunction of the universe standing on the very edge of time.

But a wavefunction is a purely mathematical construct, it tells us nothing about the 'substance' of reality so to speak, using the term 'substance' in the Cartesian sense of the category of reality which stands under the realm of experience: mind or matter? As we have seen the best answer that can now be given is that ultimate reality must have mind-like or consciousness-like qualities because prior to the universal manifestation there must be an infinite pool of potentiality which is subsequently activated by the operation of consciousness 'selecting' its infinitely multiple paths from out of the web of cosmic potentialities which are radiated out at the moment of the Big Bang.

The latest formulation of this view is enshrined in the notion that the grounding substance of reality is 'information,' or at least informational. This view is explored in Vlatko Vedral's book *Decoding Reality* and the soon to be published set of essays *Information and the Nature of Reality: From Physics to Metaphysics,* edited by Paul Davies and Niels Henrik Gregersen. The following is from the introduction to *Information and the Nature of Reality:*

> Davies suggests that instead of taking mathematics to be primary, followed by physics and then information, the picture should be inverted in our explanatory scheme, so that we find the conceptual hierarchy: information → laws of physics → matter. Lloyd's view of the computational nature of the universe develops this understanding by treating quantum events as 'quantum bits' or qubits, whereby the universe 'registers itself.'[40]

The first point to note is the absence of consciousness from the metaphysical chain of the development of reality. This is not to say that the notion of consciousness does not play an important part in the essays in the book, this would be both impossible and ridiculous. But, despite all the evidence of the central creative role that consciousness plays in the unfoldment of the experiential world from the quantum realm, it seems that it is still the case that any other concept is preferred as being foundational; keep consciousness on the margins as much as possible still seems to be a useful maxim for scientific publications. It seems that consciousness is felt to be, well, too immaterial to really get the job of manifesting a material world accomplished. Now it seems that in this new paradigm it has been realised that mathematics is probably just as immaterial as consciousness and so perhaps 'information' might do a better job as the metaphysical support of reality!

But information on its own is clearly not enough to get a universe of experience under way, the words on the pages of a closed book are 'information,' but they do not do their job of meaning something until someone opens the book and starts reading. It requires the active intervention of consciousness to bring inert information into life and meaning. This is why within Buddhist philosophy the ground of reality is characterised as being a fundamental ground comprised of 'emptiness and cognition inseparable', 'emptiness and luminosity' or 'empty cognizance'.[41] The field consists of 'empty' potentiality for manifested experience, 'empty' in the sense of being no particular thing but the basis for the potentiality of all things; and furthermore and crucially it is a field of potentiality which has internal to it the nature of 'luminosity' or 'cognizance' which is the function of becoming aware and unfolding of the potentialities contained within the field.

In this context a very brief look at quantum field theory is illuminating. In his recent book *Quantum Reality: Theory and Philosophy* Jonathan Allday, in a section he entitles 'Substance Abuse', tells us that within quantum field theory, at the lowest level so to speak, there is no substance, the quantum field is actually 'empty' of substance. He writes:

> Now, from a philosophical point of view, this is rather big stuff. Our whole manner of speech … rather naturally makes us think that there is some stuff or *substance* on which properties can, in a sense, be glued. It encourages us to imagine taking a particle and removing its properties one by one until we are left with a featureless 'thing' devoid of properties, made from the essential material that had the properties in the first place. Philosophers have been debating the correctness of such arguments for a long time. Now, it seems, experimental science has come along and shown that, at least at the quantum level, the objects we study have no substance to them independent of their properties.[42]

Because there is no substantiality (and here Allday is using the term substance to indicate 'matter') within quantum field theory the term 'particle' is dropped and the term 'qaunta' is used, and these are 'objects which have properties but not substances'.[43]

Another fundamental feature of quantum field theory is that fields are said to capable of creating and destroying quantum states; mathematically this is represented by creation and destruction operators. But can we give some indication of what is *really* going on? Well if we adopt Seth Lloyd's proposal that a quantum event, or 'qubit,' is a result of the universe 'registering itself' then it would seem that we would have to say that such events are the result of a deep level of consciousness acting within the quantum field in question, how else could the universe register itself? Our analysis has clearly indicated that at the fundamental quantum level there is only empty potentiality for qualitative experience and the internal cognitive function of consciousness to account for any activity, which is clearly in line with quantum field theory. This suggestion also conforms with our discovery that where physicists discover mathematical equations which suggest that something is appearing by the magical operation of mathematics upon 'nothingness,' in reality so to speak this indicates consciousness operating to unfold quantum potentialities, in this case the potentialities for low level experiential properties, or quantum qualitative events, from emptiness, which is the infinite potentiality for qualitative manifestation.

This view is a kind of quantum pan-experientialism based on the implication that the entire edifice of the so-called 'classical' world of dualistic experience ripples up from a quantum ground through a multitude of resonant levels of quantum functioning, all driven by the creative 'force' of the universal inner cognitive functioning which is an innate aspect of the quantum realm. Such a view is clearly consonant with the recent quantum 'epiontic' perspective, or 'quantum Darwinism', proposed by Wojciech Zurek and his associates:

> …quantum states, by their very nature share an epistemological and ontological role – are simultaneously a description of the state, and the 'dream stuff is made of.' One might say that they are *epiontic*. These two aspects may seem contradictory, but at least in the quantum setting, there is a union of these two functions.[44]

The idea here is that there is an epistemological, or perceptual, function within the fabric of quantum 'dream stuff' which fabricates the seeming world of ontological solidity through its

operation within quantum potentiality. Each 'epiontic' movement of the quantum dream stuff by which the universe registers, or perceives, itself produces a flicker of awareness, or consciousness, which constitutes a tiny momentary glimmer of experience, and as the upward cascade of such flickers of consciousness or experience reaches 'higher', more dualistic levels, the qualitative nature of the experiential awareness is amplified until it individuates in sentient consciousness. As Gregg Rosenberg says:

> Large-scale, enduring, coherent experiencers may be extremely rare. As a dilution of traditional panpsychism, the panexperientialism we may end up with may be as benign as would occur it the interactions between very simple atoms and molecules mainly produced flashes of extraordinary simple and brief feeling, like fireflies quietly flickering in the night. For these reasons, referring to the experiences of noncognitive systems as proto-conscious rather than conscious is really best.[45]

In other words the panexperientialist perspective being suggested does not entail that rocks think or feel pain. It is, rather, the case that the upward cascade of the creative cognitive force of the quantum realm produces the sentient beings within which the cognitive tendencies of the quantum realm are amplified into individuated experiencing centers of awareness or consciousness. All such sentient beings are located within an apparently solidified realm of materiality which contains them. However, it is always useful to keep in mind that what appears to be the solidified 'material' world is not what it appears to be, it is 99.9999999999 percent (or thereabouts) empty space; it is a more akin to a quantum force field created by the perceptive activities of all sentient beings, as suggested by Wheeler. This is also an implication of the HAM-TOE and, as Hawking and Mlodinow say, 'it is not science fiction.'

We are now in a position to resuscitate the notion of God after the Hawking and Mlodinow failed assassination attempt. However it must be made clear that the concept of God which can be revived is not that which is conceived of by most Christians. The existence of an independent creator God which is required by mainstream, non-mystical Christianity certainly cannot be rescued by a quantum expedition. The problem with the notion of God as it is enshrined in Christian doctrine and practice is the large amount of religious and cultural baggage that comes along with it, baggage which in no way could ever logically follow from any resurrected quantum divine principle; significant examples would be the virgin birth and the resurrection for instance.

The philosophical theologian Keith Ward has argued in his essay 'God as the Ultimate Informational Principle' for a view of God as:

> …the supreme informational principle of the universe, without which the combination of the lawfulness of the world and its inherent value would be inexplicable. Such informational code for construction of an actual universe logically precedes material configurations by containing the set of all mathematically possible states, plus a selective principle of evaluation that gives preference to the actual world we inhabit.[46]

A significant observation which should be immediately apparent, apart from the fact that this view seems to have a very tenuous connection with the traditional notion of God, is that this proposal closely resembles the Buddhist view that the ultimate ground comprises an infinitely fecund field of potentiality from which all experience manifests together with some

mechanism through which potentialities are unfolded; Ward calls this mechanism 'a selective principle of evaluation.' The crucial difference between Ward's novel vision of God as ultimate informational principle and the Buddhist notion of emptiness and cognizance inseparable, however, resides in the nature of the selection mechanism.

In his book *Why There Almost Certainly Is a God* Ward gives an account of his 'God hypothesis' which clearly maps quite snugly on to the HAM-TOE model in all but one detail:

> The God hypothesis proposes that there is a consciousness that does not depend upon any material brain, or any material thing at all. in this consciousness all possible worlds exist, though only as possible states that may or may not exist. The cosmic consciousness can evaluate these possible worlds in terms of their desirability – their beauty or elegance or fecundity, for example. Then, being actual, it can bring about desirable states and enjoy them.[47]

The first part of this metaphysical vision is isomorphic to the HAM-TOE in that it proposes that the universe comes into being as a vast web of potentiality, possible worlds or possible pathways of experience. As we have seen a logical analysis of the structure of the HAM-TOE clearly shows that this vast maze of cosmic potentiality must be of the nature of consciousness or mind. However, when it comes to specifying the selection mechanism by which a privileged set of these potentialities becomes actual Ward falls back upon the traditional view of the omnipotence of God. According to Ward's proposal it is God, apparently acting as an independent agent taking the position of external cosmic observer firing quantum beams of approval into the world of potential manifestation, who 'selects' which of the possible worlds are 'desirable.' But this is not the perspective that is suggested by the HAM-TOE, or any version of quantum theory. The HAM-TOE clearly indicates that it is the community, or communities, of generations of sentient beings weaving their way, and thereby making 'selections,' through the pathways of potentiality which perform the selection function.

The view that it is sentient beings that perform selections upon the quantum realm of potentiality is clearly indicated by quantum theory, as John Wheeler pointed out in his suggestion that 'observer-participants' are creative agents in the process of a 'self-synthesizing universe'. As Stapp points out:

> …quantum theory demands – a draconian shift in the very subject matter of physical theory, from an imagined universe consisting of causally self-sufficient mindless matter, to a universe populated by allowed possible physical actions and possible experienced feedbacks from such actions.[48]

And, remarkably, this has always been the view of Buddhist metaphysics, as the Dalai Lama indicates (in the following it is necessary to keep in mind that the notion of 'karma' exactly includes Stapp's 'possible physical actions and possible experienced feedbacks from such actions'):

> From a Buddhist point a view, the karma of all sentient beings that inhabit the universe plays a role in shaping the formation of the universe.[49]

So if we carry this view, which is suggested by the evidence of quantum theory, into the domain of theology then we can say that all sentient beings are the 'observer-participants', or the agents, of God. In this view of the process of the universe sentient beings, far from being

separate from the universal process which constitutes God, are all agents of God's intentionality to have a self-aware presence in the dualistic experiential world. We are the 'I's and 'eyes' of God!

Speaking in April 2003 to the American Physical Society, Wheeler made the following remarkable; perhaps one might say 'mystical', sequence of remarks:

> The Question is what is the Question?
> Is it all a Magic Show?
> Is Reality an Illusion?
> What is the framework of the Machine?
> Darwin's Puzzle: Natural Selection?
> Where does Space-Time come from?
> Is there any answer except that it comes from consciousness?
> What is Out There?
> T'is Ourselves?
> Or, is IT all just a Magic Show?[50]

And in the Guardian obituary for John Wheeler we can read that:

> In 2002, he wrote: 'How come the universe? How come us? How come anything?' Although Einstein had once asked him whether, if no one looked at it, the moon continued to exist, Wheeler's answer to his 'how come?' questions was 'that's us'.[51]

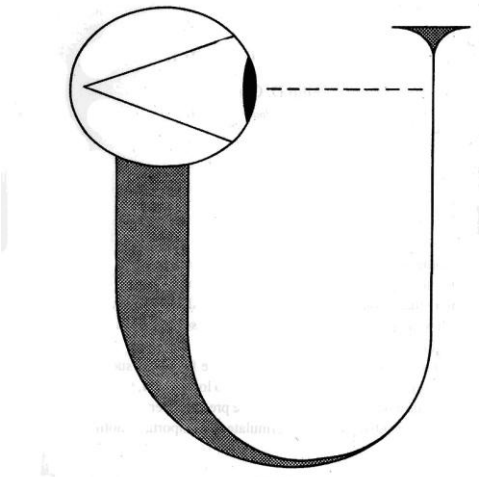

Figure 3

Wheeler was well aware that acts of perception were the creative force behind the manifestation of the universe, this was clearly embodied in his self-perceiving universe graphic (figure 3). It only remained for the final step, the extraordinary knowledge known and realised by the great mystics of 'all times and all places', *the fundamental nature of reality is Universal Self-perception*. The phenomenon of the 'collapse of the wavefunction,' the mechanism through which consciousness produces experienced actuality from quantum potentiality, is a direct indication of the fundamental self-perceiving process of the universe.

In other words *the universe uses the perceiving process within the dualistic world of experience in order to explore and experience its own nature.* Human beings occupy a central place in this process because they are the universe's agents (leaving aside the issue of beings elsewhere in the universe) in the process of universal self-exploration, self-perfection and self-transcendence; a universal process of self-discovery which modern theologians may wish to call 'God.'

Steven Hawking was the seventeenth occupant of the Lucasian Chair of Mathematics at Cambridge University. How remarkable then that, when the full implications of the HAM-TOE model are properly drawn out, the resulting theological-metaphysical model bears an uncanny resemblance to the theological perspective of the second occupant of the Lucasian Chair, Sir Isaac Newton, who suggested that space was the 'sensorium of God.' In the *Opticks* Newton wrote:

> …does it not appear from phenomena that there is a Being incorporeal, living, intelligent, omnipresent, who in infinite space, as it were in his sensory, sees the things themselves intimately, and thoroughly perceives them, and comprehends them wholly by their immediate presence to himself: of which things the images only carried through the organs of sense into our little sensoriums, are there seen and beheld by that which in us perceives and thinks.[52]

Whilst in this speculation there is by no means a fully fledged adumbration of the HAM-TOE, that would be expecting too much. There is in this musing, however, the glimmer of the idea that at the ground of the process of reality there might be an infinitely potent, innately intelligent awareness which explores its own potentialities through manifesting the 'little sensoriums' of all sentient beings. As quantum physicist Anton Zeilinger describes John Wheeler's quantum conclusion:

> …since we are part of the universe, the universe, according to Wheeler, creates itself by observing itself through us.[53]

We are all part of the Grand Designer!

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