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A Radical view of Information
On its nature and science

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Abstract

This paper focuses on a possible fundamental nature and character of information. It develops arguments on the primacy of information in the context of its relationship with space, time and energy, self, memes and genes. For investigating these relationships seven tentative postulates have been made which merit further deliberation. Information-split phenomenon may be the connection between science confined to locality and science of nonlocal domain.

The Background

If one browses through internet, using key phrase like 'what is information', one comes across numerous websites, which work with definition of information limited to message, signal, code, data, facts, text, instruction, lore, symbols, concept, construct, knowledge, wisdom etc. This paper takes the view that almost all of these are nothing but space time construct of information and the information itself is something else!

It may be said that the message in this paper is nothing but a moving space time construct of information author's mind has been processing. During the act of reading the article, this moving space time construct stimulates reader's mind to catch and fix the same information. If there is concurrence, the paper becomes understandable. If otherwise, the paper is rejected as `not sensible'.

The notion that information is inextricably related to mind could be traced to the time of Greek Philosophers Socrates, Plato and Aristotle. This could also be noted across the religious sects particularly in their respective mystical traditions; the oldest document of such scriptures is Upanishad.

The science of information, however, in its present form is positivistic and accommodates only the measurable component of information. The notion was formalised since Claude E. Shannon's classic paper, *A Mathematical theory of communication* appeared in *Bell system Technical Journal* in 1948. The Information Theory is based on probability theory and statistics. Quantification of information is used in entropy, in random variable and the amount of information in common between two random variables. One of the most important and direct application of information theory is coding theory. The same measurable component of information is now being harnessed in quantum information theory.

The hard core physicists, information scientists and mathematicians, although, do not acknowledge any trace of subjectivity in science, the fact that information has a subjective and an objective/measurable facets, has been acknowledged recently in the works of scientists like David Bohm (in his ontological interpretation of quantum mechanics)[1], Robert Jahn[2,3], Basel Hiley[4] and cognitive scientists like Bernard J. Baars (in his Global Workspace Theory)[5] and Johnjoe McFadden (in his Conscious electromagnetic field theory)[6], to name some prominent few.

That `self' can handle information has been noted by modern phenomenologists, many amongst them consider that the mechanism in both subjective and objective phenomenology is directed by information. The issue of `View from within, First–person approaches to the study of Consciousness' has been dealt in depth in two joint issues[7] of *Journal of Consciousness Studies*. That amplification of phenomenal information could be a mechanism towards conscious experience has been articulated by Liane Gabora[8].

Common sense experience tells us that information can not be generated by inanimate objects which at best can store, or activate information. Information is generated by a living entity and metaphysically this generation of information is linked with operation of *life-principle*. In a recently published essay, A. Grandpierre concludes, "living organisms have access to an inexhaustible source of information, universally, in the same manner as the physical objects have an access to information content present in the Hamilton principle or to the action principle."… "Universally available information source is the life-principle."[9]

Information, although, seems to be more powerful than energy in various live situations, its distinct relation with energy is yet to be settled in what we call 'hard science'. The question how information is related to energy has bothered[10] numerous front runner scientists from the time of James Clerk Maxwell and there is no answer yet in sight. Second law of thermodynamics is not demolished by the Maxwell's demon. (In Webster's Third new International Dictionary Maxwell's demon is defined as, "A hypothetical being of intelligence but molecular order of size imagined to illustrate limitations of the second law of thermodynamics.")

The subtlety of information has been recognized by Hawking and Penrose[11] from the fact that information can pass through black hole, while light cannot! Penrose in his *The Road to Realtiy*[12], 'being out there', elaborates on this subtlety further, in description of 'Objective Reality (OR)'. Stanford scientist William Tiller[13] recognizes information in 'subtle energy'. Since 1990, following John A. Wheeler's persuasive argument to learn about the world by looking at it in term of information, effort has been made to find out the underlying relationship between quantum mechanics and information, e.g.[14,15]. On its 125th anniversary, July 1st, 2005 issue of *Science* highlighted several questions for which we do not have any answer. One such important question is, "Do deeper Principles underlie quantum uncertainty and nonlocality?"[16]. Brukner and Zeilinger[17] and also Gerad 't Hooft[18] are more forthright to point out, `quantum physics as science of information' and `determinism beneath quantum mechanics' respectively.

On this *noisy* background the concept of information seems to be highly polysemous, being used differently in different context. The concept of information is so varied amongst scientists that no one knows where to begin with or how to investigate on fundamental nature and character of information! There is conscious demand of input of new ideas from various quarters of science to separate `wheat from chaff'[19]for exploring new source of pollution free energy. While it is intellectually strenuous to investigate the fundamental nature of information, the *signal* on its subtlety often emerges from the (i) scientific observation like in `black hole' (Hawking and Penrose) and (ii) from the vision of poet[20] which glimpses through its nonlocal existence. In an earlier paper[21] of mine, the primacy and more fundamental nature of information in creation of space time and energy has been touched upon.

The Big Question

The question which bothers me much is as follows. Is it possible to draw a coherent canvas depicting the fundamental nature and character of information overarching and accommodating its function in cosmology, phenomenology, psychology, life-sciences, thermodynamics, quantum mechanics, consciousness, and finally the science of language especially that used in computer science and expert system?

The Issues in Science of Information

Interestingly 1st July, 2005 issue of *Science* does not consider that the nature and science of information could be an important unanswered issue which needs our attention! The science of information in its present contour encompasses areas[22] on information technology dealing with classification, storage, retrieval, transmission, manipulation and management of information. Information transmission is too limited within the solar system. We have no way to know about information, if at all there, in interstellar, intergalactic or inter-universal depths.

In spite of having all such limitations, the human mind is allured with invention of *intentional expert system* which can negotiate and at opportune moment executes a fitting decision[23,24]. This achievement has compelled the hard core material scientists, who religiously deny the existence of human consciousness, to use the term like `machine consciousness'. The invention has blurred the distinction between human machine and machine humane, the `*Homo siliciens*' of Rodney Cotterill[25]. Further, the fusion of nano-, bio-, and information technology has led to the technological breakthrough in `Gene-Radar' (Anita Goel)[26], that can detect virus in any organ of the body by scanning. Gene-radar technology has been aspiring to replace the virology laboratory, at least in part, in the diagnostic clinics and hospitals! Advancing biotechnology to its finest peak, the scientists are planning to build up the desired human clone which might behave as human machine or machine humane, if not as human being!

In contrast to an expert system which might show the function of Access consciousness (Consciousness-A) and monitoring consciousness (the terms used by N. Block[27]), which have been mechanized in the expert system to a very limited degree, the `being' possesses the same faculty to an unlimited extent and in multiple domains as judged by

his ability of unbounded imagination and speculation. The monitoring consciousness in the being is qualitatively better and has wider scope, which enables him to bring order amidst chaotic information. In addition, which an expert system does not have, the being possesses self-consciousness, phenomenal consciousness (Consciousness-P, of Block) and reflexive consciousness which is why he can outwit various circumstantial pressures with his ability to decide by reflex or intuition. The above reasons make Bringsjord[28] to argue why an honest scientist should decline a billion dollar offer for making a conscious robot!

The moot question is where does information fit into this canvas of self-consciousness, phenomenal consciousness and reflexive consciousness of the being? The issues boil down to fundamental questions like, how information is related to self, mind and consciousness, or how consciousness which preserves meticulously its own independence, manipulates information? Here glares the distinction of science over technology. Science scales into the unknown, while technology deals with manipulating what is crystallized as known.

In the prevailing circumstances there is lack of adequate emphasis on the issues like ontology and epistemology of information. Very few of us dare to ask questions like, what is the fundamental nature of information. How information is generated? How does it lose its independent identity? Does information have an independent mechanics? If yes, how it is connected with quantum mechanics and mechanics of consciousness?

Science also deals with *relationship* which in the language of mathematics is called equation. What is the relationship of information with four elementary components with which we make scientific worldview? I mean relationship of information with (i) space, (ii) time, (iii) matter and (iv) energy? How information is related to self of self-organizing system, to memes, the unit of indoctrination and to genes, the unit of heredity? It is obvious from the issues raised that science of information clearly sets the agenda for twenty first century's science.

The Assumption

Accepting the subtlety of information and its distinctness from energy, the present paper is built up on an *assumption* that information is an independent 'entity' beyond Planck's scale of nature. It differs from all other known entities by its property of existence independent of space and time as location-non-addressable, context non-addressable and content non-addressable character. Information is similar to all other entities when we find it in location-addressable, content-addressable, context-addressable form. This paradox in assumption has it origin in the paradox in the very nature and character of information.

Methodology

It may be submitted that at this stage the 'sciencing' would be based on creative imagination, intuition and speculation which is not detached from the primed and fine-tuned logical sense supported by evidence which may appear as circumstantial but

nevertheless compelling. Based on such methodology, as a tentative response to the issues mentioned above, the present paper puts forward seven postulates on fundamental nature of information. This may be considered as tentative research hypothesis to begin with, which may be validated or falsified in the course of scientific pursuit. In such effort references that help get-going are not expected. On the other hand, the sovereignty of ideas that attempt to carve out a new path merit protection by the authority to be judged critically once they are made explicit.

Seven Postulates

1. Information is one of the five members of a non-local family

Information is nonlocal. It can exist independent of space and time. So are also consciousness, mind, `life' as *life-principle* and self. Nonlocality is the characteristic of the *nature* of consciousness. Mind, Self, Life-principle, and Information all dwell in the nature of Consciousness and together constitute a nonlocal family.

There might be a gradation of the members for nearness towards nonlocality or closeness towards locality. Consciousness and life-principle are far nonlocal, while information appears closer towards locality.

However, all the members of nonlocal family could be made to behave as if they are also localized; *Consciousness-as-such* as system-confined consciousness, mind as mind of the system, life-principle as life-form, information as 'bound' to quantum or classical particle/energy and self as self of self-organizing system.

Information can exist as location-non-addressable, content-non-addressable and context-non-addressable in the nonlocal domain and also as location-addressable, content-addressable and context-addressable `entity' in the local domain. Unlike all other known entities, information is not bound by space and time. The fact that information can pass through black hole is evidence for considering it as `entity'.

In the etymology of the word "information", two interesting features could be noted (Fig.1). Simultaneously, the word is a noun (Latin origin: *Informatio)* and a verb (Greek origin: *Informare*). If one excludes the prefix 'in' and suffix 'ation' from the word information, it strikes that inside information, there is a 'form'. Information could therefore be called what puts 'form' into 'process'. And, also when subjected to this process, information could create a suitable 'form'.

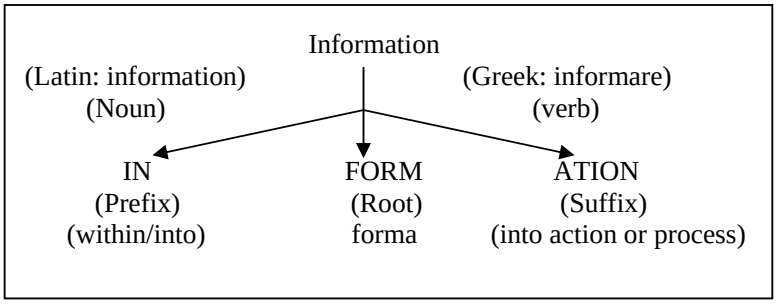


Fig. 1: Information puts 'form' into process

2. Information itself has an independent mechanics outside the Planck's scale

Information is so subtle that it cannot be detected as `entity' within Planck's scale. Its independent existence and mechanics is outside the Planck's scale. Nature extends beyond Planck's scale and has a stratified nested organization as shown in Fig.2. Nested organization of nature has been described in *The Millennium Bridge*[29] and for the convenience of the readers the logical basis of this has been described at the end of this paper, in the Appendix.

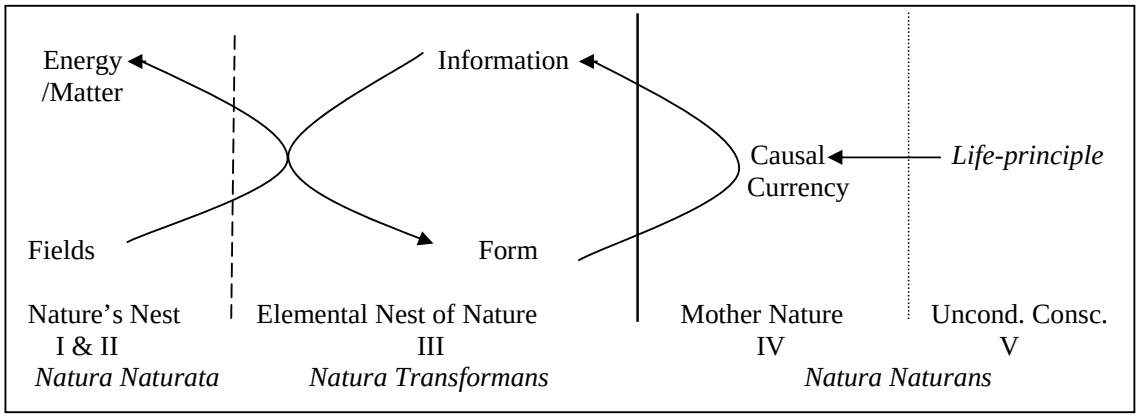


Fig. 2: Nested organization of Nature (modified from The Millennium Bridge, p. 90)

Information as subtle entity is neither generated nor emitted in form of quanta and therefore, its independent mechanics called *information mechanics* is different from quantum mechanics.

Interaction of information begins with quantum particle/wave only at the points of (i) quantum discontinuity and (ii) quantum void. This entry of information in nest II of nature is associated with *first phase of information loss* and *a break in the causality chain*.

Quantum particles/waves are of two types. One group is having mass like, atom, proton, electron, positron etc. They behave as if they are in relativistic paradigm. Their speed limit is the velocity of light. The other group is without mass, like photon which is not bound by relativistic paradigm and could exhibit superluminal velocity. As in classical level there are informational molecules (like DNA, RNA, Enzymes etc.) and non-informational molecules (like cholesterol, sugar, uric acid etc.) so at the quantum level there are informational quantum particle/energy, and non-informational quantum particle/energy. 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 retain the 'intent' intrinsic to information are proved to be 'able' ones. (cf: 'beable' of Bell). Other particles, which are incapable of carrying out the intrinsic intent of information, are `changeable' during assembly interaction. This explains *second phase of information loss* and *break in the causality chain* within the

quantum nest of nature. Gerad 't Hooft proposes that the discrete character of quantum has its origin in information loss.

At least three different ways by which quantum mechanics is connected with the concept of information have been pointed out by Brukner and Zeilinger. In this sense, quantum physics may be said as physics of *vehicle* of information in the world of matter and energy. Quantum mechanics and information mechanics although run independent of each other, two mechanics do intermingle when a quantum, massless or with mass, becomes vehicle of information. Behavior of quantum particles as we observe is largely determined by information therein. A number of quantum paradoxes like superposition of states, nonlocality and entanglement could be explained should we consider the role of information in it. These paradoxical properties are at present being harnessed for advanced information technology like quantum computation, quantum cryptography and quantum teleportation[30].

The evidence of informational involvement in quantum mechanics comes from transactional interpretation of quantum mechanics as reported by John G. Cramer[31]. Transactional interpretation is also supported by the experiment of Afshar. 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 is interconnected with quantum and classical mechanics on one hand, and mechanics of mind and consciousness on the other (Fig. 2). Information thus can work both within Planck's scale and outside Planck's scale. In course of quantum classical transition there is further *information loss* resulting in *third break in the causality chain*.

3. Information generation follows the principle of *simila similibus*

Life history of Information is yet to be known to the scientists. When did this information come into the picture of this universe? The universe was supposed to be born with a Big Bang about 14 billion years ago. Genes, which are the biological means for long-term storage of information in a heritable way, were not there at the time of the birth of the Universe. From the Big Bang to the Genes, is a long journey. The science has developed the precise chronology of events in the path namely the arrival of energy, matter, antimatter, unitary quantum macro system (QMS), molecules, amino acid, protein, RNA and DNA. However, there is no similar knowledge on information; when did it arrive in the scenario, whether in the course of big bang, before big bang or after big bang? Was it there *ab initio*?

This remains a fact that information can not be generated from inanimate object. Information generation requires life-principle in operation. Originally from Claude Shannon we know, information is that which reduces uncertainty. Uncertainty in

perception of two canonically conjugate pair in describing observer-dependent reality could also be identified in nature beyond Planck's scale (see Appendix). As shown in the Fig.2, information is generated from nest IV of nature. But how? It is not known to us.

In nest IV of nature, uncertainty is of different kind and is perceived epistemologically between canonically opposite conjugal pair, `*existence*' and `*non-existence*'(see Appendix). Accepting the subtlety of information into consideration it would not be far unreasonable to propose that information is generated following the principle of *simila similibus*, out of uncertainty in conjugal relation between masculine and feminine members of the nonlocal family, mainly the pair formed by consciousness and life-principle. The strain in such relationship generate information, re-coiling of which brings back normalcy and cessation of its generation.

4. Information has a `*form*' inside

In*form*ation has a `form' inside, which is brought out by an inside-out phenomenon. The process is executed by mind or mind-like structure and process in nature. This has been suggested in my paper published earlier in *Frontier Perspectives*. The process merits further elaboration.

From the pool of information mind selects only one at a time and conceives it. Impregnated by one selected information mind delivers a 'form' i.e. space and time specific for materialization of that information. During this delivery energy is also released (Fig. 3). This act of conception and delivery is subject to approval and consent from consciousness. Without involvement of consciousness mind proves to be sterile. As active mind remains sandwiched between consciousness and matter, this mind owes its property of fecundity to consciousness and infidelity to matter.

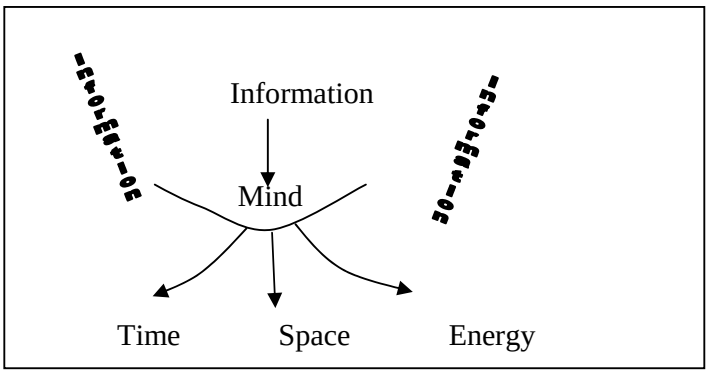
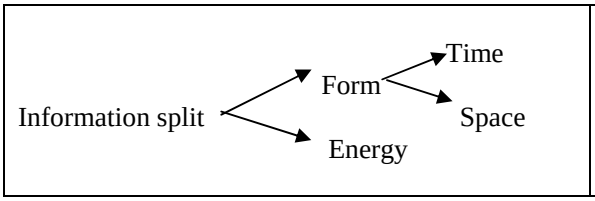


Fig. 3: Mind conceives information and delivers Time, Space and Energy

What the sense organs can understand and deal with are *form* and *movement*. Mind breaks non-sensible information into sensible components. Energy initiates movement while space and time create form. This inside-out phenomenon on information, executed

by mind, could also be described as information-split. Information split and delivery of a new kind of energy along with space and time is very naïve and novel idea with far reaching implications (Fig. 4).



	(i) Connects nonlocal phenomenology to locality (ii) Forms the basis of psychosomatic connection (iii) Creates information-based new source of energy

Fig. 4: Implications of Information-split

Information split creates the required situation for the members of nonlocal family to get appropriate infrastructure for confinement to locality, e.g., life-principle getting confined within space and time. Information split, although, leads to destruction of information as an independent entity, the process initiates production of an ensemble of multiple space(s) and corresponding time(s) from splitting of different categories of information. Information split as phenomenon can explain the basis of psychosomatic connection when the `form' is processed as idea and energy goes to neurons. One could, therefore, explain the bearing on mental hygiene of inappropriate information creating a `form' that survives and thrives as idea within the mind from the energy support offered to corresponding neurons.

The energy released from information split is intrinsic energy which might account for the behaviours like spontaneity (uncoupled reaction), expedient behaviour, and self-renovation against spontaneous destructive processes, which are so exclusive characteristics of a life-form. In human situation, this released intrinsic energy is used for consumption of neurons. This might explain how several accomplished mystics survive with little extraneous source of energy (food). Do they get an opening to an almost inexhaustible source of this intrinsic energy by splitting *mantra* as divine information! Further, if ever we could develop a machine which could sense, and split information then the machine would run with this intrinsic energy and with minimum expenditure of energy incurred from extraneous source! One could envisage the impact of this pollution free new energy in revolutionizing the world economy! Intrinsic energy is *information-based*. The energy we are familiar with is *matter-based*. There is no evidence of conversion of energy into matter within the Planck's scale. Does it happen outside the Planck's scale of nature? No evidence is there at hand! Only 1% of the universe is constituted by visible matter. No one knows the source of (i) invisible atomic matter constituting 4% of the universe (ii) non-atomic dark matter constituting 25% of the universe and (iii) 'dark energy' of universe constituting 70% of the universe. It would not be an unreasonable speculation that in astronomical nature, beyond Planck's scale, this intrinsic energy from information *may* be initially the 'dark energy' which *might* get converted into non-atomic dark matter from which invisible atomic matter and visible atomic matter originate!

5. Information interacts with `self', conditions it and influences its behaviour

The research on self-organizing systems has focused on 'organization' and left us clueless on what is `self". "Self-organization is creation without a creator attending to details" (Hans J. Bremermann). Once we accept that self is a particulate consciousness, a form of unconditional *consciousness-as-such* conditioned with three information, we can begin a new era of investigation on this terrain.

Self is *informed* (i) that it is one of the involutes of unconditional consciousness, (ii) that it is to behave in a specific way within the constrains of the given system/brain and (iii) although it can behave as confined or independent of the system/brain, it serves actually as the bridge between system/brain-confined and system/brain-independent consciousness.

The evidence that self could be independent of brain comes paradoxically from (i) neurophenomenology and (ii) neuro-behaviorism. In course of near-death experience, out-of-body experience and autoscopy, the self has been seen to free itself from the activities within the brain. The behavioural expressions of a highly evolved self-consciousness that enjoys complete freedom from the snares of its brain are (i) love (ii) altruism and (iii) disinterested search for truth.

Besides, specific information can condition self in a definite way and thereby change its behaviour.

6. Information can alter the composition of 'meme'

What is meme? Meme is an idea, a cognitive and behavioral pattern, an element of indoctrination, and the unit of culture, which spreads like virus and replicates like genes. The term and the concept were first coined by Richard Dawkins[32, 33].

> "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'."
>
> "Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots of building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain. As my colleague, NK Humphrey neatly summed

> up an earlier draft of this chapter '…. memes should be regarded as living structures, not just metaphorically but technically. When you plant a fertile meme in my mind you literally parasitize my brain, turning it into a vehicle for the memes propagation in just the way that a virus may parasitize the genetic mechanism of a host cell. And this isn't just a way of talking --- the meme for, say, "belief in life after death" is actually realized physically, millions of times over, as a structure in the nervous systems of individual men the world over'."

The question remains, of information and meme which one is primary? Which one is more fundamental? Memes transact their business through information. However, the information within the memes can not be considered as absolute. They are changeable and mutable. There is information which could alter composition of memes. Consciousness, self, mind and information all play an active role in construction of memes. Information within memes could be changed with consent of consciousness by the effort of self. Some categories of information are so fundamental and might have so much primacy over memes that they occupy the driver's seat in the dynamics of memes.

7. Information uses genes as means to achieve its purpose

What is the relationship between information and genes? Of the two, which one is more fundamental? It is not known. Such questions are rarely raised or discussed in scientific forum. Genes carry information. Genes make information manifest. However, genes could neither generate information nor can use information. It is information, which uses genes as means to achieve its biological end.

Why do we say so? It is on the basis of several evidences, which might look circumstantial but nevertheless compelling.

The central dogma of genetics with unidirectional flow of information from DNA to RNA to Protein was realized only after the momentous transition, the `enclosure', which led to localization of nonlocal entities within the matter which has evolved to the `living state' to be sustained as life-form. Philosophically this is equivalent of 'enclosure' of 'cosmology' into 'cell biology'. Cosmologically, however, information is older, much more primal and fundamental than a molecule of DNA. Before this enclosure, information had been acting through nonatomic matter, atomic matter, molecules including protein, RNA and DNA molecules. Even after the enclosure, there are three occasions when the central dogma of Molecular Biology is not obeyed. These are called dogma-busters.

a. Reverse Trasnscriptase enzyme (Baltimore and Temin)
DNA$\rightarrow$ RNA$\rightarrow$ Protein, becomes DNA $\leftrightarrow$ RNA$\rightarrow$ Protein

b. Catalytic RNAs (example of nonprotein enzymes)
(i) Self-splicing property of certain introns (Thomas R. Cech)
(ii) Ribozyme, 23_s RNA (Harry Noller)
(iii) "RNA is DNA on steroids" (Robert Reenan)

RNA interference (RNAi): The ability of double-stranded RNA to interfere with the production of the corresponding gene product (Andrew Fire).
RNA as a back-up[34, 35] copy of ancestral DNA.
In the mustard plant Arabidopsis thaliana, the plant can summon up genes its parent's have lost.

c. Proteinaceous infectious particle, prion (Stanley Prusiner).

The evidence leads towards suggestion that *the process of 'enclosure' of DNA into a probiotic life form, is to make information location-addressable, content-addressable and context-addressable*. This is also to offer DNA the pride of its place, to become the biological store-house of information. It is also to bring into the information flow an order for the beginning of a long journey we call evolution, to go back to the origin.

Could we consider this process of evolution as an error-correction? 'Error' in this context would probably be the event of *fall* from unconditional state of original *consciousness-as-such* to informationally conditioned existence! Interestingly, the nature of genetic code is an *error correcting digital coding system.* Digital coding system itself could be complex and the error correcting digital coding system is much more complex. This is rare in physical system but is obviously abundant in biological system!

We encounter the chicken and egg paradox clouding the gene information relationship. Information encoded in the nucleotide sequence is meaningless without a machine/system that could decode it and the technical specification of this machine/system is itself coded by the nucleotide sequence. There is an effort to move out of this paradox, focusing on the knowledge of *language convention*, which is set 'prior' to the language to be decoded by genes. Any language system is a result of mutual agreement between two conscious systems, may be at the abstract level, or may be arbitrarily decided. Nucleotide sequence is made up in such a way that it understands this language convention so that information could use genes as means to achieve its ends.

The language of genes, like any language, works on the principle of redundancy. Sheer number of genes in a cell is a mater of wonderment! Astronomical number of noncoding sequence interspersed between coding sequences of genes is another wonder! Exceedingly redundant number of genetic codons for each amino acid is still another! Also, if any gene is corrupted with informational error, there are back-up genes to take over (Lolle, 2005). In-built back-up system is also the characteristic of a complex computational system. All such facts lead us to think that genes could be like any other information storage device, the vehicle of information.

How language convention helps information to use genes? *Genes are observed to jump* (Barbara McClintock). We do not know why? Or, even how? Transposable genes are mostly in the noncoding sequence of DNA. What do they do there? *The gene jumping is probably the consequence of an effort, prior to their expression, for a correct juxtaposition to build up the context of the language in conformity with the goal*. As in a linguistic expression a little change in relative position of various parts of speech could change the meaning of the expressed language altogether, so by the process of jumping

the mobile genetic elements (transposons) helps to reshuffle and re-assort the entire genome to work in conformity with the desired information setting the proper context to conform to the grammar of the goal of expression. This is a fact that a change like mutation (like addition, deletion, substitution) or horizontal gene transfer in the noncoding sequences of DNA alters expression of coding region. There are differences in effect of such changes in the region of noncoding and coding regions. The former entails mostly evolutionary change (for example, avian mycobacterium evolving to human mycobacterium) and the latter mostly casts a negative impact causing ailment (for example, sickle cell anemia).

There are also other reasons to think primacy of information over genes. Does DNA carry all information necessary for development and evolution? Evidently not! Post-translational modification of the protein is not directed by genes which have coded it. Rather, the modifications are accomplished under guidance and surveillance of information emanated from other sources. So is also true for modification of protein into its primary, secondary, tertiary and quaternary structure. Genes, therefore, do not contain all information *necessary* and *sufficient* for the process of development and evolution. Evidence has started accumulating also that genes are not informationally closed. That genes could exchange information from outside has also been emphasized[36].

The evidence also come from A-Life (Artificial-life) laboratory that *the process of evolution although, is algorithmic but is not always a-teleological*. Teleology is based on the assumption of existence of a design that could not be explained by reasons or senses, since in teleology the future outcome explains the present situation. However, genetic algorithm because of prior existence of knowledge of language convention, favors the existence of a kind of teleology. Practically teleology comes into the picture particularly when the genes pass through Nest III of Nature and the organism confronts a 'either life or death' situation, the situation which triggers the evolutionary button for the organism. This necessitates genes to be informationally open in such circumstances. This could also be an additional explanation for "Wallaceism" in evolution.

Further, the explanation for the genotype-phenotype divide may come in favor of the present proposition. The cloning experiments fail several times (more than 99%) before one achieves a success. The cloned animals are not phenotypically alike. This 'adult twin' separated by space and time from its genetic brother, although genetically identical might be primed and 'tuned' to carry out and express information which are altogether different from his brother's case. In the micro-milieu of the a-nucleated ovum of a surrogate mother, the engineered genes fail to carry out the informational flow that it had been doing earlier. For the same reasons, in human situation the phenotypical behavior of babies born out of surrogate mother and genetic mother can not be similar.

Information to manifest through genes and to fulfil its purpose requires genes to be in a space-time bound appropriate micro-milieu. Creation of this desired space and time for the specific purpose requires information having active support from mind and

consciousness. It is unlikely, therefore, that a chemical molecule like DNA could be held solely responsible for genes' complete informational manifestation.

DNA does not merely *carry* information. Information drives DNA. DNA is ever-alive and never *dead*. Place it in an environment where information can drive it, it will replicate or transcribe. There is difference between DNA-molecule and live-DNA. Live-DNA works within an informational milieu where it could be driven by information. DNA molecule per se is devoid of that critical and essential milieu.

Last question! Is DNA molecule a passive vehicle for its 'driver' information? Probably not! An intimate complex interactive relation cannot manifest with one member active and the other member remaining inert and passive. It warrants activeness from both sides. One may, temporarily, remain actively standstill to conceive, for the sake of conception. The relationship of information and DNA is, therefore, deep, intimate and complex. It is where not merely the laws of chemistry but the geometry of information is equally important. It might lead us to suggest the possible existence of a category of information that could maneuver space and time to achieve its purpose.

Concluding Remarks

The argument in this paper has been built up to convey the message that information is more fundamental than space time and energy, self, memes and genes and, therefore, entails a *Paradigm shift* where the Power *is not with* the genes or memes, or even with the self *but with* Information. The genes and memes neither generate information nor can use information. It is information which uses genes and memes as means for materialization of its purpose. It is information which maintains the distinctness of self-consciousness from system (brain)-bound consciousness and *consciousness-as-such.*

Appendix

Uncertainty limits our cognitive ability and imposes epistemological constrains 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-depended 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.

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