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Perceived Reality, Quantum Mechanics, and Consciousness

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Abstract:

Our sense of reality is different from its mathematical basis as given by physical theories. Although nature at its deepest level is quantum mechanical and nonlocal, it appears to our minds in everyday experience as local and classical. Since the same laws should govern all phenomena, we propose this difference in the nature of perceived reality is due to the principle of veiled nonlocality that is associated with consciousness. Veiled nonlocality allows consciousness to operate and present what we experience as objective reality. In other words, this principle allows us to consider consciousness indirectly, in terms of how consciousness operates. We consider different theoretical models commonly used in physics and neuroscience to describe veiled nonlocality. Furthermore, if consciousness as an entity leaves a physical trace, then laboratory searches for such a trace should be sought for in nonlocality, where probabilities do not conform to local expectations.

Keywords: quantum physics, neuroscience, nonlocality, mental time travel, time

Introduction

Our perceived reality is classical, that is it consists of material objects and their fields. On the other hand, reality at the quantum level is different in as much as it is nonlocal, which implies that objects are superpositions of other entities and, therefore, their underlying structure is wave-like, that is it is smeared out. This discrepancy shows up in the framework of quantum theory itself because the wavefunction unfolds in a deterministic way excepting when it is observed which act causes it to become localized.

The fact that the wavefunction of the system collapses upon observation suggests that we should ask whether it fundamentally represents interaction of consciousness with matter. In reality this question is meaningful only if we are able to define consciousness objectively. Since consciousness is not a thing or an external object, its postulated interaction with matter becomes paradoxical. If we rephrased our question we could ask where our personal self is located and if it is just some neural structure that exists in the classical world, why is it that its activity (observation) collapses the wavefunction?

The human observer interacts with the quantum system through apparatus devised by him and, therefore, the actual interaction is between physical systems. If the human were directly observing the system, then also the interaction is within the human brain that consists of various neural structures. The observation is associated with a time element since the apparatus must first be prepared and then examined after the interaction with the quantum system has occurred. The observer's self-consciousness is also the product of life experience, and therefore the variable of time plays a central role in it.

Neuroscience, which considers brain states in terms of electrical and chemical activity in the interconnection of the neurons, that somehow gives rise to awareness, cannot explain where the aware self is located. Since each neuron can only carry a small amount of information, no specific neuron can be the location of the self. On the other hand, if the self is distributed over a large area of the brain, what is it that binds this area together? Furthermore, since we have different inner senses of self in different states of mind, are these based on recruitment of different set of neurons, and why is it that behind each such sense of selfhood, ostensibly associated with different parts of the brain, is the certitude that it corresponds to the same individual? What integrates all these different senses into one coherent and persisting sense of self? Behind these questions lie a whole set of complementarities. Thus in some contexts it is appropriate to view the self as located at some point in the brain, whereas in other contexts it is distributed all over the body.

The question whether mental states are governed by quantum laws is answered in the affirmative by those who accept a quantum basis of mind (von Neumann, 1932/1955; Wigner, 1983; Penrose, 1994; Nadeau and Kafatos, 1999; Roy and Kafatos, 2004; Hameroff and Penrose, 2003; Stapp, 2003; Freeman and Vitiello, 2006). Recent findings in support of quantum models for biology (e.g., Lambert et al., 2013) lend additional support to this position. We add a point of caution here: mind as a random quantum machine as suggested by some theories may be an advance but not the complete picture since it will not be able to account for the individual's freedom and agency; and it cannot imply an objective reality independent of observation.

The question related to the limitations on what can be known by the mind has a logical component related to Gödel's Incompleteness Theorem and logical paradoxes (Davis, 1965), which can also apply to limits of knowing in physics and biology (Herrnstein, 1985; Grandpierre and Kafatos, 2012; Kak, 2012; Buser et al., 2013).

In this article, we focus on the relationship between reality and our conceptions of it as mediated by consciousness. This mediation may be seen through the lenses of neuroscience and physics. We first show how the mind constructs reality; later we discuss how the nonlocality inherent in quantum theory and, therefore, in physical process, is veiled by consciousness so that it appears to be local (Kak, 2014; Kafatos and Kak, 2014). This veiling is a characteristic of consciousness as process and it mirrors the way quantum theory conceals all the details of the state of a single particle by means of the Heisenberg Uncertainty Principle. Finally, we consider how indirect evidence in terms of anomalous probabilities in certain events can be adduced as evidence in support of reality being quantum-like at a fundamental level.

Interpretations of Quantum Theory

The Copenhagen Interpretation of quantum mechanics separates the physical universe in two parts, the first part is the system being observed, and the second part is the human agent, together with his instruments. The extended agent is described in mental terms and it includes not only his apparatus but also instructions to his colleagues on how to set up the instruments and report on their observations. The Heisenberg cut (also called the von Neumann cut) is the hypothetical interface between quantum events and an observer's information, knowledge, or conscious awareness. Below the cut everything is governed by the wave function; above the cut a classical description applies.

In the materialist conception, which leaves out quantum processes since they were until recently thought not to play a role in brain processes, consciousness is an epiphenomenon with biology as ground. But, although this is the prevalent neuroscience paradigm, there is no way we can justify the view that material particles somehow acquire consciousness on account of complexity of interconnections between neurons. There is also the panpsychist position that consciousness is a characteristic of all things, but in its usual formulation as in the MWI position that will be discussed later it is merely a restatement of the materialist position so as to account for consciousness (Strawson, 2006). On the other hand is the position that consciousness is a transcendent phenomenon – since it cannot be a thing – which interpenetrates the material universe. The human brain, informed by the phenomenon of consciousness, has self-awareness to contemplate its own origins.

We do know that mental states are correlated with activity in different parts of the brain. With regard to mental states several questions may be asked:

1. Do mental states interact with the quantum wavefunction?
2. Are mental states governed by quantum laws?
3. Are there limitations to what the mind can know about reality?

There is considerable literature on research done on each of these questions. The question of interaction between mental states and the wavefunction was addressed by the pioneers of quantum theory and answered in the affirmative in the Copenhagen Interpretation (CI) (von Neumann, 1932/1955). In CI, the wavefunction is properly understood epistemologically, that is, it represents the experimenter's knowledge of the system. Upon observation there is a change in this knowledge. It postulates the observer without explaining how the capacity of observation arises (Schwartz et al., 2005; Stapp, 2003). Operationally, it is a dualist position, where there is a fundamental split between observers and objects. There is the added variance or interpretation of CI followed by von Neumann in his discussion of the quantum cut which implies that although the separation between observers and objects has to be brought into actual experimental setups, that it is not fundamental.

In the realistic view of the wavefunction as in the Many Worlds Interpretation (MWI), there is no collapse of the wavefunction. Rather, the interaction is seen through the lens of decoherence, which occurs when states interact with the environment producing entanglement (Zurek, 2003). By the process of decoherence the system makes transition from a pure state to a mixture of states that observers end up measuring.

In the MWI interpretation, which may be called the ontic interpretation, the wavefunction has objective reality. The problem of collapse of the wavefunction is sidestepped by speaking of interaction between different subsystems. But since the entire universe is also a quantum system, the question of how this whole system splits into independent subsystems arises. Furthermore, if the wavefunction has objective reality, then consciousness must be seen to exist everywhere (Tegmark, 1998). Actually, this particular point was again implied by von Neumann's extension of CI who held that the wave function collapses upon observation, that the wave function is real, and that the world is quantum, which is decidedly contrary to MWI and Tegmark's recent interpretation but in agreement with the works of Wigner and Stapp, as well as our own. We emphasize that the MWI resolution is not helpful because it sees consciousness only as a correlate without any explanation for agency and freedom. There are other interpretations of quantum mechanics not as popular as either CI or MWI that will not be considered in this paper.

Construction Of Reality By The Mind

If we side-step for now the question of where the self is located and focus on the question of how the self relates to reality, we come up with several issues: First, we note that the mind is an active participant, together with the sensory organs, in the construction of reality (e.g. Wheeler, 1990: Kafatos and Nadeau, 2000; Gazzaniga, 1995; Chopra, 2014). An example of this is the phantom limb phenomenon in which there is a sensation of pain in a missing or amputated limb (Melzack, 1992). There are other cases where the phantom limb does not even correspond to anatomical reality. A recent research paper reported the case of a 57-year-old woman who was born with a deformed right hand consisting of only three fingers and a rudimentary thumb. After a car crash at the age of 18, the woman's deformed hand was amputated, which gave rise to feelings of a phantom hand that was experienced as having all five fingers (McGeoch and Ramachandran, 2012).

In the case of injury to the brain, the construction of reality by mind seen most clearly in terms of deficits that persist even though the related sensory information is reaching the brain. Consider agnosia, which is failure of recognition that is not due to impairment of the sensory input or a general intellectual impairment. A visual agnosic patient will be unable to tell what he is looking at, although it can be demonstrated that the patient can see the object. Prosopagnosic patients are neither blind nor intellectually impaired; they can interpret facial expressions and they can recognize their friends and relations by name or voice, yet they do not recognize specific faces, not even their own in a mirror. Electrodermal recordings show that the prosopagnosic responds to familiar faces although without awareness of this fact. It appears that the patient is subconsciously registering the significance of the faces.

In a recent study (Rezlescu et al., 2014) of prosopagnosia the authors consider the role of the face-specific and the expertise (information processing) aspects in the recognition mechanism. According to the face-specific theory, upright faces are processed by face-specific brain mechanisms, whereas the expertise hypothesis claims faces are recognized by fine-grained visual processing. The authors used greebles, which are objects designed to place face-like demands on recognition mechanisms, in their experiments. They present compelling evidence that performance with greebles does not depend on face recognition mechanisms. Two individuals with acquired prosopagnosia displayed normal greeble learning despite severely impaired face performance. This research supports the theory that face- specific mechanisms are essential for recognition of faces.

Similar counterintuitive behavior of the mind includes the following: in alexia, the subject is able to write while unable to read; in alexia combined with agraphia, the subject is unable to write or read while retaining other language faculties; in acalculia, the subject has selective difficulty in dealing with numbers.

There are anecdotal accounts of blind people who can see sometime and deaf people who can likewise hear. Some brain damaged subjects cannot consciously see an object in front of them in certain places within their field of vision, yet when asked to guess if a light had flashed in their region of blindness, the subjects guess right at a probability much above that of chance.

One may consider that the injury in the brain leading to blindsight causes the vision in the stricken field to become automatic. Then through retraining it might be possible to regain the conscious experience of the images in this field. In the holistic explanation, the conscious awareness is a correlate of the activity in a complex set of regions in the brain. No region can be considered to be producing the function by itself although damage to a specific region will lead to the loss of a corresponding function (Kak, 2000).

Split Brains

The corpus callosum connects the two hemispheres of the brain and each eye normally projects to both hemispheres. By cutting the optic-nerve crossing, the chiasm, the remaining fibers in the optic nerve transmit information to the hemisphere on the same side. Visual input to the left eye is sent only to the left hemisphere, and input to the right eye projects only to the right hemisphere.

Experiments on split-brain human patients raise questions related to the nature and the seat of consciousness. For example, a patient with left-hemisphere speech does not know what his right hemisphere has seen through the right eye. The information in the right brain is unavailable to the left brain and vice versa. The left brain responds to the stimulus reaching it whereas the right brain responds to its own input. Each half brain learns, remembers, and carries out planned activities and it is as if each half brain works and functions outside the conscious realm of the other.

Roger Sperry and his associates performed a classic experiment on cats with split brains (Sperry et al., 1956; Sperry, 1980). They showed that such cats did as well as normal cats when it came to learning the task of discriminating between a circle and a square in order to obtain a food reward, while wearing a patch on one eye. This showed that one half of the brain did as well at the task as both the halves in communication. When the patch was transferred to the other eye, the split-brain cats behaved different from the normal cats, indicating that their previous learning had not been completely transferred to the other half of the brain.

It appears that for split brains nothing is changed as far as the awareness of the patient is considered and the cognitions of the right brain were linguistically isolated all along, even before the commissurotomy was performed. The procedure only disrupts the visual and other cognitive-processing pathways.

The patients themselves seem to support this view. There seems to be no antagonism in the responses of the two hemispheres and the left hemisphere is able to fit the actions related to the information reaching the right hemisphere in a plausible theory. For example, consider the test where the word “pink” is flashed to the right hemisphere and the word “bottle” is flashed to the left. Several bottles of different colors and shapes are placed before the patient and he is asked to choose one. He immediately picks the pink bottle explaining that pink is a nice color. Although the patient is not consciously aware of the right eye having seen the word “pink” he, nevertheless, “feels” that pink is the right choice for the occasion. In this sense, this behavior is very similar to that of blindsight patients.

The brain has many modular circuits that mediate different functions. Not all of these functions are part of conscious experience. When these modules related to conscious sensations get “crosswired,” this leads to synesthesia. One would expect that similar joining of other cognitions is also possible. A deliberate method of achieving such a transition from many to one is a part of some meditative traditions. It is significant that patients with disrupted brains never claim to have anything other than a unique awareness.

If shared activity was all there was to consciousness, then this would have been destroyed or multiplied by commissurotomy. Split brains should then represent two minds just as in freak births with one trunk and two heads we do have two minds. But that is never the case.

The experiments of Benjamin Libet showed how decisions made by a subject arise first on a subconscious level and only afterward are translated into the conscious decision (Libet, 1983). Upon a retrospective view of the event, the subject arrives at the belief that the decision occurred at the behest of his will.

In Libet’s experiment the subject was to choose a random moment to flick the wrist while the associated activity in the motor cortex was measured. Libet found that the unconscious brain activity leading up to the conscious decision by the subject began approximately half a second before the subject consciously felt that he had taken his decision. But this is not to be taken as an example of retrocausation; rather, this represents a lag in the operation of the conscious mind in which this construction of reality by the mind occurs.

Orthodox Quantum Mechanics And Complementarity

As shown in Figure 1, we have dealt with models of reality constructed by the mind, and theories of physics, both of which are at the bottom layer of reality. Now we consider the next higher layer and see how we make observations. To record an observation in a laboratory requires a certain conception of the components of the system and a hypothesis related to the process. The observations are inferred from the readings on instruments or photographic traces. More direct observations register directly with our senses and here the intention in that the sense organ, such as the eye, focuses on a specific object to the exclusion of the remainder of the visual scene indicates that there is some kind of an interaction between consciousness and matter that leads to the observation.

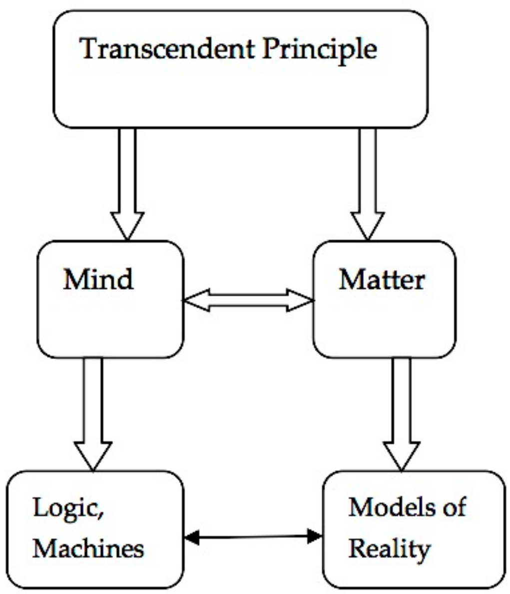

Figure 1. Universe as projection of a transcendent principle (broad arrow is projection; narrow arrow is full representation)

Within the Copenhagen Interpretation, von Neumann provided a mathematical treatment (von Neumann, 1932; Bohr, 1934; Heisenberg, 1958) of this question by speaking of two different processes at work and doing so made one look for the interaction of consciousness with matter in the first process: *Process 1*. This is a non-causal, thermodynamically irreversible process in which the measured quantum system ends up randomly in one of the possible eigenstates (physical states) of the measuring apparatus together with the system. The probability for each eigenstate is given by the square of the coefficients c_n of the expansion of the original system state $|\varphi\rangle$

$$c_n = \langle \varphi_n | \phi \rangle$$

This represents the collapse of the wavefunction.

Process 2. This is a reversible, causal process, in which the system wave function $|\varphi\rangle$ evolves deterministically. The evolution of the system is described by a unitary operator $U(t_2,t_1)$depending on the times $t_1$and t_2, so that

$$|\varphi_2\rangle = U(t_2,t_1)\,|\varphi_1\rangle$$

The evolution operator is derived from the Schrödinger equation

$$i\hbar\frac{d|\varphi\rangle}{dt} = H|\varphi\rangle$$

When the Hamiltonian H is time independent, U has the form:

$$U(t_2,t_1) = e^{-\frac{i}{\hbar}H(t_2-t_1)}$$

Von Neumann was guided by the principle of psycho-physical parallelism which requires that it must be possible to describe the extra-physical process of the subjective perception as if it were in reality in the physical world. This principle is not appreciated much nowadays but it is justified since psychological states must have a corresponding physical correlate. von Neumann described the collapse of the wave function as requiring a cut between the microscopic quantum system and the observer. He said it did not matter where this cut was placed:

> The boundary between the two is arbitrary to a very large extent. ... That this boundary can be pushed arbitrarily deeply into the interior of the body of the actual observer is the content of the principle of the psycho-physical parallelism -- but this does not change the fact that in each method of description the boundary must be put somewhere, if the method is not to proceed vacuously, i.e., if a comparison with experiment is to be possible. Indeed experience only makes statements of this type: an observer has made a certain (subjective) observation; and never any like this: a physical quantity has a certain value. (von Neumann, 1932).

To the extent that the collapse provides a result in a statistical sense, there appears to be a choice made by Nature. The other choice is made by the observer whose intention sets the measurement process in motion.

These two processes are an instance of complementarity of which the wave-particle duality of the Copenhagen Interpretation is a more commonly stated example. In reality, complementarity is a general principle that characterized all experience. Although it is sometimes seen as emerging out of complexity (Theise and Kafatos, 2013), here we view it as a fundamental principle that organized reality.

The question of complementarity was matter of debate in Greek thought. Thus reality was taken as change by Heraclitus and as things and relationships by Parmenides. In Indian thought several fundamental dichotomies such as matter and consciousness, physical reality and its descriptions, and analysis and synthesis are given. Some of the complementarities that are part of the contemporary discourse are:

- Waves and particles – quantum theory
- Being and time – in philosophy (Heidegger, 1962)
- Law and freedom – in physics and psychology
- Holistic and reductionist views – in system theory
- Matter and consciousness.

If we take complementarity as the common thread in phenomena that are described at different levels, then one might suspect that quantum theory should also underlie consciousness.

Veiled Monlocality

According to quantum mechanics reality is nonlocal and objects separated in time and space can be strongly correlated. Thus for a pair of entangled particles billions of miles apart, an observation on one particle causes an instant collapse of the wavefunction of the twin particle. Entanglement also persists across time and an observation made now can change the past as in Wheeler's delayed choice experiment (Wheeler, 1990). Yet there is no way one can confirm such an entanglement for a specific pair of particles for any attempt at verification will be defeated by the collapse of the wavefunction. Probability experiments for ensembles of particles to separate classical from quantum effects do exist (Bell, 1964).

If reality is nonlocal why does it appear to our senses as local and separated? The idea of veiled nonlocality is that consciousness disguises its wholeness and nonlocality in order to produce local processes. This idea arose out of the experimental fact that no loophole free test of nonlocality has yet been found (Kak, 2014). It can be seen as quite like the Heisenberg's Uncertainty Principle which places limits on the description of the state of a specific particle.

This filtering process allows for specific observations and thoughts in a classical world of everyday experience, while keeping quantum and general relativistic processes out of sight. Another example of veiled nonlocality in gravitation is the hypothesis of cosmic censorship (Penrose, 1999), which describes the inability of distant observers to directly observe the center of a black hole, or "naked singularity." (Kafatos and Kak, 2014) Veiled nonlocality is like a fuzzification that breaks up a whole system into several locally connected subsystems. We illustrate below in Figure 2 the general idea.

The breakup of a whole into subsystems can be shown through simple observation. The five senses cannot perceive the quantum world, and yet perception depends upon it. The quantum world is hidden from us the way the operation of the brain is hidden. If you think the word "elephant" and see an image of the animal in your mind's eye, you aren't aware of the millions of neurons firing in your brain in order to produce them. Yet those firings -- not to mention the invisible cellular operations that keep every part of your body alive -- are the foundation of the brain's abilities.

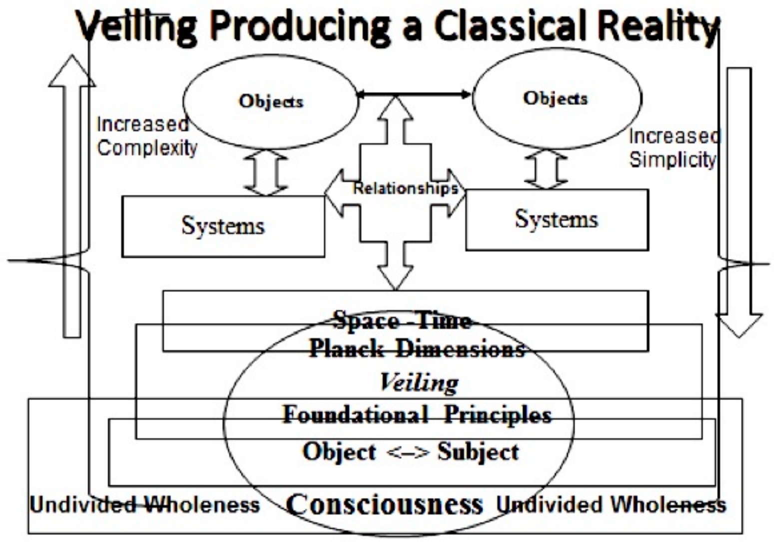

Figure 2: Breakup of the undivided wholeness of consciousness and implied quantum wholeness through the veiling process.

Just as the image of an elephant is the visible end point of veiled processes, the material world is founded on a veiled reality. Moreover, to produce a single mental image, the whole brain must participate. Specific areas, mainly the visual cortex, produce mental pictures, but they are coordinated with everything else the brain does, such as sustaining the cerebral cortex, which recognizes what an image is, and maintaining a healthy body. This points to a profound link between the brain and the cosmos. The two are inseparable. In fact, in our view, complementarity assures that they appear as separate and one causing the other but in fact they are aspects of undivided wholeness brought about by consciousness, which is undivided, nonlocal and whole (see also below).

The veiling of reality is in consonance with the idea of the mind constructing its reality. Such a veiling even occurs in the scientific process which filters out and discards a huge portion of human experience -- almost everything one would classify as subjective. Its model is just as selective, if not more so, than the model which shapes a religious or metaphysical reality. As far as the brain is concerned, neural filtering is taking place in all models, whether they are scientific, spiritual, artistic, or psychotic. The brain is a processor of inputs, not a mirror to reality.

If our brains are constantly filtering every experience, there is no way anyone can claim to know what is "really" real. You can't step outside your brain to fathom what lies beyond it. Just as there is a horizon for the farthest objects that emit light in the cosmos, and a farthest horizon for how far back in time astronomy can probe, there is a farthest horizon for thinking. The brain operates in time and space, having linear thoughts that are the end point of a selective filtering process. So whatever is outside time and space is inconceivable, and unfiltered reality would probably blow the brain's circuits, or simply be blanked out.

Consciousness as Foundational Principle of Reality

We propose, as shown in Figure 2, that consciousness-based reality limited by a fundamental veiling provides meaning and the appearance of what we say is objective reality, systems, objects and relationships at all levels of organization. The quantum and the classical worlds aren’t separated merely by a physical gap. On one side the behavior of the quantum is meaningless, random, and unpredictable. A subatomic particle has no purpose or goal. On the other side, in the classical world, it goes without saying that each of us lives our life with purpose and meaning in mind. To accept this as self-evident is crucial to getting up every morning, so arcane disputations about free will and determinism are, pragmatically speaking, not relevant to the more fundamental question: Can randomness produce meaning, and if so, how?

To lead a meaningless existence is intolerable, so it’s ironic that quantum physics bases the cosmos on meaningless operations, and doubly ironic when you consider that physics itself is a meaningful activity. The phrase “participatory universe,” sums up how the very process of observation changes the outcome (Wheeler, 1990). Observation not only changes the outcome in a random sense, but it can actually be used to steer to unfolding of a physical system to whichever way one chooses by the quantum Zeno effect (Misra and Sudarshan, 1974; Kak, 2007).

By definition reality is complete; therefore, whatever purpose and meaning we find in it, using limited human capacities, is a fragment of a pre-existing state, which we term the state of infinite possibilities. The fragment cannot be the whole, although in what may appear as strange, the part implies the whole (Kafatos and Nadeau, 2000; Nadeau and Kafatos, 1999). And the whole is more than the sum of the parts, because no amounts of parts, no matter how many, form the whole. This state is veiled from us, just as the existence of every possible subatomic particle is hidden from us. The concept of a field contains within it this relationship between the whole and its parts. There is no reason to exclude the field of consciousness from exhibiting the same relationship to its parts, whence the insight that there can be only one consciousness, not many (Schrödinger, 1974).

In a matter–alone conception of the universe, we cannot conceive of a reality that has no objects in it, and only pure consciousness. However, such a matter alone conception goes against the very nature of a quantum universe as quantum theory contains observation through measurement. Yet without awareness, nothing can be perceived. Having placed its trust in “reality as given,” science overlooks the self- evident fact that nothing can be experienced without consciousness. It is a more viable candidate for “reality as given” than the physical universe. Even if the materialist position is accepted that claims consciousness is an epiphenomenon, one cannot escape the fact that consciousness existed from the very beginning although it may have been in a latent form.

If enlightenment consists of seeing beyond the veiling that accompanies a commonsensical view of the universe, it too isn’t some sort of obscure mysticism but recognition that self-awareness can know itself. The mind isn’t only the thoughts and sensations constantly streaming through it. There is a silent, invisible foundation to thought and sensations. Until that background is accounted for, individual consciousness mistakes itself, and in so doing it cannot help but mistake what it observes. This is expressed in a Vedic metaphor about the wave and the ocean: A wave looks like an individual as it rises from the sea, but once it sinks back, it knows that it is ocean and nothing but ocean.

Cosmic consciousness, then, isn't just real -- it's totally necessary. It rescues physics and science in general from a dead end -- the total inability to create mind out of matter -- and gives it a fresh avenue of investigation. We exist as creatures with a foot in two worlds that are actually one, divided by appearance and reality. Consciousness as a transcending principle provides a way to bridge the two processes of quantum theory. We emphasize that this view is the only one that is ultimately self-consistent. Material views of reality ultimately run into unanswerable conundrums and inconsistencies or the need of strange views such as the MWI which is founded on the existence of real outcomes without the agency of consciousness.

Conclusion

Quantum theory has reached the point where the source of all matter and energy is a vacuum, a nothingness that contains all the possibilities of everything that has ever existed or could exist. These possibilities then emerge as probabilities before "collapsing" into localized quanta, manifesting as the particles in space and time that are the building blocks of atoms and molecules.

Where do the probabilities exist? Where is the exquisite mathematics that we have at our disposal to be found? Some sort of “real space”, or material-like space? That of course makes no sense. The probability of an event (even an event like winning the lottery or flying on the day a blizzard strikes) only exists as long as there is someone to ask the question of what may happen and to measure the outcomes when they occur. So probabilities and other mathematical expressions, which are the foundation of modern quantum physics, imply the existence of observation. Countless acts of observation give substance and reality to what would otherwise be ghosts of existence. This solves the so-called “measurement problem” of quantum theory which is there if one assumes a reality independent of observation.

It is more elegant, self-consistent and far easier to accept as a working hypothesis that sentience exists as a potential at the source of creation, and the strongest evidence has already been put on the table: Everything to be observed in the universe implies consciousness. Some theorists try to rescue materialism by saying that information is encoded into all matter, but “information” is a mental concept, and without the concept, there’s no information in anything, since information by definition must ultimately contain meaning (even if it is a sequence of 0s and 1s as in computer language), and only minds grasp meaning. Besides, assuming that this kind of bit information is an encoded property of matter implies hidden variables (the bits) which have been ruled out by the Bell (1964) Theorem and laboratory experiments related to it (Aspect, Dalibard and Roger, 1984). Does a tree falling in the forest make no sound if no one is around to hear it? Obviously not. The crash vibrates air molecules, but sound needs hearing in order for these vibrations to be transformed into perception.

We've proposed that consciousness creates reality and makes it knowable -- if there's another viable candidate, it must pass the acid test: Transform itself into thoughts, feelings, images, and sensations. Science isn’t remotely close to turning the sugar in a sugar bowl into the music of Mozart or the plays of Shakespeare. Your brain converts blood sugar into words and music, not by some trick of the molecules in the brain, since they are in no way special or privileged. Rather, your consciousness is using the brain as a processing device, moving the molecules where they are needed in order to create the sight, sound, touch, taste, and smell of the world.

In everyday life, we get to experience the miracle of transformation that causes a three-dimensional world, completed by the fourth dimension of time, to manifest before our eyes. The great advantage of experience is that it isn't theoretical. Reality is never wrong, and all of us are embedded in reality, no matter what model we apply to explain it.

The indirect examination of consciousness through the process of veiling as sketched in this paper can be tested by means of experiments. For example, the proposed theory can be refuted if loophole-free tests to confirm nonlocality are devised. On the other hand, cognitive processes with anomalous probabilities would lend support to our thesis.

We finally note that the cut of Heisenberg/von Neumann does not exist anywhere: The observer must be one, all observers are appearances of distinct or independent entities, taking on an apparent “reality” through the veiling action. As stated above, our thesis resolves the measurement problem. In reading von Neumann, there is a strong hint that he also held this view.

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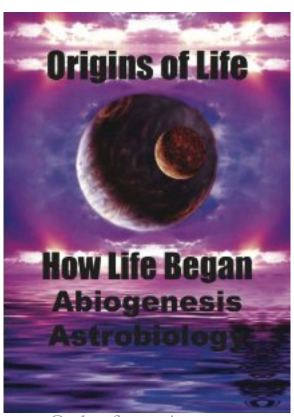

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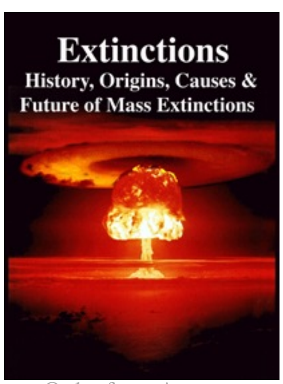

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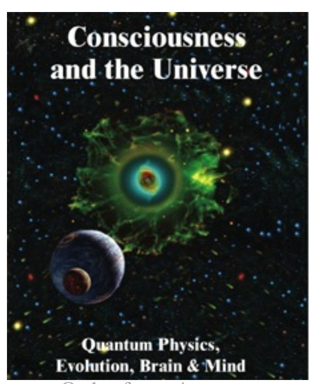

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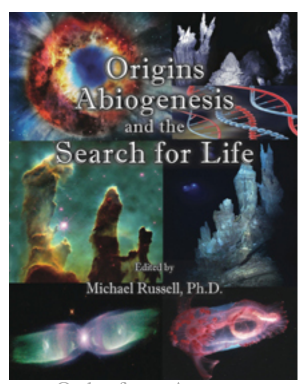

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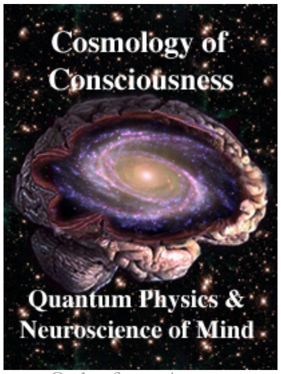

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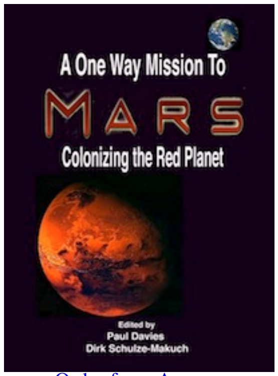

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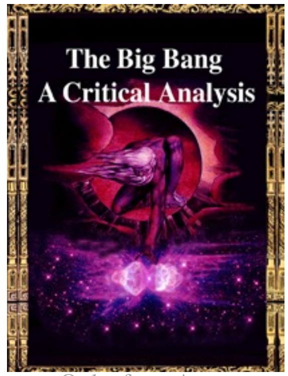

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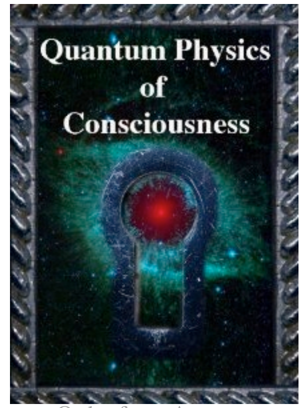

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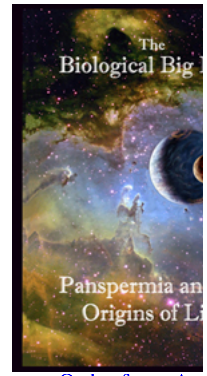

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