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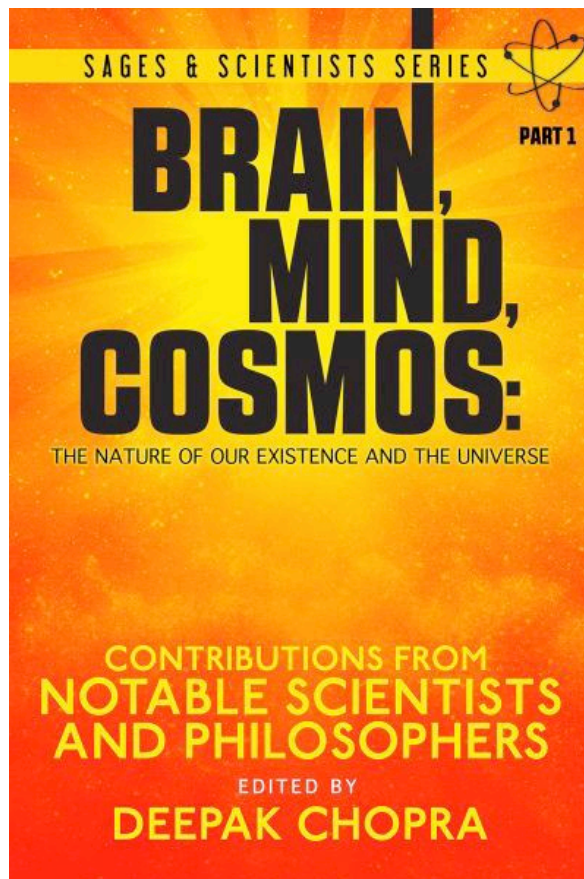
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COVER



CHAPTER 22: FROM QUANTUM TO CONSCIOUSNESS: A LONG WAY TO GO!

by A. K. Mukhopadhyay, M.D.

Consciousness is not generated in the brain, nor can the brain use it; it is consciousness that uses a living brain for its manifestation along a nested hierarchical cascade of mind, self, life-principle, information, and quantum states of matter.

Abstract: On the basis of a dogmatic assumption that there exists no nature beyond Planck’s scale, science seems to be suffocating, imprisoned within a self-created quantum nest. Therefore, various issues of frontier science are seen to be in philosophical conundrum, and consciousness is far from reach of the present science. The way out is to recognize the role of nonlocal players like mind, consciousness, and self while doing science and also their respective mechanics in nature. Having accepted this as a great **a s s u m p t i o n** to begin with, one can observe that a science of information can bridge the two titans: local science of Time, Space, Matter, and Energy and nonlocal science of Consciousness, Mind, Self and “Life” as life-principle. Perhaps the twenty-first century is for exploration and establishment of a science of information. Science of information is suggested to address the issues like ontogeny of information, its tour from deeper recesses of nature to the measurable scale of material nature, its structure and geometry, difference between inactive and active information, independent and conjugal dynamics of information, once generated, what is its density, and finally, its relationship with other local and nonlocal entities. Developing a science of information is necessary to fill the chasm observed between the human as scientist and the human as a spiritual being. It is also probable that, in the process, we could unlock a new source of energy, information-based energy, having potential to revolutionize the power structure of society.

Science has reached a crucial phase when a number of issues are on its plate and there is a lack of direction as to how they are related. Three problems of three great theories of physics, quantum gravity, genesis of space and time, dark matter and dark energy, etc., are on one side and on the other side are life as life-form or life-principle, and the issues of mind, consciousness, and self. Information is a confounding factor in every discipline of science. In this conundrum of issues, this paper has been written with an aim to establish a connection between consciousness and nature as observed within Planck’s scale with a specific objective to set the agenda for a science of information within the ambit of systems science. The argument exists that it would bring spirituality and mysticism in the scenario. If it so comes, we must be skillful enough to address the issue with logic and formulation accepted in scientific pursuit. In a paper like this, it has been envisaged, without which the growth of science remains perilously impaired, that there is a possible nonlocal science of consciousness, mind, self, and life-principle. While consciousness is being accepted as ground, albeit an active and participatory ground, mind, self and life-principle are the players operating on this ground. Information could be the bridging link between the two titans, local science of time, space, energy, and matter and nonlocal science of consciousness, mind, self, and life-principle (Fig. 1).

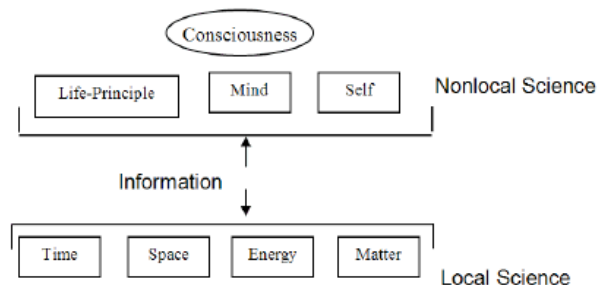


Fig.1 “The Whole” Nine Entities of Local and Nonlocal Science

Scientific exploration of this frontier terrain is certainly a strenuous job, and we are required to be patient. The expected timeframe for science to lay down the complete connection is perceived to be 200 years. The twenty-first century is for exploration and establishment of a science of information. The twenty-second century is for exploration and establishment of science of “life.” The next century will open the door for science of self and consciousness. The process also demands personal transformation of scientists in their lifestyle, attitude, and ethics. What is inside the depth of mind of a scientist can only come out as a fundamental (from the *fundus*, i.e., depth of mind) discovery out there! The development, therefore, would accompany an intertwined co-evolution of the human brain in general and, in particular, of those beings who are engaged in doing science. The process of “sciencing” demands fine-tuning of mind, intellect, and self to acquire evidence at the required level by sharpened cognition and observation.

Science in its present phase has been working under the umbrella of three inviolable constants, which excludes from the territory of science a number of events and happenings in nature. Einstein's velocity of light constant excludes any possibility of *simultaneity*, Planck's constant excludes the possibility of any *continuity*, and entropy barrier excludes the possibility of *identity* of events. The science has also been dealing with local players like matter, energy, space, time, and information at a local level. A time spectrum extends between birth and death of any event. Einstein's fundamental field equation, which connects space, time, and matter, predicts "birth," but cannot fathom "death" of the universe. No physical law, hitherto known, questions or predicts what is beyond the beginning and end of time. The velocity of light and the horizon of the black hole limit the investigative arena of space. An investigative stretch of the matter/energy spectrum extends from absolute zero to predicted super force (Fig.2).

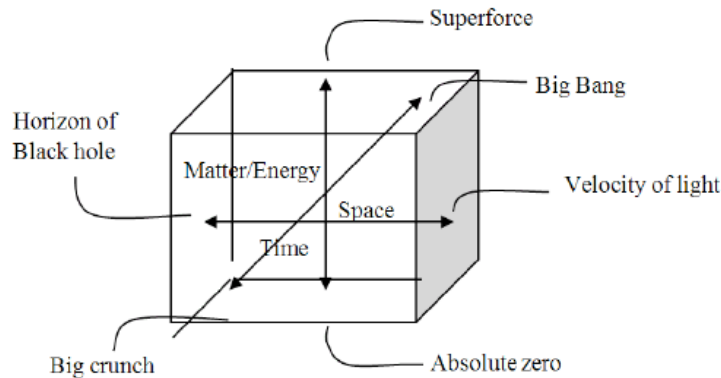


Fig. 2 Limiting Horizons of the Known Universe Heaston, R.J. (2003). *Journal of New Energy*, 7 (3), pp. 32-37

The box appears closed¹. Anything outside the box is not considered science at the present juncture of time. One may also wonder where "information" is in the scheme!

It is perceived that communication between inside and outside the box does happen. The human brain is certainly capable of this communication. There is, thus, a justification for exploration of such communication between the inside and the outside of the brain across the cortex, which is, unfortunately, considered a forbidden boundary for neuroscience. The issue is, does this communication happen through consciousness stuff? Or does it work through some "interstitial particle," or through some kind of subtle energy?² Does it occur through "pilot waves," which move with a velocity faster than light? Is it like communication between electron and magnon (magnetic monopole)? Or, as in William Tiller's Simulator model,³ is it conducted through deltron particle? Also, I wonder, could it be all-pervading neutrinos? In order to strengthen mainstream science, we may agree to call this unit of communication information. While information is the *lingua franca* of today's science and any new information is considered to be the language of consciousness, it is still not clear what is the *locus standi* of information as an independent variable or invariant in science? The issue merits serious attention and addressing by methods of science.

BURDEN OF INFORMATION COMPELS TO SET THE AGENDA FOR A SCIENCE OF INFORMATION

The burden of information is enormous. It is said, although not uncontested, that the information in all words spoken and written from the beginning of time to 1999 has been estimated to be 5 exabytes (one exabyte is one million terabytes, 10^{18} byte). In the year 2002 alone, another 5 exabytes of information were produced, and by 2022, we will be producing 5 exabytes every ten minutes.⁴ In addition to this quantitative burden, consider the qualitative and intentional aspect of those bits and q-bits! We are drowned in the ocean of information without knowing what it is! Looking at this enormous burden, we in science are to address questions like what is information? Does it have any specific structure? Where and when does it originate from? Is it always in active state? What are the differences between inactive and active information? What characterizes information dynamics? How is it related to other nonlocal entities and local entities? All these issues are going to set the agenda for the science of information.

REVIEW OF LITERATURE

There are ample evidences from literature where one can find that a number of scientists and philosophers have tried to assign a unique position to "information" in science. For David Bohm,⁵ information is in the implicate order. Bohm distinguishes mind and matter on the basis of implicate and explicate order. His quantum potential includes information. Espagnat⁶ describes the ultimate reality, which is independent of, and posterior to mind and matter. Why could information not also be traced to *unus mundus* of Carl Jung? We must recall Wheeler's persuasive argument^{7,8} to learn about the world by looking at it in terms of information. Susan Oyama⁹ (2000) in the book *Ontogeny of Information*, says, "Information is a prime commodity, and when it is used in biological theorizing it is granted a kind of atomistic autonomy as it moves from place to place, is gathered, stored, imprinted, and translated." Hawking and Penrose¹⁰ recognize the subtlety of information from the fact that information can pass through a black hole, while light cannot. In Penrose's OR, which is "out there," subtlety of information is so obvious.¹¹ David Chalmers¹² has pointed out that information is more fundamental to both mind and matter. Very recently, Paul Davies¹³ commented in *The Guardian*, "Life's origin may only be explained through a study of its unique management of information.... Our work suggests that the answer will come from taking information seriously as a physical agency, with its own dynamics and causal relationships existing alongside those of the matter that embodies it."

*Science*¹⁴ in its 125th anniversary issue, 1st July 2005, raised several unanswered issues and questions, one of which is, “Do deeper principles underlie quantum uncertainty and nonlocality?” Nobel physicist Tony Legget,¹⁵ in 1986 commented, “Quantum Mechanics is the complete and ultimate truth about physical universe ... I am inclined to believe that at some point between the atom and the human brain, it (Q.M.) not only breaks down, but must break down.” Also read his statement¹⁶ in 2005, “...the linear formalism of standard quantum mechanics may break down at some stage between the level of the atom and that of human consciousness.” Look at his consistency of thought and statements over the span of twenty years. Penrose¹⁷ has suggested that quantum superposition remains as long as the difference in space-time manifold, entailed by the different mass configuration, is maintained below a threshold value. Beyond this threshold, there is no quantum mechanics but some other nonlinear dynamics. Jeffrey Bub¹⁸ argues, “quantum mechanics is fundamentally a theory about the representation and manipulation of information, not a theory about the mechanics of nonclassical waves or particles. The notion of quantum information is to be understood as a new physical primitive—just as, following Einstein’s special theory of relativity, a field is no longer regarded as the physical manifestation of vibrations in a mechanical medium, but recognized as new physical primitive in its own right.” Prigogine¹⁹ has suggested that there are some irreversible dynamics underlying quantum theory. Another Nobel physicist, Gerard Hooft,²⁰ observes determinism beneath quantum mechanics. Brukner and Zeilinger²¹ see quantum physics as a science of information. Also, examine the multi-revolutionary theory of Michael Lockwood, Colin McGinn, and Roger Penrose as analyzed by Robert Van Gullick.²² Before one can solve the mind-matter problem, one revolution is expected and necessary on the matter side, another revolution on the mind side, followed by a third evolution that will connect the two. To the author, quantum mechanics is the Mount Everest of material science, and no further height is there to scale, except the mission of exploration of information.

It is also interesting to look at the New Testament: “In the beginning was the Word, and the Word was with God, and the Word was God.” One hears a similar echo from the Kabbalah paradigm. Our neuro-linguistic friends might certify that here *word* means information. In *Mimamsa*, one out of six philosophical schools prevalent in Vedic *Darshan*, it has been said that the matter has come out of information {*Padartha* = *Pada* (word) + *Artha* (matter)}. In the last century, Swami Vivekananda said, “I am a Voice without form.” Information is prior to “form”!

Primacy of information in conscious experience has been brought out by Bernard Baars as “the Theatre of Consciousness, the workspace of the Mind.”²³ In 2008, when G. Tononi published,²⁴ “consciousness as integrated information,” the present author published a paper in *Frontier Perspectives*²⁵ titled, “A Radical View of Information: On its Nature and Science.” Also, I refer to my two post-CERN 2012 papers titled, “From God Particle to Consciousness”²⁶ and “Information Holograph: The Structure, the Source and its Operation.”²⁷ In all three papers, I have elaborated on different aspects of possibility of information as an independent entity, which are to be taken into account for developing a science of information.

BIRD’S EYE VIEW OF THE “BIG PICTURE” LOCATING INFORMATION IN SYSTEMS SCIENCE

If we start with nature, which follows Newtonian mechanics as nest-I, there extends nature underneath this macroscopic world, which is the terrain of nature where “abstract quantum physical description of nature” is humanly possible and which is also measurable within Planck’s scale. We may call it nature’s nest-II. Nature does not end, vanish, or disappear there. Deeper to this, there is a nest subtler than microscopic quantum world, which might be called nest-III or sub-quantum nest of nature. No end here either! Deeper to this nest-III, there is the domain of Mother Nature (nature’s nest-IV), which is the domain of feminine consort of consciousness, which could also be described as the kinetic pole, mobile facet, or executive front of consciousness and which, in fact, is the source of the rest of nature as we see in nests III, II, and I. This might also be called sub-sub-quantum nest. Deeper still remains the nest (nest-V) of unconditional consciousness. This forms a Pentaune (Five in One) model of nature-consciousness, the systems science of the whole, where every discipline of science can fit in (Fig.3). *The Millennium Bridge*²⁸ is an elaboration of this model.

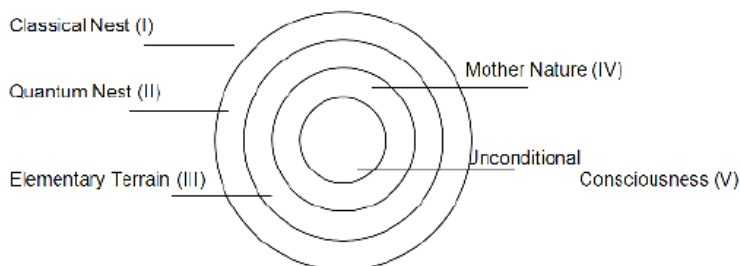


Fig. 3 Nested aArrangement of Nature-Consciousness

From one single point (cf., pointillism) extends creations of consciousness in a spiral fashion as *natura naturans* (creative nature, Mother Nature: nest-IV) which is responsible for created nature (*natura naturata*, nests I and II). In between *natura naturans* (creative nature) and *natura naturata* (created nature), there is *natura transformans* (nest-III, nature under transformation), establishing in either way a connection between the two. It is an indivisible extension of the spiral of consciousness, although when viewed from the side, it looks like having five consecutive planes or nests (Fig.4). Each one of the five nests could be expanded almost to Infinity. Five such indissoluble divisions of One could be described as Pentaune. The descriptive word “Pentaune” means the indissoluble unity of the

five in one. What look like partitions in this model are, in fact, integral divisions of an Indivisible Whole. In other words, we may also call these nests “layers” in the matrix of Matter and Consciousness.

There is no room for anything “supernatural” in this model. This nesting arrangement of nature-consciousness does not require explanation by the method of “reduction” or “emergence.” There is also no need of “collapse” of any individual nest in favor of the other. The hierarchy described is a nested hierarchy, which is different from a linear vertical or a pyramidal hierarchy. In a bottom-up approach, one encounters a tangled hierarchy between nest-IV and nest-V, where it becomes difficult to say which one is ontologically more primal than the other!

Consciousness in nest-III of nature is consciousness as it *seems* (phenomenal) while in nest-IV, consciousness is as consciousness *does* (causal). *Seeming* consciousness remains incomplete excluding the *causal* consciousness. Causal consciousness remains incomplete if we ignore unconditional *consciousness-as-such* of nest-V.

In the context of *matter-mind-consciousness* spectrum, the nest of Mother Nature (nest-IV) occupies the gulf between mind and consciousness, and the gulf between mind and matter is occupied by the phenomena in nest-III.

IS THERE ANY OTHER SIMILAR MODEL?

If not exactly the same, the proposed model has many similarities with the *Pancha Kosha* model described in *Taittiriya Upanishad*, where one gets in description of the reality of the human body, from outside inwards, constituted by *Annamay Kosha*, *Pranamay Kosha*, *Manomay Kosha*, *Vijnanamay Kosha* and *Anandamay Kosha*. Although the Pentaune model presented here is originally applicable in description of nature-consciousness, it could also be applied for the description of the human conscious experience.

This Pentaune model may also be an example of complete explication of what David Bohm described as implicate order.²⁹

Scientists have been envisaging nature beyond the realm of quantum scale. The presumptive evidence for connection between elementary terrain (sub-quantum nest) and the *nature* of consciousness (sub-sub-quantum nest) comes from experiments on artificial life and genetic algorithm, which raises our expectation that there must be a “programmer,” a prior information manifold, the “brain” of nature, which is responsible for the program executed by the genome. Michael Levin³⁰ considers that this kind of evidence could be used to build a bridge between creationist and evolutionist. There is a recent paper³¹ with the suggestion that even the Planck’s constant is not an absolute invariant. It could be a cosmological variable, which increased with cosmic time, and this variability might be the root cause of cosmic red shift!

That *brain-like structure and process* do exist in nature has come from recent a suggestion by Tegmark³² that, at the level IV multiverse of mathematical structures, there are self-aware substructures (SAS), which play the role of observer in their specific universe. We, however, envisage real conscious structure and process in the nest-IV and the mind in nest-III of nature. Nest-III of nature is “sub-quantum” and sub-microscopic outside Planck’s scale of space (10^{-32} cm) and time (10^{-43} sec).

PLAYERS IN DIFFERENT NESTS

Every nest of nature has specific players within. There is standard operative procedure (SOP) for the dynamics of every player. There is also SOP for their interactive dynamics. The players of nest-I and nest-II are known to science. In nest-III, players are self and mind. Information is the currency of mechanics here. Inside nest-IV, players are self and life-principle. The currency is “causal currency.” Nest five is the domain of unconditional consciousness. In nests II and I, information remains as a hitherto unrecognized player. So also are self, mind, life-principle, and consciousness.

LOCATING INFORMATION IN THE SYSTEMS SCIENCE THE ASSUMPTION TO BEGIN WITH

Accepting the subtlety of information and its distinctness from energy, the research agenda can be build up on an assumption that information has an existence independent of matter and energy and space-time, which is, in nature, beyond Planck’s scale. In this system and subsystems of nature exhibiting a hierarchy of nesting, the independent position occupied by information is in nest-III. Information, therefore, has a place of its own, completely independent of matter/energy and of space-time in the systems science, in the sub-quantum nest. However, nothing, and so also the information, is ever independent of its source. The source of information is in the sub-sub-quantum nest of nature as we are going to discuss in detail as we walk the talk in this paper.

INTER-NEST PHASE TRANSITIONS

The mechanism of transition from nest-II to nest-I with emergence of classicality and transition from nest-I to nest-II are yet to be explained. The transition from nest-II to nest-III is most likely to occur through quantum discontinuity often described as the “*sink*” of the quantum domain of nature. The transition from nest-III to nest-II, on the other hand, is suggested to be through quantum void, often described as the “*fountain-head*” of quantum domain. From nest-III to nest-IV, the phase transition has been described to happen through an outside-in phenomenon with surrender of properties, while the nest-IV to nest-III transition happens through an inside-out phenomenon. The nest-IV is the beginning of graded unconditionality. The transition from nest-IV to nest-V can only occur by complete,

unconditional, and active surrender of self to absolute unconditionality of nest-V. Phase transition down from nest-V to nest-I is an operation of how “free will” of consciousness could run on the Newtonian wheel (Fig.4).

MAJOR CONTRIBUTION OF EACH NEST IN EVENT MANAGEMENT

Nature is not merely governed by rules; event generation and their management also dominate nature. Nest-V is the nest for “Will.” The purpose of the event is formulated and scrutinized for manifestation within nest-IV. The operational mechanics is chalked out within nest III to pass it in the microscopic world of nest-II as an event (quantum event). The event transits to macroscopic world (nest-I) as a classically sensible event. What sensory organs can recognize are only “form” (space-time) and “movement” (effect of energy).

The events within nests II and I have *phenomenological roots* within nest-III, *axiological roots* within nest-IV, and *ontologic roots* in nest-V. The real event manager is within nest-V asserting through its kinetic facet (Mother Nature) in nest-IV for a defined purpose to order “happening,” “not-happening,” or a “set of happening” in nest-III according to the rules of the game laid down in nest-IV. In nests II and I of nature, the sensory apparatus senses the events, for example, formation of space, time, and any movement (energy). While classical and quantum nests are concerned with observable events, nest-III is concerned with “meaning” and “context” of the event, nest-IV deals with “purpose” of the event, and nest-V deals with “will” for the event. Executive transformation of “will” into action involves operations at all nests of nature-consciousness. The connection is nothing but an interconnected network in the operational mechanics of an individual nest.

FREE WILL ON THE WHEEL

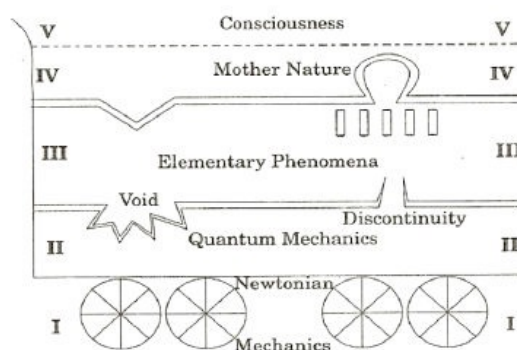


Fig. 4 (On Lateral View, Nature’s Nests Appear as Levels)

THE BASIS OF DIVIDING THE NATURE-CONSCIOUSNESS SPECTRUM INTO FIVE NESTS

I have articulated this basis, which is fairly intelligible, in my 2008 paper in *Frontier Perspectives*. To quote, “This has been done on the basis of perceived uncertainty in describing observer dependent reality. Uncertainty limits our cognitive ability and imposes epistemological constraints in observation. That nature observes a stratified nested hierarchy in organization could be logically constructed on the basis of an extended uncertainty principle. Perceived uncertainty in describing simultaneously the paired properties, which are canonically conjugate to each other in Hamiltonian sense (e.g., position and velocity or angular momentum and angular position, energy of the particle and the time at which it is measured) is the characteristic of description of quantum nature (nest-II). In classical nature (nest-I) no such uncertainty is encountered. The nature subtler than what is measured in Planck’s scale could be reached by penetrating through ‘quantum discontinuity’ or ‘quantum void’. This is sub-quantum nest of nature (nest-III) that deals with existential phenomena that are most ‘elementary’ in character. Within this nest the perceived uncertainty in describing observer-dependent reality is between *properties* of the object and its very *existence*! The ability to distinguish properties from the existence reflects a sharper cognitive function. With further sharpening of cognitive faculty this principle of uncertainty could be extended into a sub-sub-quantum nature (nest-IV) where in description of observer-dependent reality uncertainty is encountered between *existence* and *non-existence*. Properties are totally irrelevant here. In the deepest recess of nature (nest-V) perceived uncertainty in observer-dependent reality is seen to play between *non-existence* and a *new existence*! Unconditioned consciousness as a perceived reality *either* does not exist *or* it exists as a reality that is new, novel and hither-to-unknown. It appears in a new ‘form’, every time one tries to observe and describe it. Four levels of perceived uncertainty, therefore, determine four different depths of nature beyond the classical nature. Uncertainty is measurable and, therefore, could be an issue for science.”

One could hear a similarly echoing argument from Jan-Markus Schwindt:³³

In quantum mechanics, the “solid” atom has to be replaced by “wave functions” or abstract states in Hilbert spaces whose precise interpretation is still a matter of debate. But it is still a fact that the particle unambiguously “exists” (at least in one particle quantum mechanics, in a simple interpretation). The wave function just reflects the fact that it does not have a well-defined position. The situation gets worse in quantum field theory on Minkowski space. Now there can be, for instance, an overlap between a state in which a particle is somewhere and a state in which there is no particle at all. So, even the existence of a particle becomes a matter of tendencies and probabilities. Next, in quantum field theory on curved spacetime, there are situations in which a given state is seen by one observer as a vacuum (i.e., no particles), and by another observer as thermal mixtures of particles. This implies that the probability

for the presence of a particle is now also a matter of the observer's perspective. Finally, from a yet to be discovered theory of quantum gravity, one might expect even worse effects.

This division could also be explained on the basis of information characteristics. In the superficial nests (nests II and I), information is either on the scaffolding of matter/energy or is already deciphered as space-time form. The deepest recess of nature (nest-V) is devoid of any information. Unconditionality of this nest (nest-V) is independent of any information. Superficial to this unconditional zone is the "factory" and "store-house" of information (nest-IV). The entity, which conditions the rest of the nature, (i.e., information), originates from here and is stored as information manifolds. The pattern of arrangement of information in manifolds and the way of its unfolding determine the axiological aspect of consciousness-generated phenomena. Following is the nest (nest-III) where information exhibits its own mechanics. Information is naked there and is not in scaffolding of matter or energy. In fact, matter or energy cannot exist there. The nature in nests III, II and I are conditioned by information. The nature of nest IV has been labeled as *Mother Nature*, mother since the origin of information, which is the primal and original conditioning element for nature, could be traced up to this nest, also mother because the rest of the natures in nests III, II and I originated from there.

PROBLEMS ENCOUNTERED IF WE ARE IN A HURRY

If we try to connect nest-II to nest-V directly, we face the Problem of Measurement. If we try to connect nest-III to nest-V directly, we face the Problem of Infinity. If we try to connect nest-I to nest-V directly, we face the Problem of Singularity.

THE PENTAUNE MODEL IN SCIENCE-SPIRITUALITY DIALOGUE

Within this model, it is not difficult to understand why the science is objective, public, dealing with outer world (nests I and II), independent of morality and ethics! Spirituality, on the other hand, is subjective, private, dealing with inner world (nests IV and V), and is the source of all ethics. It cannot be pursued without moral precepts. Nests II and I are tangible; IV and V are intangible. What connects tangible and intangible is nest III of nature. Nests II and I are "out there." Nests IV and V are "within." However, "within" and "without" are connected in nest-III. While in nests II and I, one stands apart from what one is exploring, in nests IV and V, there is serious engagement between the explorer and the explored. This partnership really begins when one is within nest-III of nature.

Perseverance is the key to conquer nests II and I, but for nest-IV, one requires *devotion*. To have access control over nest-V, what is essential is *love*. What connects devotion to perseverance is *faith*, the treasure of nest-III. Growing pole of faith is devotion, which is also described as melting love.

Standing within nest III, one could see the *difference* between science and spirituality³⁴ on various parameters. The assumption (philosophy and metaphysics), the type of questions one asks, the research hypothesis, the experiment, the way one takes care of variables and therefore decides on control, the method of analyzing the result, the conclusion, and finally, the goal are different in nests II and I and nests IV and V. In the domain of science, on the basis of some metaphysical assumption, one asks questions about working modes of nature, formulates the hypothesis, makes the prediction, designs the experiment, analyzes the results statistically. The conclusion in science is probabilistic. The goal is to understand the laws and mechanics of nature. In spirituality, the goal is self-realization, self-actualization, and self-fulfillment. To start with, one has an assumption of existence of the Divine. One begins with existential questions. The hypothesis in spirituality is based on the identity of self and the Divinity. The experiment is on the subject by the subject himself. Analysis is based on experiential data, and the result is accomplishment of certitude. Public verification of the conclusion is not easily or always possible. If one is keen to verify it, one has to put oneself as a subject and repeat the experiment on him.

SOME CLARIFICATION BEFORE WALKING THE TALK:

We have painted the big picture above. Science, however, cannot grow by flying in the sky with an airplane! Science grows by walking on the ground or, to be more honest, by crawling. Therefore, in this stage, we are concerned with nest-II nest-III transitions and events and dynamics in nest-III. However, before we walk the talk, the following *five clarifications* seem essential:

A. IDENTIFYING THE UNPRODUCTIVE APPROACH

When we see that deeper to quantum nest, there are two more nests of nature guarding the nest of unconditional consciousness, any attempt to link "quantum" with consciousness without taking into account the role of information, mind, self, and life-principle will certainly be considered a hasty approach. Therefore, at the outset, we must recognize such approaches, which could be unproductive and may prove futile to pursue with.

Many scientists are also engaged in how to connect relativity and quantum mechanics and have been working on the theory of quantum gravity. The maximum mass that relativity allows to be squeezed into a space without space's collapsing into a black hole is identical to the minimum mass that quantum mechanics allows to be accommodated in that tiny space of 10^{-32} cm. The possibility of a theory of quantum gravity begins here.

Research on quantum gravity is beset with a combination of formal, experimental and conceptual difficulties. It is inevitable that the quest for a quantum theory of gravity will continue—whether for reasons of necessity or not—and it seems that the resolution of the problem will require an equivalent combination of formal, experimental, and conceptual expertise. Given

this, and given the central position quantum gravity research occupies in theoretical physics, it makes good sense for philosophers of physics (and general philosophers of science) to do their best to acquaint themselves with the central details of the problem of quantum gravity and the main approaches that are seeking to crack the problem. Beyond this, quantum gravity research has the potential to invigorate several standard areas of philosophical inquiry, including our standard notions of theory construction, selection and justification, the nature of space, time, matter, and causality” (Millard Wohl³⁵).

Wohl has articulated the situation with sanity. However, how long one can retain the sanity while pursuing the elusive theory of quantum gravity is an open question!

This is a personal view of the present author that this approach to find out the quantum gravity in reality by combining the events of nests-I and -II of nature is not an appropriate one. It would be waste of time and energy and therefore useless to pursue with. Nest-I and nest-II can never be combined to have a super-nest overarching the both. The reason is clear. The source of relativity and quantum physics is not common. The road ahead, therefore, is to address the issue, *unde venis quantum physics* (Q.M., where do you come from?)!

B. THE EXISTING EFFORT OF BOTTOM-UP CONNECTION BETWEEN NEST-II AND NEST-III

How q-bits become bits is not known. Similarly, how information transits into q-bits is also not known. David Bohm conceptualized this connection in the implicate order as Quantum Potential. Wang and Ma conceptualize³⁶ a second-order covariant derivatives of scalar potential field. Nuclear physicist Millard Wohl thinks that “From a physics point of view, we have Bohm’s Quantum Potential (=Guiding Consciousness) at the Quantum Level and Wang/Ma’s Scalar Potential and Scalar Potential Energy Density representing, I feel, a Guiding Consciousness at the Cosmological Level. I’m not really sure the two can be equated in a meaningful way, or we might already have a working theory of Quantum Gravity, which we do not. The best hope for a wedding of the two aspects of the Guiding Consciousness may be in Garrett Lisi’s E8 Lie Group (up to 248 dimensions) formulation in what he purports to represent a Theory of Everything—still much work to be done in this area. Recent work of Samuel Ting (MIT) et al., which measures positron tracks with the Alpha Magnetic Spectrometer (AMS) affixed to the Space Station, indicates a substantial likelihood of Dark Matter Particles in space.” In Millard’s opinion, “This could open an experimental back door to a better understanding of the Wang/Ma work, which equates a negative Scalar Potential Energy Density with Dark Matter.”³⁷

The dimension is relevant for us since it decides on the context of information. The same information in different dimensions generates different context for its operation. Dimension is determined by space-time geometry. Information from a pre-space, pre-temporal domain creates the context for its own operation.

In none of these views, however, can one find any role of mind and self in establishing any connection with consciousness.

[Sudarshan](#) and Misra of the University of Texas in 1977 coined the term quantum Zeno-effect in their analysis of the situation in which an [unstable particle](#), if observed continuously, will never decay.³⁸ “One can ‘freeze’ the evolution of the system by measuring it frequently enough in its (known) initial state. The meaning of the term has since expanded, leading to a more technical definition in which time evolution can be suppressed not only by measurement: the quantum Zeno effect is the suppression of unitary time evolution caused by [quantum decoherence](#) in quantum systems provided by a variety of sources: measurement, interactions with the environment, stochastic fields, and so on.”³⁹ As an outgrowth of study of the quantum Zeno effect, it has become clear that applying a series of sufficiently strong and fast pulses with appropriate symmetry can also *decouple* a system from its decohering environment.”⁴⁰ Henry Stapp⁴¹ in his book *Mindful Universe*, claims that “the mind holds the brain in a superposition of states using the quantum Zeno effect.” He advances that this phenomenon is the principal method by which the conscious can effect change, a possible solution to the [mind-body dichotomy](#). Stapp and co-workers do not claim finality of their theory.⁴²

Although bringing mind and act of observation in the scenario seems to be a correct approach, the above articulation is far from a clear-cut connection, territory, or a map.

C. THE PHENOMENA OF EMERGENCE AND EMBODIMENT

None of self, mind, life-principle, information or consciousness is an “emergent entity,” neither in principle, nor in observer-dependent reality. They are there as independent but well-connected agencies, which operate beyond Planck’s scale of nature according to their specific laid-down dynamics (with specific SOP—Standard Operative Procedure) for independent and interconnected operational mechanics. The origin or genesis of five entities is another story. Consciousness is the ground without any background. Unlike other ground, it is an active participating ground. It was there. It is there. It will be there. Self is hologram of consciousness and is informationally conditioned and is customized to work within the constraint of a system. Life-form is the hologram of Consciousness-Mother Nature (C-M) while life-principle is said to be the daughter darling of C-M. Information originates following a principle of *similia similibus*. While information reduces uncertainty within the boundary of the system, information is generated out of uncertainty in relationship between different nonlocal members outside the boundary of the system.

The material world within Planck’s scale evolves and evolves with emergence of property, which carries the matter in a state readied for embodiment of information/self/life/mind/consciousness as described in the following paragraphs.

1. Penrose and Hameroff's orchestrated objective reality (Orch OR) speaks of emergence of property from neuronal somato-dendritic microtubules that connect with consciousness.⁴³ Microtubules are not ordinary matter. Microtubules are matter in quantum state within a milieu of "life," (i.e., in connection with life-principle!). Therefore, it would not be fair enough to jump so hastily from microtubules to consciousness. First, it would be better to replace their word "consciousness" with the word "information." The emergence of designated orchestrated property of matter at quantum state within a milieu of "life" is meant for a permissive sanction to allow the dynamics of information to be played within the matter, here, microtubules. Orchestrated objective reality makes an example of embodiment of active trifoliate information (see below) in quantum state of matter.

2. Embodiment of "self" in a highly organized state of matter results in the formation of a self-organizing system.

3. Life-form could be considered the result of embodiment of life-principle within an emergent "living state" of matter from an ordinary state of matter. In such state, the matter has evolved to a phase where it can handle trifoliate active information. *Life-principle embodied in the living state of matter in a specifically informed situation of space-time framework develops into life-form.*⁴⁴ The relationship is not that of simple addition since life-form *minus* life-principle does not make the living state.

4. There is a very important issue on the neural mechanism of conscious experience. The cerebellum, in spite of having extensive synapses and microtubules within its neurons, does not make us conscious of those experiences, but the cerebral cortex (along with thalamus) does. What is so special about the dynamics of cerebral cortex to make the brain able to participate in generation of conscious experience (not of consciousness)? To be very brief, seven characteristics make the cerebral cortex special; (i) high neuronal density, (ii) high density of supporting cells, particularly astrocytes, (iii) remarkable synaptic density, the connectivity required for orchestrated ensembling (iv) the polarity of cortical neuronal membrane toward consciousness accounting for consciousness-*philia* of neurons (v) serenity of genes of cortical neurons accounting for stability of microtubule and, therefore, the property of neuron-*philia* of consciousness, (vi) exorbitantly high information density per unit mass of living tissue, and finally in the author's opinion (vii) the ability of a large number of cortical neurons to keep the system brain informationally open to supracortical domain.

There are two competing hypotheses in this regard in neuroscience of consciousness; the microtubular dynamics of several millions of individual *living* neurons within the cortex (Hameroff and Penrose) and the extensive synaptic connectivity and circuitry of the cortical neurons and astrocytes (the view which is considered to be mainstream).

Extensive recent research has shown that the microtubules process a far greater number of bits or q-bits of information than what is processed by synaptic neuronal network. The frequency of decoherence is also less in the microtubule as compared to synaptic version. The capacity of memory storage is also high with microtubular machinery. Cortical neuronal somato-dendritic microtubules are considered special since cortical neurons rarely get involved in cell division. Cell division requires microtubular reorganization for production of mitotic spindle from which the neuronal cells are completely free.

Taking only quantity of information into account, it can be stated that microtubules are excellent candidates for information organization within an individual living neuron or, at best, in a group of neurons with microtubular connection through gap junction. On the other hand, neural network and synaptic activity (neuro-neuronal and neuro-astrocytic) are excellent for informational connectivity amongst a far larger group of neurons involving the live cortex globally even across the hemispheres.

In the comparison of two competitive hypotheses, not only the quantity of information but the *quality* of information has a role as well. The quality of information could not be traced within the quantum nest of nature. Perception of quality by self is the result of a dynamics within pre-space, pre-time, sub-quantum nest-III. None of the theories is forthright on this issue.

The debate between membrane and microtubule theory often skews on the primacy of one over the other in production of conscious experience. Membrane theory stresses on the cell membrane and particularly on the synapses, most of which are tripartite (one astrocyte and two neurons) in the cortex. Microtubule theory stresses on within-the-cell generation of conscious experience. The debate ignores the basic fact that both membrane and microtubules are integral components of a *living* cell. (I remind the reader of the role of "life" in genesis of conscious experience, here, neuron). Cell membrane *anchors* microtubules as part of cytoskeleton. Even the gap junctions through which microtubules of different neurons communicate are cell-membrane junction! What is called anchorage in classical mechanical sense is actually the site meant for "gating" of information in quantum sense. Information gating to and from microtubules within the organization of a cell is a function of this membrane anchorage. What is considered gating phenomenon in nest-II is nothing but the result of operation of intelligence, a joint activity of self and mind in nest-III; all, in turn, are under control of life-principle operating from nest-IV. It is the life-principle, which does not allow any gating of information inside the cell, which could be detrimental to it. When this life-principle ceases to operate, the anchorage, and so the gating mechanism, fails. As a consequence, information doldrums within the cell take the cell toward a downhill course.

Since 1987, I have been pursuing⁴⁵ a third alternative way of explaining this genesis of conscious experience. In this refreshing alternative, there are cell membrane and dendrites with all their contents like microtubules but no specifics for any synapse. The non-synaptic *free* spines of the *apical dendrites* that project toward outer superficial layers of cortex from the *pyramidal* cortical neurons (the pyramidal neurons are the most prominent neurons of the cortex) along with the interconnected meshwork/mating they form over the most superficial layers of cerebral cortex is suggested to create a *catchment area* and form *receptor* for information bombarding on it.⁴⁶

Therefore, an overarching hypothesis can be offered assuming that *conscious experience* cannot occur without involvement of *consciousness-as-such*, stating, thereby, that for a conscious experience to happen, the global informational state of the cerebral cortex has to open up to the nature-consciousness through nest-III. The operation points toward a truly inside-outside, cortico-supracortical dynamic. Opening of the cerebral cortex to nature-consciousness outside the cerebral cortex of the brain (Fig.5) is itself a dynamic and can account for the mechanism ranging from simple awareness to higher spiritual experiences. *This is the dynamic that converts the polyolithic brain into a monolithic entity for unitary experience.* A supracortico-cortical dynamic satisfies the most important requirement of a conscious system, which has to remain informationally open across the system boundary, which, in this case, is cerebral cortex.

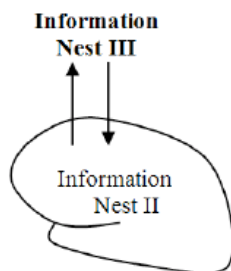


Fig. 5

Finally, there is a need to re-examine the concept of “minimal brain for identifiable and reportable consciousness,” which was originally proposed by Wilder Penfield and Herbert Jasper⁴⁷ on the basis of their vast experience in neurosurgery in epileptic patients and is recently elaborated on by Bjorn Merker.⁴⁸ Sperry was aware of this phenomenon that the cerebral hemispheres and their commissural systems are not essential for identifiable and reportable consciousness. Even the neural substrate of episodic memory (hippocampus) and affective memory (amygdala) are not essential for the same. However, the upper brain-stem region (Penfield)/ the mesodiencephalic regions (Merker) have been found absolutely essential for such conscious states. How this anatomically subcortical structure exercises power over, or overrides, the cerebral cortical control in a super-ordinate or supracortical way⁴⁹ is yet to be known. A possible supracortical location of command for volitional assertion of motor function has recently been considered by S. Perrey.⁵⁰ Anatomically subcortical system, but functionally playing supracortical role has also been postulated in biology of shared experience and language development in infants.⁵¹ Ramirez,⁵² in the context of naturalized epistemology for autonomous system, uses the concept of supracortical (p. 241) at sublingual level forming the *basis* of configuring ontological categorization. Do “inside-outside dynamics” through changed geometry of information also play a role in all such situations? Consciousness posited at an overarching supra-system (here, supracortical) seems absolutely essential to integrate multiple and diverse information-processing sub-structures within the system (brain) in absence of which these processes would work independently and divisively often even with multiple positioning of “self” and is against the purpose of the system.

Supracortico-cortical and cortico-supracortical, inside-out and outside-in dynamics, can uphold all three competing hypotheses highlighting the relevance of the cerebral cortex in varieties of conscious experience and also for the mechanism for anatomically subcortical structures functioning in a supracortical way. These dynamics point toward a special structural geometry of information where information has not only a measurable/quantifiable facet (nest-II), but information also has a facet of content (operating in nest-III) and another facet of intent (operating in nest-IV).

Whether any event-related information merits reaching the level of consciousness is suggested to be determined by three factors working at their respective threshold levels: *concern*-threshold of self, *intent*-threshold of relevant information and *perfection*-threshold of the event as per the decision (will) of consciousness (Fig.6). When the intent of information satisfies the concern of self for a decided degree of perfection, event-related information is granted autonomy. Therefore, even the very complicated reflex, like pupillary reflex, event like binocular rivalry and McGurk effect (*hearing lips and seeing voices*)⁵³ are left autonomous and are executed below the conscious level! In no such situation does information have to be brought to the conscious level to be examined by self for its intent.

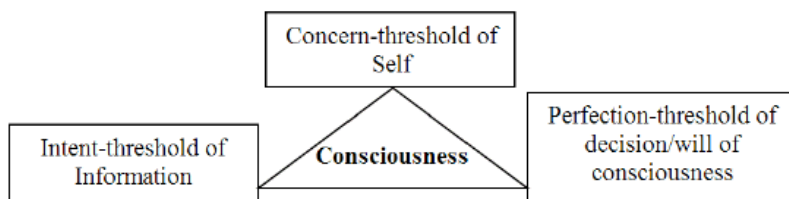


Fig. 6

Emergence from below and embodiment from above combine these dynamics.

5. What is described as “Grace” of God in the spiritual jargon could only be realized by such brain, which has been elevated to the

State of Grace, and that itself is an extraordinary emergent state of the brain from an ordinary mundane state. And this extraordinary emergent state of the brain may be the result of *absolute obedience* to the *Source*, when in information processing and responsiveness of the brain, there is absent hemispherical bias (left and right brain), little hierarchical asynchrony within the triune-brain (reptilian, mammalian, and human brain) with perfect cosmo-cortical (outside-inside of the system) harmony. This harmony at the highest level percolates down to all other bodily systems and subsystems.

D. ALTERNATE INTERPRETATION OF WAVE FUNCTION COLLAPSE THEORY

Observation of any quantum phenomenon is said to collapse its inherent innumerable possibilities into intended actuality. Therefore, most scientists interpret the event as transition from nest-II to nest-I.

Let us “dilate” this “moment” of so-called collapse by dilating the process of observation. Engagement of observer’s “self” (remember “self” is categorically identical with consciousness), and not of mind, in the process of observation is the cause of the so-called collapse. In fact, during the process of observation, initially the self is bewildered in the midst of endless uncertainties and possibilities. “The more alternatives there are, the more uncertain the outcome. More the uncertainty, greater is the potential for information transmission.”⁵⁴ Quantitatively, “information is directly proportional to the number of probable states, and inversely proportional to the number of the realized states.”⁵⁵ With a view to finding a meaning out of such a situation, “self” calls on the mind. In other words, “self” identifies myriads of information and, itself being incapable of handling information, looks for assistance from its instrument mind. Mind is capable of handling information and, according to its own evolutionary status, could conceive the intended *information*, only one at a time, to make that *information* inside-out. The “form” inside *information* comes out as a result of inside-out phenomenon. The energy is released, which is responsible for movement. This brings the “form” and “movement” in the sensible domain. It may be emphasized again that what our sense organs can perceive are only form and movement.

Now it could be said that (i) there was no collapse of wave function in any way. Wave remained as it was. (ii) “Self” observed a myriad of probabilities (information), called for assistance from mind. (iii) If anything had happened, it was not a transition from nest-II to nest-I but a leap from nest-II to nest-III with identification of the central player there, namely, information. It is to remind the readers that self and consciousness are categorically identical. Mind and information each is of different category. (iv) As information functionally reduced uncertainty and brought determinism, one might easily mistake that the act of observation by the self was the cause of collapse of probabilities into actuality of classical world. (v) Following this, the mind conceived only one piece of information at a time (i.e. in sequence) according to its own *evolutionary status* (cf., “*Social Mirrors*” of Whitehead⁵⁶) and delivered “form,” which was *information’s* inside. “Form” and its movement were captured by sense and self then could relate the events with its senses.

Therefore, the science of *qualia* could be explored in the sub-quantum nest of nature. The subjective *qualia* is generated out of *choice of self* and *capabilities of mind* from an infinite repertoire of possibilities (cf., Tononi’s theory: Consciousness as information integration capability).

E. THE ISSUE OF CERTAINTY AND UNCERTAINTY

Between the deterministic classical world and the certitude of consciousness, there exists a vast zone of uncertainty. This uncertainty could be graded. Uncertainty, to begin with, is that of the quantum domain (nest-II). Besides this, there are two more zones of uncertainty (Fig. 7), which are qualitatively different and quantitatively of different grade, in fact, of higher grade: uncertainty at the level of the black hole (nest-II to III transition) and uncertainty at the horizon of the universe (nest-III to IV transition).

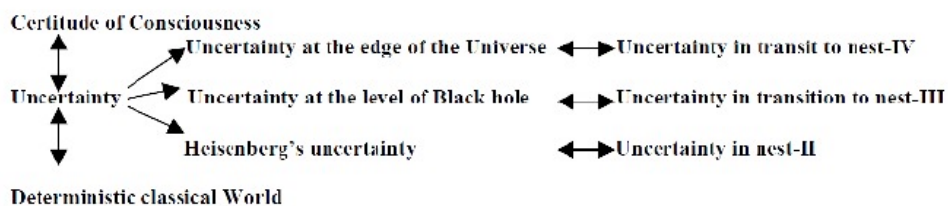


Fig. 7

Perception of symmetry and certainty go hand in hand. When our senses/mind/self could perceive the total symmetry of the observed, uncertainty perception is zeroed. It is during symmetry breaking and symmetry making that we perceive uncertainty. Therefore, both the processes of disorganization of space-time and reorganization of a new space-time initiate uncertainty perception. The physics of symmetry breaking and symmetry making could therefore be linked with perception of uncertainty in the brain. Information dynamics is for inter-conversion between uncertain world and certain world. Classical world of determinism can therefore be of two categories; classical world without involvement of any dynamics of information and classical world intertwined with dynamics of information. The same is true for quantum nest, too. Quantum world without information is truly an uncertain world. Quantum world intertwined with information dynamics produces quantum puzzles and quantum paradoxes.

The most primitive emotional response of a living creature is *fear*. If fear is a response, what is its causative stimulus? The stimulus could be that which working on senses/mind/self is responsible for production of sensory, extra-sensory, or non-sensory *perception* of

uncertainty respectively. It could be stated that the degree and complexity of this fear can be directly linked with the perceived degree and complexity of uncertainty. And, an input of *relevant* information surely reduces this perception, conception, and experience of uncertainty. It may also be suggested that the *perception, conception, and experience of uncertainty* by human beings and its eventual *alleviation by input of relevant information* could be tied to the computational, representational, and evolutionary capacity of human senses, mind, and self respectively.

Uncertainty management by the brain stimulates its own evolution. Stemming the tide of quantum uncertainty leads to development of quantum integration of the brain, stemming the tide of phenomenological uncertainty leads to development of its phenomenological integration, and stemming the tide of axiological uncertainty leads to development of axiological integration of the brain. When all existential uncertainties as one comes across in the *process of becoming* are stemmed up this way, evolutionary crisis has also been overcome. A new integration follows, and the said being evolves to a new ontological status.⁵⁷ This explains why co-evolution of the scientist's brain and the graded revelation from intangible to tangible domain of science are intertwined.

WALK THE TALK: SETTING THE AGENDA FOR THE SCIENCE OF INFORMATION

Let us now walk the talk. This walk is based on imagination, intuition, and speculation not detached from primed and fine-tuned logical sense supported by evidence, which may appear circumstantial but nevertheless compelling. I get support for use of my intuitive and imaginative faculty from what Einstein used to say: "I believe in intuition and inspiration. Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. It is strictly speaking, a real factor in scientific research."

WHAT IS INFORMATION?

Information is the unit of communication. Like consciousness-as-such, information-as-such is nonlocal. Unlike consciousness, information could be a subtle entity in phase; its location, content, and context are addressable. Unlike any other entity, information could be independent of energy and matter and of measurable space and time, so thereby can exist in a location-non-addressable, content-non-addressable, and context-non-addressable state.

Information is the antithesis of what is called chance. The dynamics of information is intertwined with that of uncertainty. According to Shannon, information is that which reduces uncertainty! However, at a perceptual level, a misinformation (which is an information, too) is capable of creating false uncertainty of severe degree and of various kinds, maybe temporarily!

Various dimensions of information quality have been discussed in a recent paper⁵⁸ published from an unexpected front of business school. According to the author of this paper, Relevance, Timeliness, Accessibility, Accuracy, Completeness, Coherence, Compatibility, Validity, presentation Format and Security are ten dimensions of information quality. It is the user of information who read, ("self") judges the value of information quality. Management of information quality by *self* is a continuous process on which depends the strategy of business consciousness conducts in this world. Information is not the end. Information is the means for the business of self (consciousness).

Accuracy of information depends on its ability to reflect the underlying reality. Completeness of information depends on how it can coherently hang on with others. No information is an island. So are knowledge and concepts. Mind processes information (sorting out, prioritization etc.) according to program set by self. Verification of information validity, information auditing, assessment of its relevance, timeliness, and completeness, etc., are primarily functions of self and not of mind. The format of presentation of information, (i.e., the structure [form] and the frame [of reference]) is an activity of self. Both logical security and disaster recovery planning is a function of intelligence, a combined effort of mind and self. Finally, coupling of information and information entanglement are functions of self.

DATA-INFORMATION-KNOWLEDGE-WISDOM HIERARCHY:

There is a well-studied hierarchy of Data-Information-Knowledge-Wisdom. This hierarchy satisfies both bottom-up and top-down analyses.

The "data" or the facts-sheet (nests I and II) crystallizes into a kind of information (nest-III) when it could convey some *meaning*. Meaningful data may be treated as information. There are five sources of information to the being; information from sensory apparatus, information directly acting on the mind (mind as inner sense organ), information directly acting on "self" (mainly phenomenal information), information mainly generated from life-experiences, and information originated from consciousness.

Information could be treated as "knowledge" when it can be used for a *purpose* without further deliberation on it. Knowledge is information for a specified purpose, maybe for a defined culture at a specified period of time. Knowledge is information that has acquired executive/causal properties (nest-IV). In this sense, knowledge is power.

Wisdom is super-crystallized knowledge (nests IV and V), which is valid across cultures and across the barrier of time (past, present, and future) and thereby possesses transforming power. Wisdom bears powerful information that is *contagious* because of the presence in the element of life-principle (nest-IV). Wisdom is also the essence of experience of life. Wisdom could change the real-life situation.

This stratification corresponds to hierarchy of Informative knowledge, Formative knowledge, and Transformative knowledge. Informative knowledge is loaded with meaningful information. Formative knowledge is value-added, (i.e., its purpose has been made clear, although may not be purposeful across culture or across the barrier of time). When the valued information has been lived in real-life situations, this acquires a transformative power and may be called wisdom, the application of which transcends culture and the barrier of time.

There exists an ontological gap between human wisdom and the cosmic/supracosmic wisdom (nest-V). This gap gradually diminishes as the brain-confined self-consciousness approaches the brain-independent *consciousness-as-such*. It is the ability of processing qualitatively different categories of information that distinguishes an object as matter or a computer, and another as alive and conscious. It is the difference in processing of different ontological categories of information in our brain that makes one a limbic being or cortical being and another person a supracortical being.

THE LANGUAGE AND INFORMATION

The language in any form, whether it is body language or symbol, mathematical equation or vernacular, mantra or slang, could be said a space-time construct by the mind out of information conceived by it. In spite of having incredible fecundity, only a specific state of mind could conceive a specific category of information. On the other hand, to read the correct information from an expressed linguistic gesture, an able mind is required. Therefore, the theory of mind is valid for any meaningful communication to occur. Information is capable of (i) covering up and camouflaging. It can (ii) distort and distract. Finally, (iii) information can guide. Information that guides toward self-realization is the *language* of consciousness. Information that distracts and distorts could be the *language* of life, and information that camouflages and shields could be the *language* of matter.

With this background, we will try to set the agenda for developing the science of information.

SETTING THE AGENDA FOR DEVELOPING A SCIENCE OF INFORMATION

The agenda for the science of information could be set up (the readers are requested to go through author's presentation at TSC-2013 in India⁵⁹) under the following headings: A. Characteristic properties of information B. Structure and geometry of information C. Tour of information D. Mechanics/Dynamics of information, E. Relationship or equation of information with other entities in the following manner.

A. CHARACTERISTIC PROPERTIES OF INFORMATION:

Information is different from quantum energy

1. In size, information, which is a subtle entity and an identity in phase, is smaller than that which can be measured in Planck's scale.
2. Information is categorically different from energy.
3. Information, unlike energy, is neither generated nor emitted as quantum, and therefore, its dynamics are different from quantum dynamics.

Information itself is not consciousness

1. Information itself is not consciousness. Like consciousness, information is also nonlocal and may be used as a noun as well as a verb. At the highest ontological level, information has been equated with consciousness (*Sabdham Brahman*). Also, "in the beginning there was word. The word was with God. And the word was God." Unconditional consciousness, however, is totally free and independent of information of any kind, of any category.
2. Information corrupts unconditionality of consciousness. Unconditionality of consciousness is apparently lost following "mix up" (mess up or sexing up) with information. Information is responsible for *fall* of unconditional consciousness into conditioned states. Consciousness gets different conditioned existence by input of information of a different category.
3. Nevertheless, the source of information could be found in the nature of consciousness, (i.e., *natura naturans*, or nature of all natures, Mother Nature). Consciousness conceals itself and denies itself, and by concealing its modus operandi, it advances its own operation ("*der list der-Vernunft*"—Hegel). Information generation by *nature* of consciousness is one of the mechanics of its self-concealment. It is the information network generated from the *nature* of consciousness that probably was described as "*maya*" (great illusion) in Acharya Sankar's philosophy. *Maya* and measurement share the same etymological root. Therefore, in course of individuation at the final stage of ascent of the being, *consciousness* thunders, "I am not information! I generate information."
4. A hierarchy of category of information could be proposed according to the depth of Mother Nature's nest involved in its genesis. (It needs another separate paper to address the issue of different category of information.)

5. Whether any event-related information merits reaching the level of consciousness, as already stated earlier, is determined by three factors working at their respective threshold level: *concern*-threshold of self, *intent*-threshold of relevant information, and *perfection*-threshold of the event as per the decision (will) of consciousness. When the intent of information satisfies the concern of self for a decided degree of perfection, information is granted autonomy. If not, information has to be brought to the conscious level, to be examined by self for its intent.

Information could be characterized by its Properties

1. Information has the ability of being simultaneously present anywhere and everywhere in the universe and outside the universe (a property of spatial nonlocality of infinite order), also present at any point and every point of time from before beginning of time through present time to endless continuity of time (a property of temporal nonlocality of eternal magnitude).
2. All information is present simultaneously, atemporally, at any given space and given time and in every space and time (a property of simultaneously being local and nonlocal).
3. In spite of being originally pre-spatial and pre-temporal, it remains in potential (waiting phase) for an opportune situation to become active for causal execution, creative emergence, and new creation.
4. Generation of information of this category requires “life,” life-form at observable nest of nature and life-principle in non-observable nest of nature. Information that has an existence independent of space-time energy matter cannot be generated from a non-living entity.
5. It is the mind or mind-like structure and processes in nature (e.g., quantum fields), which makes “form” inside the information out. Information creates form (space and time) by an inside-out phenomenon executed by mind in connection with consciousness, or by quantum fields, which could be considered as a messenger of Infinity.

B. CRACKING THE STRUCTURE AND GEOMETRY OF INFORMATION

Information is a structure and a process, noun and verb simultaneously. The clue lies in the geometry of information. “God geometrizes,” said Aristotle (read, consciousness geometrizes) and this geometrization is done probably through information.

Information Manifolds

To repeat, no information is an island. In the no-space, no-time domain of nature, information could not remain alone. Information remains as information manifolds especially in the deeper part of nest-III and superficial part of nest-IV, creating a specific pattern or “grouping” for functional recruitment. Here, a close relationship of information is observed with life-principle, consciousness, and its individualized unit, “self.” The pattern of arrangement of information in manifolds and the way of its unfolding determine the axiological aspect of consciousness-generated phenomena. Several categories of information could be recognized in manifolds.

Is Information Bipolar?

Information has been considered unique in the sense that it appears bipolar and has double aspects. It has an objective pole that is measurable and a subjective pole, which, when introduced into the system, the system can make some sense of it. In this sense, information occupies a unique position to bridge the domain of energy/quantum with the domain of mind/consciousness.

The notion that information has a subjective or mental pole and an objective or physical pole come from the various views expressed by the eminent philosophers, scientists, and philosophers of science. Why could the information not be the surface of “*causa sui*” of Spinoza, or even the conveyer of Leibniz’s “divine wisdom” that grants guarantee for a “pre-established harmony” connecting parallelism that runs between mind and matter? Why could the information not be central to the “central state” of double-faceted identity theory of Feigl?⁶⁰ Robert Jahn et al.,^{61, 62} in several of their papers, emphasize this double-faceted information.

Again, why could the information not be the basis of “unified point” of a view that Wigner⁶³ expected to maintain the symmetry between mental and physical phenomena? According to Ernst Cassirer,⁶⁴ information has a signal aspect and a symbol aspect. “...Signals and symbols belong to two different universes of discourse: a signal is a part of the physical world of being; a symbol is a part of human world of meaning. Signals are ‘operators;’ symbols are ‘designators.’”

Inactive Information

However, this bipolar flat structure of information, as suggested, could be its “inactive” form (Fig.8). In information manifolds, information could be flat and bipolar, too. The possibility of this two-dimensional bipolar model has been depicted in various shades in the philosophy of science as discussed in the above paragraph. However, the idea of bipolar information itself has remained “inactive,” non-utilizable for consciousness study or for study of mind, and therefore, has not cut much ice in doing frontier science.

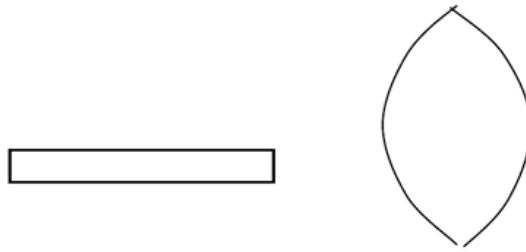


Fig. 8 Inactive Information in Information Manifolds and in Bipolar State

Activated Information

Activated information is not simply flat, two-dimensional bipolar structure! In a linear two-dimensional bipolar disposition, active information could have three domains; the intent domain constitutes the core component and is sandwiched between the measurable pole that alleviates a sense of uncertainty and the content pole, responsible for qualia of form and movement (Fig. 9).

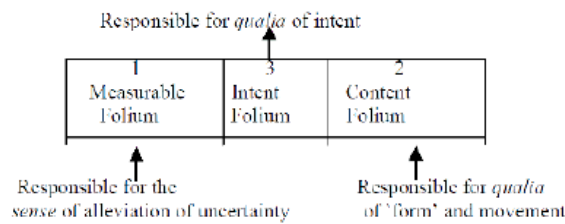


Fig. 9

The spindle-shaped, bipolar, three-dimensional information is also inactive. It becomes active when its wounded folia open up! The opened-up folia encompass all dimensions. (i) The measurable folium is related to reduction of uncertainty with functional transformation from probable states to actualized states. (ii) Another folium is with which mind/ mind-equivalent structure and process interacts. Through an inside-out phenomenon, this portion is phased out as space, time (form), and energy. (iii) The core component, the central folium, which is the "intent" of information, interacts with private facets of "self." Active information is like a trifoliate leaf (Fig. 10).

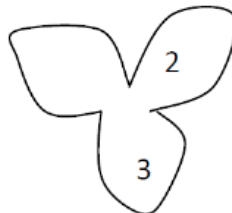


Fig. 10: Trifoliate Structure of Information

Measurable folium (1) interacts with matter, results in uncertainty reduction, and is important in material science. Content folium (2) interacts with mind, results in delivery of form and energy, and is relevant for psychological science. Intent folium (3) interacts with self, results in intentionality/ causality/ purpose, and is relevant in science for consciousness. Measurable folium is third person's domain, folium of content is of second person and folium of intent is of first person. Respectively, the folium that is measurable alleviates the sense of uncertainty; the folium working in pre-space, pre-temporal domain generates the *qualia* of "form" (space-time) and movement, and the folium operative in dimension of "self" is responsible for *qualia* of intent (see information below).

Three folia of Information: 1. Folium responsible for measurability

Interacts with: Matter/machine/ senses

Results in: Uncertainty reduction

Studied in the domain of: Material science

Privacy/ Sharing: Third Person's perspective

Effect on Psyche: Alleviates sense of uncertainty

Three folia of Information: 2. Folium responsible for content

Interacts with: Mind

Results in: Delivery of "form" and energy

Studied in the domain of: Psychological science
Privacy/ Sharing: Second Person's perspective
Effect on Psyche: Generates qualia of "form" and "movement"

Three folia of Information: 3. Folium responsible for intent

Interacts with: Self / consciousness

Results in: Intentionality / causality / purpose

Studied in the domain of: Science for consciousness

Privacy/ Sharing: First Person's perspective

Effect on Psyche: Generates qualia of intent

We are reminded of a Bael leaf, which is trifoliate and is offered as a devotional symbol at the feet of Lord *Shiva*, the supposed embodiment of consciousness.

ANOTHER ALTERNATIVE GEOMETRIC FORM OF INFORMATION

Still, there could be another alternative geometry of information! Information could be a monopole and may be considered to have a three-shell nested structure (Fig. 11) with a process of cascade like opening from outside inwards. Its outer shell works with energy fields and is responsible for reduction of uncertainty and, in the process, opens up its middle shell to interact with mind, which, during the act of inside-out phenomenon, produces *qualia* of movement and form and, in the process, unfurls the innermost shell's intent to consciousness resulting in conscious experience, the *qualia* of intent.

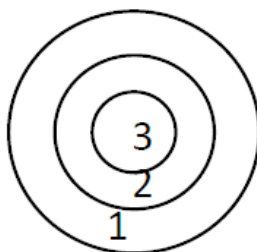


Fig. 11 (Nested Structure of Information)

WHAT ACTIVATES INACTIVE INFORMATION?

The question remains: what activates information? Following possibilities are suggested. (i) Spontaneous activation is possible but rare. (ii) Activations by quantum fields (and infinity/ mind), or (iii) activation by a specific state of self/consciousness, and (iv) activation by life-principle remain clear possibilities. (v) In a self-organizing system, activation probably could happen when the self is tossed into a life-and-death situation in the existential terrain.

C. TOUR OF INFORMATION

When did this information arrive into the genesis scenario of this universe? In science, one has developed the precise chronology on the pathway of events, namely the arrival of energy, quark, anti-quark, unitary quantum macrosystem (QMS), molecules, amino acid, protein, RNA and DNA, etc. For example, quarks had arrived⁶⁵ when the universe was greater than 10^{-15} meter in size, older than 10^{-12} seconds and had a temperature lower than 10^{15} Kelvin. However, there is no similar knowledge on information; when did it arrive in the scenario, whether in the course of generation of universe, prior to the genesis, or after the genesis? Was "information" there all along, from the beginning, as *ab initio*? Or has the original information undergone a process of metamorphosis in the course of the journey from the genesis of the universe to DNA molecule? Genes could be considered the biological means for long-term storage of information in a heritable way. The information at the genesis of universe and the information that DNA carries seem ontologically different! Content-non-addressable, context-non-addressable, and location-non-addressable properties of information prior to the genesis, after the genesis, and what we observe in *location*-addressable and *content*-addressable information stored in DNA show little similarity! Or could it be that information has remained all along unchanged qualitatively? Only the *context* of the original information has undergone a severe metamorphosis in the course of this long journey from *location*-non-addressable to *location*-addressable-situation! In front of us is an openly spread objective history sheet of almost everything without the picture of this life sketch of "information." The Oparin-Haldane-Miller paradigm presupposes a chance but with 100% probability for a specific combinatorial association necessary for origin of "life" in a given situation of infinite period of time. However, chance is the very antithesis of information.

Tour of Information from Nest-IV to Nest-I

The tour of information from nest-IV to nest-I is an interesting proposition. Information as nonlocal entity surfaces from nest-IV to nest-III (Fig. 12) of nature. In nest-III, information could assert its independent mechanics as described.

During the tour, there are four stages of information loss that may explain partly the different properties and the contents of same information in different nests. Information loss accounts for the following phenomena.

1. Breakage in the chain of causality

2. Breakage in continuity (In fact, there is an opinion proposed by Gerard 't Hooft that discrete character of quantum could be accounted for by information loss).

3. Anomalous or bizarre phenomena, which quantum scientists often try to ignore or avoid by a process known as "normalization."

As stated earlier, information begins to be associated with quantum particle/wave only at the points of (i) quantum discontinuity and (ii) quantum void. During transit of information from nest-III to nest-II of nature, when information enters within the Planck's scale, there is *information loss* (Fig.12). This information loss in the entry phase causes first break in causality chain.

Within the nest-II (Fig. 12), there is interpenetration of quantum mechanics and information mechanics. Many of the quantum paradoxes, in fact, could be the effects of intermingling of information with quantum particle. It is likely that the quantum particles, which could retain the "purpose"/intent inside information, are proved to be "able" ones. (cf: "be-able" of Bell). Other particles, which are incapable of carrying out the purpose/intent of information, are "changeable" during assembly interaction. This explains *second phase of information loss* and *second break in the causality chain* within the quantum nest of nature.

During quantum-classical transition, there is *further information loss* (information loss-III) resulting in *third break in the causality chain*. In this case, not only is there loss but also there is marked alteration of its intent and content. Again, normalization (re-normalization) is warranted at this transition. It is not wholly true that classical particles could not be vehicle of information. Through quantum travel, when information reaches the classical nest of nature, it shows a very high affinity for silicon/carbon-based compound (compare their position in the Periodic Table). Information remains stored in an organized way in inanimate silicon compound. In the living state of matter, it chooses carbon compound for the same purpose (See the story of Guru and his disciple.⁶⁶). An observer in the classical nest who is not able to comprehend the whole as nested picture of nature has access to only that information stored on classical particle irrespective of its causal past. It is also relevant to mention that nonlocal properties, which are often observed in a classical state of matter (as shown by William Tiller) are also because of this information!

In classical level, there are informational molecules (like DNA, RNA, enzymes, etc.) and non-informational molecules (like cholesterol, sugar, uric acid, albumin, etc.). How an innocuous non-informational molecule becomes an informational molecule with what kind of change in configuration in structure is a frontier of research in structural biology. At what time of degradation of the informational molecule information is freed is also an important issue.

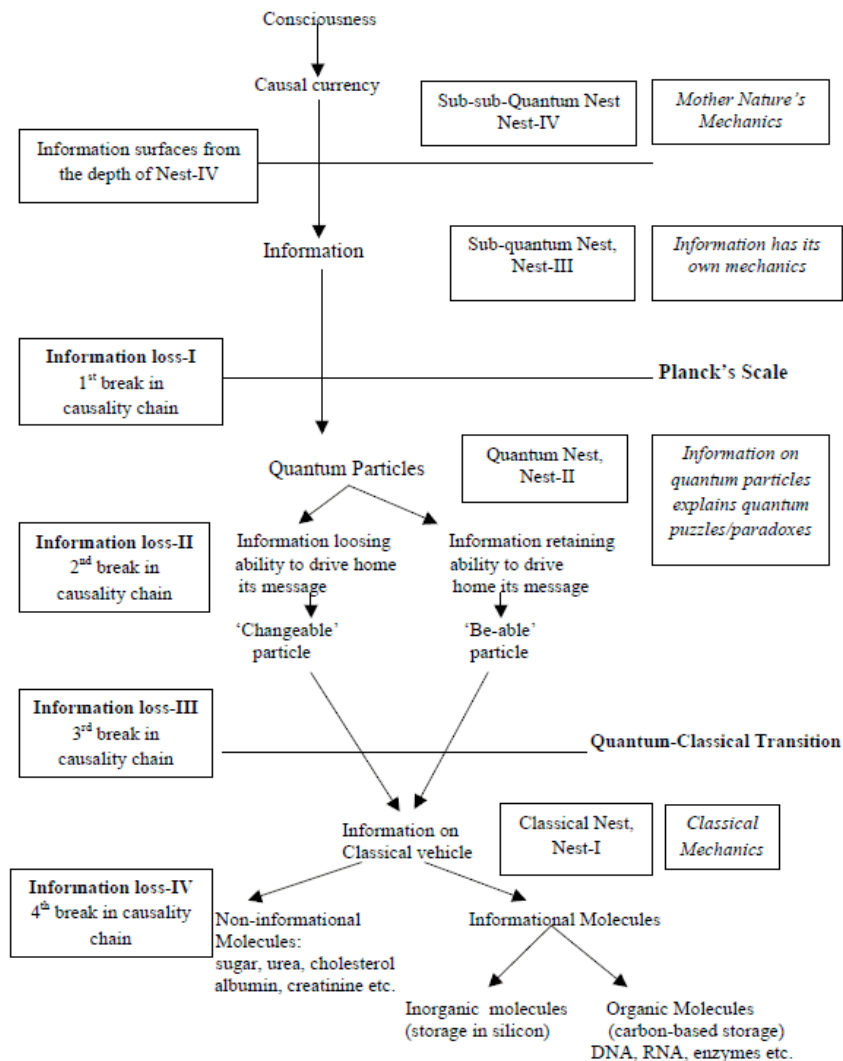


Fig. 12 A simplified Scheme of "Tour of Information" from Nest-IV to Nest-I

D. MECHANICS/DYNAMICS OF INFORMATION

Information Mechanics is different from quantum mechanics in the following way:

1. Information-as-such is neither generated nor emitted on any regular quantum basis. Therefore, quantum mechanics is not applicable for understanding of the dynamics of information.
2. The properties ascribed to quantum particle/wave, like discontinuity, superposition, nonlocality, and entanglement, could be explained on the basis of information dynamics.

Interaction of information begins with quantum particle/wave at the points of (i) quantum discontinuity and (ii) quantum void. In other words, the "sites" of association and dissociation between quantum object and information are suggested to be quantum "void" and quantum "discontinuity." The observed "discontinuity" in quantum state is, as such, not a property of quantum particle/wave. Discontinuity as a phenomenon becomes observable because of association and dissociation between free information and quantum state of matter with consequent information gain and information loss. Similarly, nonlocality might not be a property of quantum object per se. This is a property borrowed from information. The property is acquired out of conjugation with information. A non-informational quantum object cannot exhibit nonlocal behavior. When a classical object exhibits nonlocal behavior (William Tiller), it could be similarly explained by this informational presence. Similarly, "tangled hierarchy," another property as observed in quantum phase, is also because of entanglement with information. The higher the "quality" and ontological category of information ingrained in the entity, the higher becomes its hierarchy. Dissociation from that information pulls down its hierarchy.

3. Quantum mechanics and the mechanics of information intermingle. Quantum particles/waves are of two types. One group is having mass like atom, proton, electron, positron, etc. Those behave as if they are in relativistic paradigm. Their speed limit is the velocity of light. The other group is without mass, like photon, phonon, conformon, etc. These are not bound by relativistic paradigm and could exhibit superluminal velocity. In their *New Inertia Hypothesis*, Bernard Haisch, Alfonso Rueda, and Hal Puthoff^{67,68} suggest that mass is, in effect, an illusion, and the inertia could be traced to zero point field. There is a suggestion from their hypothesis that transition from

massless existence to that of having mass occurs across the zero-point energy. Information, however, is definitely massless and does not acquire mass across any barrier. Information could penetrate and use both types of quantum existence as stated above: quantum particle/wave without mass and with mass. It is likely that the quantum particles, which could “mess up”/ “mix up”/ “sex up” with information are proved to be “able” ones. (cf: “be-able” of Bell). Other particles, which are incapable of doing such, are “changeable” during assembly interaction. In this sense, we may call *quantum physics as physics of vehicle of information in the materialistic world within Planck’s scale of nature*. It is implied that information has other vehicles, too, beyond Planck’s scale.

Although quantum mechanics and information mechanics run independent of each other, they do intermingle when the quantum, massless or with mass, becomes “vehicle” of information. As a result, quantum particles show paradoxical behavior. These paradoxical quantum properties are, at present, being harnessed for advanced information technology like quantum computation, quantum cryptography, and quantum teleportation.⁶⁹ Although left independent to a large extent, information mechanics appears eventually to govern quantum mechanics.

The notion that information is at the very root of quantum mechanics springs from the result of the double-slit experiment itself. What is the relation between quantum interference and knowledge? Does quantum mechanics describe reality or information (knowledge)? Is QM directly more a science of knowledge and indirectly a science of reality? Brukner and Zeilinger try to answer those questions by considering “quantum physics as a science of information.” According to them, there are at least three different ways by which quantum mechanics is connected with the concept of information. In this sense, quantum physics may be said as physics of *vehicle of information in the materialistic world within Planck’s scale of nature*. Niels Bohr used to say, “There is no quantum world. There is only an abstract quantum physical description. It is wrong to think that the task of physics is to find out how Nature is. Physics concerns what we can say about Nature.”⁷⁰

The evidence of informational involvement in quantum mechanics comes from transactional interpretation of quantum mechanics (John G. Cramer⁷¹). Transactional interpretation is also supported by the experiment of Afshar (http://en.wikipedia.org/wiki/Afshar_experiment). In transactional interpretation, there are two waves, propositional wave (retarded wave, forward in time) and confirmation wave (advanced wave, backward in time). Two waves interact independent of an observer, and their “handshake” is responsible for actualization of the quantum event. The “handshake” of the waves is completed with exchange of information between the two.

Information mechanics therefore is interconnected with quantum and classical mechanics on the superficial side and mechanics of mind and consciousness on the deeper side.

4. Information is frequently seen to remain coupled. Information coupling is done by self (consciousness). The magnitude and extensiveness of coupling can be increased or reduced by self. Entanglement is another description, usually applied for quantum objects. Pure entanglement could be spontaneously initiated in nature. Involvement of self/consciousness is not mandatory for entanglement. Entanglement also differs functionally from coupling. Entanglement means binding without freedom. Coupling does not abhor freedom. Information can couple with an endless number of its kind and still can remain individually free. In contrast, a quantum particle/wave cannot be entangled with an endless number of quantum particle/waves. When “quantum” and information intermingle, information follows quantum rules. We might call it information entanglement. In such scenarios, following are the differences between information entanglement and quantum entanglement (Table 2).

Information Entanglement	Quantum Entanglement
Connects matter, mind, and self	Connects all in the nest of nature, which obeys laws of Quantum Mechanics
More elaborate and really multi-dimensional	Elaborate in material plane
More proximate to consciousness	Farther from consciousness, mind, or self
As it connects mind, matter, and self, so it can connect different objects, different subjects, and objects with the subjects.	As it connects only matter at quantum level, so it connects only objects. It cannot connect objects with subjects or different subjects.

Table 2

Not quantum entanglement but information entanglement seems conceptually more proximate to consciousness! However, both can happen independently. Information entanglement can initiate quantum entanglement at the material level to make it sensible. The table also explains why quantum entanglement cannot be a mechanism for the “whole”! I mean holographic communication is done through information entanglement and not through quantum entanglement. It is information entanglement that connects several minds, several “selves” and several universes. By disentangling this informational network, self comes face to face with unconditional *consciousness-as-such*.

Determinants of Observable Events from Information Mechanics

In science, dynamics usually means changes with evolution of time. If information is pre-temporal, how can one assess its dynamics? Although information could be location-non-addressable, context-non-addressable, and content-non-addressable, the observable events of its mechanics is determined by five factors, namely, its (i) location (ii) content (iii) context (iv) propensity and also (v) the system in which it has to work respectively in the following manners:

(i) By nature, information is nonlocal. It is present everywhere, every time. It is nonlocal spatially as well as temporally. Information could be “tapped” anywhere on this globe, outside the globe, anytime one wishes, provided one has the receiver or receptor organ for it. This should be true also for information in interstellar and intergalactic space, as well. Interestingly, information could be located on particulate consciousness like “self,” on massless waves, on quantum particles having mass, and also on the classical particles. The mechanics of information depends on its location.

(ii) The content of information is a difficult property to read. The instrument, which could do this, is mind or mind-equivalent structure and process in nature. The reader of information retrieves the content. The content determines its destiny, the outcome of information as form and movement.

(iii) Also, the mechanics of information depends on the context. In which dimension information has been working determines its context. From a pre-space, pre-time domain, information creates complex geometry of space-time regarded as dimension. The same information works within framework of different dimensions to create different contexts. Situational dimension determines the context of information. Neutrino-equivalent of consciousness is the most likely candidate that is responsible for changing and creating a new context.

(iv) Information is always in flux. Flux seems to be a milder word to describe the state or phase. The reality is much wilder. Active quagmire/whirlpool/quick sand/foamy mess in motion could be other descriptions. However, information could hold on its flux, as propensity. While the *meaning* could be read and interpreted from information content, the *purpose* of intent could probably be deduced from this propensity.

Propensity and flux indicate a kinetic property. The suggestion that information could propagate has been gathering storm amongst scientific community. Stefan Luding⁷² recently has proposed that information propagates as wave, in elastic mode and in diffuse mode. We suggest information can travel where there is no space, no time. It can travel breaking the barrier of space and time. It can travel through space and time. It can travel in the scaffolding of matter/energy. It can create new space, new time.

(v) The outcome of information mechanics is eventually restricted by the properties of its reader. There is dimension/context factor as well. To read any information, the requirement is either of a mind or a mind-like structure and process in a functionally conscious entity. However, there are “layers” of mind working as an organ of communication between different depths of consciousness.

Information Mechanics

Characteristics and Requirements

When information is believed to do so much of works, it seems obvious that information has a mechanics of its own. If it does not, how does it do it? Even to get any work done by any other, one requires a specific dynamics!

Information Mechanics: Characteristics

It is difficult to dissect out completely at this stage a mechanics that could be considered information’s own. It may be stated that information mechanics is a mechanics of waiting, a mechanics of opportunism, a mechanics of causation, a mechanics of creative emergence, and a mechanics of new creation.

Information mechanics is a *mechanics of waiting*. Information for its manifestation could wait for eons, for millions of years. Waiting is mostly attributed to inactivated form of information. Activation opens up its opportunistic property. Information mechanics is a *mechanics of opportunism*. Information is opportunistic. Therefore, imperatively, it is slow, patient, and intelligent. Its dynamics are nonlinear. (The process of evolution is also considered an opportunistic one; probably in the process of evolution intertwined is the information mechanics). Information, in opportune moments, asserts *causal execution*. Information works as the causal executive. The system undergoes changes according to input, output, or reassignment of information within. Informational link, therefore, represents the causal link. Information loss explains the break in the causality chain. Information mechanics is also responsible for what we observe as *creative emergence*. Information reorganizes space and time bringing a new meaning and a new context. Finally, *the mechanics of new creation* is inextricably connected with the mechanics by which a new “form,” a new space-time organization, comes out of information!

In the pre-space, pre-time domain, information waits patiently and intelligently to get carried on the vehicle of a “quantum” and looks forward to getting accepted in a receptive system where it can perform causal execution, or can bring about creative emergence. The most creative function of information is displayed when it takes the opportunity to impregnate a prepared and receptive mind, or mind-like structure and process in nature. This results in delivery of new space, new time, and the information-based intrinsic energy of quietude.

Information Mechanics: Requirements

For the five different aspects of mechanics described above, conditions and requirements would be different. In the mechanics of waiting, which mostly happen in inactivated form, there is no requirement or involvement of human mind or mind-like structure and process in nature. In the mechanics of opportunism, information is causally connected with consciousness. Mind is not necessary here, either. Mechanics of causal execution could be achieved when there is “receptivity” of the system where information is allowed to work and execute causality. For executing creative emergence, human mind, or mind-like structure and process in nature, seem essential. Finally, in the mechanics of new creation, both mind and consciousness are essential at the interface of nest-IV/III of nature.

Information Mechanics Characteristics	Information Mechanics Conditions and Requirements
1. Mechanics of waiting (information in inactive form)	Mind or mind-like structure and process in nature is not required
2. Mechanics of opportunism	Consciousness is essential. It is conscious opportunism
3. Mechanics of causal execution	Requires receptivity of the system in which information is to work and execute
4. Mechanics of creative emergence	Requires human mind or mind-like structure and process in nature
5. Mechanics of new creation	Requires both mind and consciousness (or nest-IV/III interface of nature)

Table 3

Concluding Remarks on Information Mechanics

Classical mechanics, quantum mechanics, information mechanics, and causal mechanics are mechanics in their own rights, independent but interconnected, and are ontologically governed by the mechanics of consciousness. Let us conclude that this is the agenda for the twenty-first century’s science. This agenda is not merely scientific but artistic and humanistic as well. It is not less spiritual, either!

E. RELATIONSHIP OR EQUATION OF INFORMATION WITH OTHER ENTITIES

In hard-core science, the relationship between entities is expressed by means of equation. So far, we have expressed information in scientific equations in terms of probability, which originally started from Shannon. *No symbol has been used so far for information per se in any scientific equation.* Let us admit that there are situations that are better described by a relationship rather than by an equation. In the wooly, foamy, whirling, quagmire-like, extremely soft part of nature, what equation could be built up between entities that move or remain as identities in phase? Relationship is a better terminology in describing such relationship. The analogy from common-sense experience might be a better description of such relationship than a strict mathematical equation.

1. Information-self Relationship

Regarding origin of self, there are two views; first, self emerges from brain-based consciousness, and the second, self is informationally *conditioned* consciousness customized to act as the operator of the system following embodiment. Self has free access to a) different states of consciousness (wakefulness, dreamy sleep, and dreamless sleep), b) different levels of being-consciousness (e.g., brain-stem consciousness, limbic consciousness, cortical consciousness and supracortical consciousness) and c) three developmental lines of consciousness (cognitive, psychomotor, and affective) and d) five nests of nature-consciousness. The self has also the ability to identify with any of those states, levels, lines, or nests and, therefore, to create a specific self-identity with specific need and purpose. Self, genes, and memes have a common currency for their business transaction, and that is information. Further exploration of this area could unveil hidden aspects of information mechanics.

2. Gene-information Relationship

The issue of primacy of information over genes opens up a strong debate amongst geneticists, philosophers, and information scientists. According to mainstream science, information travels from DNA to RNA to protein. However, genes neither generate information, nor can they use information. More likely, it is information that uses genes as a means to achieve its end. There are several evidences to support the hypothesis. Principle of redundancy, not-a-teleological evolution, exchange of information by genes from outside, jumping of genes (gene fluidics) can change the grammar of language/information in the genes, and there are many dogma-busters, too, like reverse transcriptase, catalytic RNAs, and prion protein, which hint at primacy of information over genes. There are also the environmental and epigenetic factors influencing inheritance. *Epigenetics encompasses the study of heritable changes in gene expression that occurs without any change in DNA sequence.* DNA-methylation and histone-acetylation are two important mechanisms in epigenetics. The readers are referred to the experiment of Waterland and Jirtle,⁷³ who supplemented a group of obese yellow pregnant agouti mice with methyl-group rich food-supplement in contrast to another group of similar mice not having this food supplement. The litters born out of the former were lean brown mice while the litters out of the latter were yellow and fat.

Could we consider the process of evolution as an error correction? “Error” in this context would probably be the event of *fall* from unconditionality of original *consciousness-as-such* to informationally conditioned states. Interestingly, the nature of genetic code is an *error-correcting, digital-coding system.* The digital-coding system itself could be complex, and the error-correcting, digital-coding system is much more complex. This is rare in physical systems but is so obvious in biological systems!

Further, the proportion of A-T pairs in DNA sequences in higher organisms is much greater as compared to the number of G-C pairs. G-C pairs are thermodynamically favored; A-T pairs are not! An admixture of relatively stable G-C pairs and relatively unstable A-T pairs makes genomes most suitable as an information-processing device.⁷⁴ Hameroff has raised a question, is DNA a quantum computer?⁷⁵

Even Barbara McClintock—while commenting on genetic reassortment in mitosis and meiosis— finds a kind of *sensitivity* within a cell. She uses the words sense and sensitivity thrice in the following lines, just falling short of calling it a “psyche” of genes:

The conclusion seems inescapable that cells are able to sense the presence in their nuclei of ruptured ends of chromosomes and then to activate a mechanism that will bring together and then unite these ends, one with another. And this will occur, regardless of the initial distance in a telophase nucleus that separated the ruptured ends.

The ability of a cell to sense these broken ends, to direct them to each other, and then to unite them so that the union of the two DNA strands is correctly oriented, is a particularly revealing example of the sensitivity of the cells to all that is going on within them.

Genome in a living cell is aware of all the processes that are going on within the cell.⁷⁶

The real choreographer within the genes is the *intelligence*, as suggested by Deepak Chopra, in *Ageless Body, Timeless Mind.*⁷⁷ The present author assigns intelligence to interactive self and mind.

3. Meme-information Relationship

Richard Dawkins introduced the concept of meme as unit of cultural transmission as follows:

The new soup is the soup of human culture. We need a name for the new replicator, a noun which conveys the idea of a unit of cultural transmission, or a unit of imitation. “Mimeme” comes from a suitable Greek root, but I want a monosyllable that sounds a bit like “gene.” I hope my classicist friends will forgive me if I abbreviate mimeme to meme. If it is any consolation, it could alternatively be thought of as being related to “memory,” or to the French word meme. It should be pronounced to rhyme with cream.^{78,79}

The core composition of meme is information with its content and intent. And the restructuring of memes can be done only when one adds or deletes information from meme or alters quality of information.

4. Life-Information Relationship

It is not clear how organization of life differs from self-organization. Is self-organization an sb-set of organization of “life”? How a living organism generates information and organizes information? Why is development of consciousness seen only in living organisms?

If we define life, heretically, as a process for perfecting the universe’s ability to accumulate and preserve information about itself, it may be the case that language represents the universe’s best weapon against its own entropic heat death. The snag is if information accumulation is basically a net *transfer* of entropy outside the system, this will ultimately fail if the universe is a closed system. Unless, of course, the universe is simply the least probable of many co-existing parallel universes...and its redundant grammar is the laws of physics themselves.” —Steve Mizrach⁸⁰

5. Information-Space-time Relationship

Information has no other final destiny but to break into space and time. To put it in a reverse way, all space and time are generated from information.

Look at the word information—its main part is “form” with prefix “in” and suffix “ation.” In Latin, information is a noun, in Greek information is a verb. To put form into process is information (Fig.13).

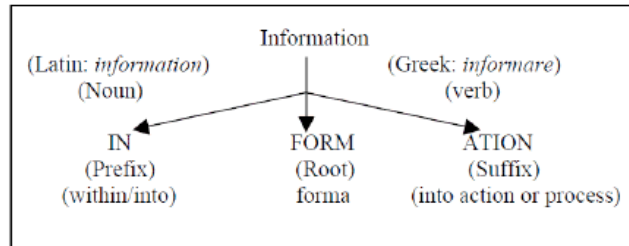


Fig. 13: Information Puts “Form” into Process

What can make information’s inside out? Or how can one split information?

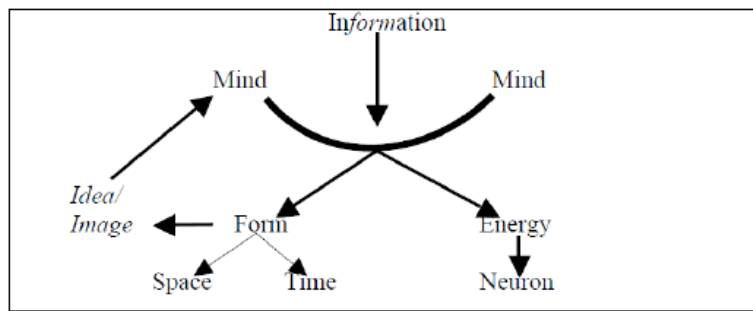


Fig. 14: Information Split: the Basis of Psychosomatic Connection

It is done by mind! Mind conceives information and delivers “form” (i.e., space-time) and energy (Fig. 14). What sense organs can understand and deal with are form and movement. Mind breaks non-sensible information into sensible components. Space and time create form, while energy initiates movement. What else could make information’s inside out? One is mind and the second is quantum fields that could be considered as the messengers of infinity. This information-split could be the basis of psychosomatic connection (Fig.14). “Form” moves within the mind as image/idea, and the energy is consumed by neurons. In nature, it has been happening through operation of quantum fields, which are in connection with the Infinity.

Look at the Trinity Point, the meeting point of information, Infinity and quantum fields—the bedroom of nature (Fig.15). Also look at the labor room of nature where space-time and energy are born for sensory perception.

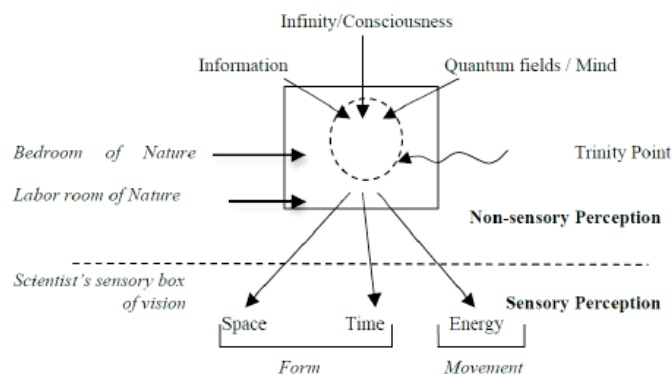


Fig.15

The labor room and bedroom of nature are beyond sensory perception and may be described under the category of non-sensory perception.

How does one describe this relationship in any equation? To state simply, information could be described as father, mind as mother, while space, time and information-based energy are their three children!

The present author feels that information splitting by mind has been regularly happening within the brain, and what is happening inside the brain can be externalized in the near future with discovery of an information-splitting machine probably in the same way the discovery and development of the computer had happened as an externalized version of many functions of mind. Here exists a great potential for a material revolution from this tapping of *information-based energy* with innovation of new technology (see author's papers on information, 2008, 2012).

6. Consciousness-information Relationship

Ontogeny of information leads us to "*sabdam brahaman*" or to "*Word is God*." Here, any *mantra* that is usually considered as a symbol of God could be considered as information on the Divine. However, unconditional consciousness (nest-V) is beyond the reach of any information! Information is generated in nature's nest-IV and is suggested to be created on the principle of *Similia Similibus*. The uncertainty in relation between different components of nonlocal entities is the cause of genesis of information. Within the boundary of the system (nests I and II), information reduces uncertainty. Outside the boundary of the system (nest-IV), uncertainty is the root cause of information generation.

ROLE OF INFORMATION IN INDIVIDUATION

At the concluding end of this paper, I'd like to draw attention to the work of Maurice Merleau-Ponty, *The structure of behavior*,⁸¹ where he describes the contribution of matter, life, and mind in the process of individuation. According to him, each of the three "participates unequally," "represents different degree of integration" to "constitute a hierarchy in which individuality is progressively achieved." Individuation requires appropriate handling of information by the individual. In the Indian spiritual text, the *Bhagavad Gita*, this individuation has been described on the basis of three *gunas*, namely *Tamas*, *Rajas*, and *Swatta* respectively. In the present work, we have considered values of information that work on matter, life, and mind. As said earlier, information can (i) cover up and camouflage, can (ii) distort and distract, and finally is capable of (iii) guiding. Information that guides toward self-realization is the *language* of consciousness. Information that distracts and distorts could be the *language* of life and information that camouflages and shields could be the *language* of matter. This could be easily correlated with three *gunas*: *satwa*, *raja*, *tama* respectively. Behavioral characteristics of three *gunas* are crisply described in the *Bhagavad Gita*. Human beings are an unequal mixture of three *gunas* with different degrees of integration. According to their respective dominance, one or the other kind of individuality becomes preeminent. The evolutionary status of the being is determined by his ability to handle difficult situations studded with different categories of information! According to Merleau Ponty, "The more effectively the organism can withdraw from and exercises control of its immersion in the milieu, the more it triumphs over immediacy and achieves individuality." Behavior, as Merleau Ponty also points out, may be said a situational response, which depends on the final outcome of the specific skill of handling three kinds of information or on the basis of three *gunas*.

CONCLUDING REMARKS

If the present science is to extend beyond the measurable quantum nest of nature and to *accommodate consciousness* within its realm, then the first step is to concede that there could be a science of information. A number of other assumptions and deductions, and research hypotheses, then logically follow. The time has come when information needs to be looked at as an independent agency connecting the physical and non-physical realm. The twenty-first century's mandate and the agenda for science seem to be in this direction.

On the other hand, the first step toward *explaining conscious experience* is to understand "life." Only the activity within a living brain could give rise to a plethora of conscious experience in humans. A dead brain with all its wiring and microtubules is incapable of having any conscious experience! As an all-pervading entity, consciousness might be there or is there in the non-living object, however, an inanimate entity cannot have (or can not evidentially have by any behavioral expression) conscious experience! A plant without a "brain" can have conscious experience (maybe because of microtubular activity and presence of "self"), but it must remain alive to have it. The science of "life" to establish itself might take another hundred years!

This timeframe, as set, is, however, for public consumption. There are people around us who could contract these two centuries into two years, or two months, or two days or even two seconds to bring unconditional consciousness into their behavioral platform.

With this vision, this paper has drawn both a "big picture" for science and the map of advancement of local science into nonlocal realm. There are a few disconnects in the model presented here, which would be likely to disappear if we practice a science of information and science of "life" rigorously. Ontological, axiological, phenomenological, and epistemological roots of information and consciousness are intertwined. In a bottom-up approach, to go into the domain of consciousness, one has to pick up the thread from the relevant information.

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Levels of Being Consciousness	Levels of Integration	Neural infrastructure
Supracortical Autonomy	Integration of the Being	Development of the <i>brain</i> of a brain
Supracortical Godhead	Axiological integration of the brain; Integration of the brain to become conducive of Mother Nature's mechanics.	
Supracortical Being	Phenomenological integration of the brain	
Transitional Being	Quantum integration of the brain	Brain starts behaving as a monolith, as a macro-quantum object
Cortical Being Limbic Being Brainstem Being	Classical integration of the brain	Classical Brain

Each and every level of integration of the being as mentioned above could be characterized by respective behavioral parameters. The clinical test for assessing this integrity is not too difficult to develop.

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