Consciousness Series – 5

Nonlocality in the Nature of Consciousness Implications in Neuroscience and Evolution

A. K. MUKHOPADHYAY

Indian Council of Philosophical Research
Darshan Bhawan
36 Tughlakabad Institutional Area
Mehrauli Badarpur Road
New Delhi – 110 062

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Abstract

There are many known interfaces between Physics and Biology. Consciousness comes into play where physics and biology make conjugal bonds. The phenomenon of nonlocal communication is suggestive of that conjugal relationship does really exist. It is possible to explore those relational bonds should the scientists take seriously the exploration of relationship between the brain and consciousness. The process of evolution is not difficult to explain then. This article describes different types of nonlocality in Part I. In Part II, it is explained how nonlocality could extend the limits of present science beyond the constant of Einstein, Max Planck and the constant Entropy barrier. Part III deals with quantum properties of the brain and nonlocality. The evidence has been cited how brain can behave as a macro-quantum object and participate in nonlocal communication. The far-reaching implications of nonlocal communication in exploring some special functions of the brain have been narrated. Application of the concept of nonlocality in the process of evolution has been described in Part IV. It seems to fill up various explanatory gaps still present in various theories of evolution. Concluding parts, Part V, describes the entire spectrum of Nature stating that unconditional consciousness could be found in her deeper recess. Nonlocality then can be put in proper perspective of nature and consciousness.

I
Introduction

The signal travels through space and, nothing can have velocity which is faster than that of light is the inviolable dictum of Albert Einstein. With this dictum, however, the classical mechanics was extended to the level of Relativity. Meanwhile, the quantum principles were also silently insinuating in the field of physics. Einstein, being terribly uncomfortable with the element of `uncertainty' in quantum mechanics, devised a thought experiment along with Podolsky and Rosen. The result of this thought experiment proved to be paradoxical. This is known as EPR paradox (1935).[1] It was observed that there were occasions when Einstein's own dictum was possibly not valid. Then the scientists also came across Bell's theorem (1965) and Nonlocality (1982). Alan Aspect[2] from France set up an experiment (1982) which unequivocally proved the existence of nonlocal communication between particles 12 meters apart in less than a billionth of a second i.e., 20 times faster than the supposedly unbreakable speed of light. The idea of non-local communication is further reinforced by the experiment of Nicolas Gisin who in 1997 demonstrated nonlocal communication over 10 km of distance with a speed 20,000 times faster than the speed of light. Nonlocal communication happens across galaxies between once related quantum particles.

What is Nonlocal communication?

Local communication is through space and the signal does not travel faster than light. Nonlocal communication is a kind of communication between quantum particles which have had interaction with each other in the past. The communication is unmediated by any known form of energy. The communication is also unmitigated, where the strength of interaction is independent of magnitude of separation[3].

Different types

Nonlocal communication happens independent of space (spatial nonlocality) and often independent of time (temporal nonlocality). Spatial nonlocality is when two events happen simultaneously irrespective of their spatial separation. The events are causally connected, meaning the event in the place one initiates the event in the second place or vice versa. It is simultaneous happening of two causally connected events separated by space. It is instantaneous action at-a-distance. Temporal nonlocality, on the other hand, dissolves the barrier of time. This communication works independent of time. The happening of two events, causally connected, irrespective of barrier of time indicates temporal nonlocality. For example, a distant recipient receives a mental message long before it is mentally sent. According to many scientists, an element of time-reversibility plays here.

The scientific progress is evidence-based. The scientists have objective and reproducible evidence in their hands to accept the phenomenon of spatial and temporal nonlocality in science. Spatial nonlocality is also called nonlocality type I and, temporal nonlocality is nonlocality type II. It is logical to extend our thought that if communication is possible independent of space or independent of time, it is also likely, therefore, that a kind of communication would be there which is independent of both space and time. This is nonlocality type III. This is a prediction. There is no 'scientific' evidence yet obtained for this. Many scientists discard this possibility and prefer to debunk it because of its teleological flavor. However, if science ever accepts seriously teleology as a scientific issue, nonlocality type III could be its immediate tool to explore it further. The issue is not so easily dismissed by the accomplished mystics. They claim to experience nonlocal communication

type III quite regularly. The author prefers to call it, ‘purposal’ nonlocality, where the vital information regarding the goal/the master plan is communicated to a system where it continues to do work independent of both space and time. Rather, it changes the earlier space-time wrap of the system to a degree that it becomes conducive for the newly set purpose/goal/master plan. This type of communication is proposed to exist amongst evolving and/or living systems. It is rare to find it in the non-evolving or non-living system.

The ontological relationship of space, time and 'purpose' is reflected in the ontological relationship of type I, type II and type III nonlocality. The interesting feature is that acquisition of nonlocality type II includes acquisition of nonlocality type I and acquisition of nonlocality type III includes acquisition of other two as well.

David Bohm's view on Nonlocality

It is David Bohm who tried to bring an ontological distinction[4] amongst different types of nonlocality. According to him, quantum nonlocality is not instantaneous. It involves some kind of signal transmission, may be at superluminal speed. However, nonlocality which is instantaneous does exist which he preferred to call supernonlocality. Bohm also used the term super-supernonlocality which probably may be what we are calling nonlocality type II.

II
Nonlocal communication can extend the present Science to further reaches of Nature and Consciousness

There are three important disciplines in present science, each of which has grown under the respective umbrella of an inviolable constant set up by its pioneer. For the discipline of Relativity it is velocity of light, for Quantum Mechanics, it is Planck's constant and for Cybernetics it is entropy barrier. These three constants set the limit, the boundary of present science[5], which is based on measurability.

Einstein's constant i.e. velocity of light excludes the possibility of simultaneity of events. The phenomenon of spatial nonlocality, however, dissolves this barrier of space and indicates existence of events beyond the boundary drawn by Einstein. Planck's constant excludes the possibility of continuity of events. 'Discontinuity' is one of the cardinal characteristics of quantum world. As existence of spatial nonlocality throws a serious challenge for Einstein's constant, the phenomenon of temporal nonlocality seems uncomfortable for Planck's constant. For many quantum mechanists, temporal nonlocality is a 'paradox', almost similar to the paradoxical situation the classical and relativistic physicists faced with advent of spatial nonlocality (EPR paradox). Beside Quantum Mechanics and the Relativity, the third important discipline of science is the discipline of cybernetics, which works under the inviolable umbrella of entropy barrier. This entropy barrier excludes the possibility of identity of events. The phenomenon of nonlocality type III, if it exists, proclaims identity of events. The identity of events is independent of both space and time and questions inviolability of the entropy barrier in the discipline of cybernetic in its present form.

Three constants under umbrella of which the present science works	**The discipline of Science**	**Excludes the possibility of**	**Challenged by the phenomenon of**
1. Einstein's constant	The classical and Relativistic physics	Simultaneity of events	Spatial nonlocality. Nonlocality type I
2. Planck's constant	The quantum physics	Continuity of events	Temporal nonlocality. Nonlocality type II
3. Entropy barrier	Cybernetics	Identity of events	*Purposal* nonlocality Nonlocality type III

The phenomenon of nonlocal communication has, therefore, a brighter side to endure with. It bears the potential to extend the present science to a deeper plane of nature and consciousness. Nonlocal communication so far has been acknowledged as phenomenon. The scientists still do not have any control over it. Therefore, they cannot use it also. The stumbling block in investigating nonlocality is the non-specificity of this phenomenon in the

realm of measurement. Many scientists, therefore, consider it as a 'Permissive' theory and not a 'Specific' theory. However, the future of information technology depends on how the scientists can gain access and then control over this phenomenon and use it for communication purpose. Physicist Henry Stapp is probably right when he says that *nonlocality is the greatest discovery of modern science.*

III
Quantum Mechanics and the Brain

Einstein once said that telepathy had much to do with physics than with the psychology. We are not sure whether he was talking of classical/relativistic physics or of the relevance of quantum physics! It is proposed that the nonlocal communication could be the right choice in this context. The idea that human brain has `biologized' quantum mechanical principles has been there for over three decades, mostly amongst the physicists. However, it is E. H. Walker[6] who in 1970 published a paper which clearly stated the possibility of quantum nature of the brain, particularly at the level of synaptic communication. Physicists like H. P. Stapp[7], Amit Goswami[8] have stressed on this point. Goswami also conceptualizes that 'Self' could behave in 'Classical' or 'Quantum' way, the later may be called quantum self. Nobel neuroscientist Sir John C. Eccles[9] embraced quantum mechanics in his study of synaptic transmission. Recently, Roger Penrose and Stuart Hameroff[10] published a paper in the Journal *of Consciousness Studies,* relating subcellular quantum events in the neuron with development of conscious awareness.

> *"Microtubules are appropriate candidates for quantum coherence leading to consciousness because their subunit conformation (and consequent function) can couple to quantum events in hydrophobic region, their paracrystalline lattice structure and symmetry promote long range order and their hollow cylindrical core can lead to water ordering with wave-guide super-radiance and self-induced transparency."*[10]

There is another view that quantum streams of events within the brain are in communion with Quantum Sea outside to generate an experience of *supracortical consciousness*[11].

However, it is nonlocal behavior of the brain, or nonlocal communication by the neurons in the brain which are relevant to the message of this paper.

Nonlocality and the Brain

Nonlocality can never be simulated in a classical system. For nonlocal communication to occur the objects must be of quantum nature. That the brain as a whole can behave as macro-quantum object and can participate in nonlocal communication has been demonstrated by Grinberg's experiment[12].

> *"Einstein-Podolsky-Rosen (EPR) correlations between human brains are studied to verify if the brain has a macroscopic quantum component. Pairs of subjects were allowed to interact and were then separated inside semisilent Faraday chambers 14.5 m apart when their EEG activity was registered. Only one subject of each pair was stimulated by 100 flashes. When the stimulated subject showed distinct evoked potentials, the nonstimulated subject showed "transferred potentials" similar to those evoked in the stimulated subject. Control subjects showed no such transferred potentials. The transferred potentials demonstrate brain-to-brain nonlocal EPR correlation between brains, supporting the brain's quantum nature at the macrolevel."* [12]

The interacting pairs of brain in Grinberg's experiment were chosen from those persons who meditated together and could feel the presence of other partner irrespective of their separation at distance.

Meditation although has stimulated a lot of research interest in the West, both for the disciplines of neuroscience and physics, the hard core scientists still hesitate to embrace it because of a lot of subjectivity inherent in the field. Non-reproducibility and closedness to public scrutiny are other reasons for scientist's repulsion to explore spiritual experience. What I suggest in the followings is that there are numerous situations, beside formal meditation, where nonlocal communication between once-interacted pair of brains remains a clear possibility. Meditation is not the only consciousness-expanding procedure. Consciousness grows as well in nurturing of love, promoting devotion and cultivating trust. With expansion of consciousness, brain starts participating in nonlocal communication. Implications of the fact that the brain can participate in nonlocal communication are far reaching.

Implications of Nonlocality in exploration of some special Brain functions

First of all, experimental findings on brain's nonlocal activity, as demonstrated by Grinberg et al[12] is a serious challenge to the classical views of brain which hold brain as a wired structure to process information and to respond. Nonlocal communication is outside the scope of any classical system. It is stated to be one of the signatures of micro-, or macro-quantum object.
For a structurally polylithic brain to behave as a macro-quantum object, it has to work functionally as a monolithic organ. *How does the classical structure of the brain behave, as one ensemble, single block, a quantum at macroscopic level, is a frontier for research*. Let me explain this a little. The brain has three evolutionary components *nested* vertically one above the other - the reptilian brain, the mammalian brain and the human brain. It has two culturally differentiated components, arranged horizontally, the left hemisphere and the right hemisphere. Although these components have been assigned different works at appropriate level, a composite global response from the brain is almost always an outcome even at the classical level of its response. When the brain participates in nonlocal communication, the question how does this polylithic structure become monolithic is likely to stimulate many scientists to revise their knowledge in simultaneous classical and quantum behaviour of some systems like brain.

However, once we accept the view that the brain can engage in nonlocal communication, we are able to explain many phenomena, hitherto left as anomalous. There are sensory perceptions which are not communicated through known sensory routes (extrasensory perceptions). There are also perceptions which are not 'sensory' in nature (nonsensory perception). Nonlocal communication can come in rescue to substantiate these phenomena.

For example, we have **Lover's brain** (may be teenaged lovers, accomplished married couple, mother-son, or even good empathic friends) where spatial nonlocality can explain their concurrence of thought and behaviour. Involved in the tangle of Love, one is often seen responding to questions arising in partner's brain. We also have example of **Visionary's brain,** which dissolves the barriers of time and read the scenario fifty or hundred years ahead. Temporal nonlocality is probably the physical mechanism acting on the visionary's brain. Successful forecasting without taking any help of present evidence could be occasioned by Temporal nonlocality.

We also have examples of **Transmissive brain** where the same 'ideal' is seen to be continued to manifest from the master to a follower, from the guru to a disciple. The mechanism could be the transfer of 'power' from the Guru to the brain of the Guru designate (*Shaktipat*). What could be this transfer of *power*? Probably, there develops a quantum correlation of two brains while they are spatially near and there occurs a communication between the two, following which the destined brain is capable of working almost inexhaustibly irrespective of space and time. It probably works through a communication of a vital *information* which is independent of both space and time and is concerned with transmission of the `goal' / `purpose' / master plan, vertically (through nonlocal communication between the brains, may be through involvement of neuronal genes!) from one spiritual generation to the next. We observe this phenomenon in spiritual traditions, like generation of Sikh gurus or in Ramakrishna-Vivekananda lineage.

Three examples given above focus on the brighter side of the scenario where the brain is able to retain its *phenomenal integrity* while acquiring the ability to communicate non-locally. There are examples when the brain fails to retain its phenomenal integrity and the darker side of the scenario gets unfolded. *Hallucination, hysterical fit* and even *epilepsy* may be the examples of such various nonlocal communication, albeit focally, where the vertical and horizontal components of brain fail to integrate this communication in the course of its final output. There are also occasions where the phenomenal integrity might have been retained but its *axiological integrity* (the value system) seems to be compromised or misplaced. **Witches' brain** is an example. There are examples of persons from the Huna tradition of ancient Polynesians[13], who often engage themselves individually or collectively in *death-prayer* or in *death-hexing,* praying for or hexing death of an undesirable person from a distance.

Integration and Nonlocal communication

The important issue here, is how to define the integrity of the brain in language of science? Not every brain has the ability to acquire the capacity of nonlocal communication in an integrated way. However some brains can acquire it when they successfully overcome various *uncertain* situations. The issue of development of integrity is related to the evolutionary potential of brain. Integration, in this context, could be defined as successful biologization of information relevant for overcoming different levels of uncertainty.

There is usually no perception of uncertainty in the classical plane. The uncertainty is felt between two complementary properties of an object (Heisenberg's uncertainty) when the observation and measurement are in a quantum plane. At a deeper plane of existence, a different kind of uncertainty is perceived between the conditioned properties and the very existence of the observed (e.g., uncertainty at the level of a black hole). In a still deeper plane, the perceived uncertainty is between '*Existence*' and *'No existence*', between the '*Presence*' and the `*Absence*' (e.g., uncertainty at the edge of the universe) and finally, the uncertainty oscillates between '*Nonexistence*' and *'A new existence*', between '*Absence*' and a '*New Presence*'[14]. Does an ontological relationship exist amongst different types of uncertainties as mentioned? Although difficult to argue at this stage, I guess it exists. Stephen Hawking, in contrast to Roger Penrose[15], has already pointed out that the uncertainty at the level of a black hole is of a different kind, different from Heisenberg's uncertainty. It is also Hawking who mentions about the most profound uncertainty found at the edge of the universe[16]. Does nonlocal communication occur while a brain or to say any macro-quantum object under evolution, overcome various depths of uncertainty? A very pertinent issue to attend, indeed.

The uncertainty can be reduced by input of relevant information into an informationally open system. One of the defined properties of information is its ability to reduce uncertainty. The meaning of an information is, however, read by the system in which it is introduced. Inclusion of the information within the system (systemization), may also be called 'biologization' of information, leads to a new integration within the system[14]. What is the relation between nonlocal communication and certain kind of information that are communicated in this way? We are dealing with an issue, a scientific mind can't just brush aside.

IV
Possible role of Nonlocal communication in Evolution

"Nothing in biology makes sense except in the light of evolution" (Dobzhansky). And, let us start with Darwin, the father of the Theory on evolution. Darwin's theory of Natural Selection stresses on continuous and gradual accumulation of variations which are put to test in the course of struggle for existence (intraspecies competition, interspecies competition and the struggle against environmental odds like natural calamities and scarcity of food). *The theory can explain survival of the fittest but not the arrival of the fittest*. Genetic mutation theory of Hugo de Vries offers explanation for the process which is discontinuous and heritable. It can explain arrival of some, if not all, new characteristics also. Interestingly, most of the mutations are recessive in character and, in general, retrogressive or negative in nature. Their role in evolution is not always direct. Genetic segregation (isolation) is another very important requirement for mutation theory. Mutation is more likely to happen in the segregated group. Or, clonal selection by mutation is followed by clonal proliferation and clonal evolution. Recombination of genes is another factor that can explain genetic diversity.

It is, however, not known what sets the programme for evolution for new properties to replace the old ones in a system under evolution? Also not known what makes the system choose a programme far ahead of time to beat others in the competition? Relevant also what makes this process happen simultaneously on different regions of the earth/cosmos, even when the regions are geopolitically different?

Any two randomly drawn human beings have genetic identity to the extent of 99.9%. The genetic uniqueness of any human being resides in this 0.1% of genome. Most of the forces supposed to influence the process of evolution work through this minute fraction of genome. Genetic markers chosen from this fraction remain the most important tool for tracing the foot prints of human migration and consequent establishment of civilization. Mitochondrial DNA haplotype, nucleotide sequencing of hypervariable segment (HVS-1) of the mitochondrial genome and y-chromosome RFLP and STRP data have been found very useful[17] for this purpose in addition to the data obtained from HLA-typing of different ethnic groups. However, there remain the gaps in painting the complete canvas as mentioned above, particularly pertaining to the question, how does it happen? Or, what initiates and determines it? Nonlocal communication by biological macro-quantum objects, not necessarily only by human brain, might be of relevance in filling up the gaps.

In contrast to `micro'-evolution which remains confined to sub-species realm or, mega-evolution involving phyla, classes, orders and families, the macro-evolution involves genera and species of animals. It passes through different kinds of uncertainty which often amounts to different kinds and degree of `death trap', where only an informationally open system is likely to acquire the ability to communicate non-locally.

It is suggested that the process of evolution journeys through three voids[18,19] namely, 'the apparent void', the 'great void' and the 'divine void' (if described in the philosophical language), probably the symbolic of interstellar space, the intergalactic space and interuniversal space respectively (if described in astronomical language). The selection pressures from nature would be different in different kind of voids. The modality of communication in these three voids is most likely to be non-local, type I, II & III respectively.

Perceived Uncertainty as ontologically placed	**Ontology of voids in Philosophical term**	**Ontology of voids in Astronomical scale**	**Nonlocal communication, in rescue of uncertainty**
1.Heisenberg's uncertainty	Apparent void (Void I)	Interstellar space	Spatial Nonlocality Nonlocality Type I
2.Uncertainty at the level of Black hole	Great void (Void II)	Intergalactic nebulae	Temporal Nonlocality Nonlocality Type II
3.Uncertainty at and beyond the edge of the universe	Divine void (Void III)	Interuniversal space	*Purposal* Nonlocality Nonlocality Type III

Darwin's theory of evolution is based on natural selection. However, Darwin's nature is confined to classical world/plane of nature. Nature has a stratified and nested hierarchy. Daniel Dennett from the Center of Cognitive Studies at Tufts University, USA has suggested natural selection of evolution to happen in quantum algorithmic way[20]. Quantum nature, unfortunately does not cover the entire spectrum of nature. Nature extends beyond the quantum plane (vide infra). Nonlocal communication, although, begins in the quantum world, extends across the entire spectrum of nature beyond the world of quantum.

Once we accept the proposal of extension of nature through three voids studded with three kinds of uncertainties and look at *the process of macroevolution as a death-transcending emergence*, it would be easier to incorporate different types of nonlocality in this composite picture.

I look at the whole scenario as follows.
Nonlocal communication type III, which is a communication independent of space and time probably sets the conformity of the evolving system with the new programme and new 'goal'. The relevant information is suggested to be communicated nonlocally to the system, may be to the brain, to the genes or may be to the neuronal genes. That "evolutionary strategies themselves evolve in a living situation under the pressure of selection" and "genes can acquire information from outside that transforms its behaviour in a heritable way", has been pointed out by L. H. Caporale[21]. Nonlocal communication type II acquired by the system during its passage through one of the `death traps' may offer it the selection advantage over those which have not acquired this integrated ability. Nonlocal communication type I may explain simultaneous happening of the evolutionary process over all favorable eco-milieu (multi-point origin of species). It is a matter of serious scientific concern, whether this added factor of nonlocal communication help to sort out the difference of opinions between archaeologist, paleontologist and geneticist regarding the origin of modern homo sapiens from the archaic human, homo erectus! Could this suggestion be far more applicable in the context of evolution of human civilization, since the human brain, when civilization started, had acquired the ability to attend and respond to nonlocal communication in an integrated way?

To 'sense'/'perceive' and to 'acquire' the ability of different types of nonlocal communication, one requires macro-quantum objects, brain-like structure in a system or the brain itself in biological animals. The ability of nonlocal communication by the system brings us to a 'no boundary' situation. The boundary, although, appears to be an important feature of any sane system including the living systems, for a brain the boundary is an impermanent reality. For a living system the boundary remains porous. This *porosity of the boundary* is essential for the process of evolution to continue. But, porous to what? Porous to some special kind of information, porous to nonlocal communication, porous also to neutrinos bombarding on photon-phonon-conformon repertoire[22] within the system.

I also look at the scenario as follows.
'Evolution from within' can take the system to near-death point. At this point, the system, if capable, becomes informationally open and, if further able, overcomes the existential uncertainty by biologization (systemization) of the relevant information from outside the system. Information reduces uncertainty. The meaning of an information is, however, read by the system in which it is introduced. Realization/biologization of this relevant information leads to a new integration within the system.

Once 'systemized'/`biologized', the relevant information working from within, sets the new goal within the system. In this way the system develops a temporary harmony with the outside. Then begins another long journey. Eventually it may again come across a similar situation of threatened death. Whether it would be able to overcome it or not, depends on several probabilities and the interplay of factors as mentioned above. If the system fails, we call it death. When it succeeds, we call it evolution of the system. The evolved system are expected to have emergent properties which have the controlling power over the older ones (Searle's type II emergence).

Nevertheless, the death-phenomena would continue to remain in this world in spite of nonlocal communication acting wonderfully and sometimes dramatically. There would also be evolutionary dead-end in spite of having a favorable eco-milieu. Probable reasons could be found in such situations within the system10itself, for a biological system may be within

its genes. The evolution, although, involves all the planes of nature, its final or permanent imprint is left at the classical plane. The classical plane retains all memories and memory induced changes, and thus, the evolutionary changes are visible within the easy comprehension of senses.

Evolution is, therefore, a mechanism where non-locality and locality unite. In other words, a *system that can act locally and has the ability to communicate non-locally reserves chances to evolve*.

I have narrated the whole scenario in one of my poems.

Buddha said that he was not God, nor Angel,
Nor a Saint. He is "Awake."
Darwin saw only struggle and struggle
In all existential quakes!

Lamarck emphasized an internal vital force.
`Appetency' to change with environment.
Hugo's mutation. Or, genetic isolation and drift,
Clonal proliferation and unpredictable recombination.

The common in them, is *a locally acting system*
Communicating in a non-local way.
Overcoming uncertainty in all its fitness
Integrating information in its biological bay.

Oh! The traveler! There are several death traps.
I wish you get through, with a feather in your cap!
Conscious advance, a little, through Nature's complex recess.
A death-transcending emergence, Evolution is the Process.

V

Stratified Nature

Nature has a stratified structure. This stratification has made nature's several planes hierarchically placed. To emphasize, it is not pyramidal hierarchy. It is a kind of `nested' hierarchy meaning all of the 'lower' is in the higher, but *not vice versa*. Unconditional consciousness could be found at the deepest recess of nature.

There is no nonlocal communication in the classical plane of nature. Neither it could be seen in the realm of unconditional consciousness. Nonlocal communication is a property of nature bridging the classical plane of nature with unconditional consciousness.

The basis of this stratification of nature into several planes, to start with, is the absence (classical plane) or presence (quantum plane) of a perceived uncertainty, the statistical probability in an observer-dependent reality. Then the division depends on the kind and degree of uncertainty. To emphasize, `uncertainty' is not just a philosophical or metaphysical issue. It is a scientific issue. It is measurable, and 'measurement is science and science is measurement'.

The plane amenable to senses is the classical plane (Plane I). The classical world is a space-time bound sensory world where determinism and causality work. Newton's three laws of motion or the Theory of Relativity runs the mechanics of it. Theory of Relativity works over an extension of the classical world of Newton to the level of the universe where $e = mc^2$. The inviolable constant here remains the velocity of light. Uncertainty or probability in observation and measurement is conspicuous by its absence.

As soon as one goes to the world of quantum (Plane II), uncertainty becomes a dominant feature. This uncertainty is an observer-dependent uncertainty and is a statistical probability during measurement. According to Heisenberg's uncertainty principle, it is not possible to specify precisely and simultaneously the values of both members of particular pairs of physical variables (properties) that describe the behavior of the quantum system. The paired properties are canonically conjugate to each other in hamiltonian sense; e.g., position and velocity or, angular momentum and angular position, or the energy of the particle and the time at which it is measured. For the position and the velocity of an electron the equation is usually written as follows.

$$\Delta Q \times \Delta P \text{ is of the order of } h/2\pi$$

(where Q is the uncertainty about velocity and P is the uncertainty about position of an electron and h is Planck's constant, a definite number 6.63×10^{-27} erg. Sec.).

Discontinuity and superposition of states of existence also characterize quantum existence. The capability of nonlocal communication is another added feature. Here, *consciousness* is a major problem since it affects the process of observation as well as the process of measurement. Science here cannot be purely objective or positivistic. Observer's consciousness influences the epistemology.

Quantum mechanists are, however, silent on two points, which are on the boundary of the quantum world; quantum discontinuity and quantum void, the 'sink' and 'fountain-head' respectively for the quantum plane. This implies a very existence of another terrain, which remains deeper to the quantum world. I label it as the terrain of elementary phenomena (Plane III) of which 'death' (de-conditioning of properties) and a new `life' or `re-birth' (reconditioning of properties) are inescapable elements. The people are afraid of penetrating through this `discontinuity' because of profound degree of uncertainty attached to it. In this terrain, uncertainty is of a different kind, of a different ontological status. In the plane of quantum, uncertainty principle is applied on canonically conjugate conditioned properties of the observed. In the terrain of elementary phenomena, uncertainty for an observer-dependent reality is between conditioned properties and the very *existence* of the observed. Penetrating through discontinuity, while one explores a domain where existence itself has been put under question, there is all likelihood of a fusion of Q-*language* (quantum language) and M-*language* (metaphysical language). *Discontinuity is not merely a metaphysical issue. It is a scientific issue too*. A bridging language here is of utmost importance.

The *effects* of quantum phenomena are observed in the classical plane. To speak in the same vein, the effects of activity in this elementary plane, Plane III, are surfaced as *annihilation* (death), *complexity* (life), *chaos* (ego), *transformation* (love) and *creative emergence* (sex). In the language of depth psychology, this terrain is the terrain of Sex (Sigmund Freud), Ego (Adler), Love (Carl Jung), Life (Abraham Maslow) and Death (Sri Aurobindo in *Savitri*). As annihilation, complexity, chaos, transformation and creative emergence are hardly isolated event independent of each other, so these five phenomena too are. They have superposed characters, which are difficult to read in isolation. Unlike the quantum world, not matter nor energy but information is the currency of mechanics in this terrain (Plane III). Whether the phenomenology at its elementary level originates from further reaches of nature (Plane IV) is beyond the scope of present scientific/experimental study. Probably *this is the end of the domain of experiment and is the beginning of experiential revelation.* Unconditional consciousness, in this scheme, constitutes Plane V of the whole spectrum.

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