

VEDIC SCIENCE OF CONSCIOUSNESS.

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Abstract: What is consciousness and whether quantum physics can explain it has been discussed from Vedic perspective. The mechanism of perception by our sense organs have been described.

I bow to The Consciousness, which is the light of all lights (when there is no light, we see through speech form and when even that is not available, we see through our Self through mind's eye – शान्तायां वाचि किञ्ज्योतिरेवायं पुरुष इत्यात्मैवास्य ज्योतिर्भवति – बृहदारण्यकोपनिषत् IV.iii.6), whose radiation illuminates every perceptible object, and which shines in the heart and mind of all to make perception possible.

CAN QUANTUM THEORY EXPLAIN CONSCIOUSNESS?

A recent paper “A Relativistic Theory of Consciousness” DOI: 10.3389/fpsyg.2021.704270, claims to present a mathematical and relativistic model of consciousness. The paper is neither science (neuro or any other including physics) nor psychology. Mathematics is the quantitative aspect of reality and applies to discrete objects with numbers. Numbers are a property of everything, by which we differentiate between similars. If there are no similars, it is one. If there are similars, it is not-one or many, which can be 2, 3, 4, ... n, which arise due to successive accumulations of one's. Infinity is not a big number, because for every n, there is n+1. But infinity plus any number is infinity. Hence, mathematics doesn't apply to consciousness, which is infinite and can't be counted.

To be relative, the description must be in relation to something else - not absolute by itself. What Bob and Alice see is the same motion described from their positions. They see each other reduce in size, while neither actually does. This is because the event horizon of the two frames of reference (ऋक् and साम) are different. For a proper description, we must consider the energy interaction between both (यजुः). I have explained it elsewhere.

Thousands of years ago, Prashastapada has analyzed the Equivalence Principle of relativity and concluded that it is a wrong description of reality (जातिसाङ्कर्य). The same motion described by both as moving in opposite directions, - hence different - is self-contradictory. If Alice moves out in India, it can't be linked to Bob entering a café in America, unless we treat the Earth as a common frame of reference. This is the Russell's paradox in set theory. The same thing happens here. The proper description is to relate both in a bigger frame of reference – motion from position A towards position B. That will give an absolute physical answer to the question: “how to describe the motion of Bob”. This will be true even if one has conscious experience, while the other is not. The kaon experiment also is faulty for the same reason.

The neurophysiological and/or neuropsychological processes also can't explain consciousness. Neuroscientists believe that, consciousness is an emergent property and localized activity generated in and by the brain. In humans and mammals, the cerebral cortex is the “seat of consciousness”, while the midbrain reticular formation and certain thalamic nuclei may provide gating and other necessary functions of the cortex. But because the neurons remain the same for some time after death, but they do not act as conscious agents after death. For the same reason, the RNA and proteins and other implementation details are not conscious.

Neuroscience today says: Alternatively, we propose that consciousness may not originate in the brain, although some aspects of human perception of consciousness may be dependent on the brain. The influence factors of consciousness are response-stimulus intervals (RSI), openness and novelty. Investigations on the three factors respectively support dichotomous or graded theory and future studies may breed new theory. Consciousness is associated with a flexible response mechanism (FRM) for decision-making, planning, and generally responding in non-automatic ways. The FRM generates responses by manipulating information and, to function effectively, its data input must be restricted to task-relevant information. Consciousness is not about “generalized intelligence” or general computational sophistication, as will be described.

REDUCTIONISM HARMING SCIENCE.

There is a story about six blind men going to “see” an elephant. One touched its leg, the other its tail, the third its ear, the fourth its belly, the fifth its trunk and the sixth its tooth. They described the elephant as like a pole, rope, fan, ceiling, pipe, and hard like stone, respectively. Individually, their descriptions are correct description of the specific part. But even after mixing their reductionist observations, one who has not seen an elephant, can’t grasp what an elephant is. Similarly, by trying to discuss consciousness from the perspectives of various reductionist approaches, we will never get any idea of what Consciousness is. We may get some idea about Artificial Intelligence, which is GIGO – Garbage In, Garbage Out – limited to programming. The only way is to take a wholistic approach.

There is much confusion about reality. Reality is defined as anything, which has existence independent from all Observers (अस्तित्व) so that they describe the same thing for all observers outside of themselves, is knowable (ज्ञेयत्व) - invariant in all measurements at the same time and place as received by their internal mechanism, and is describable in any language (अभिधेयत्व) to compare that, similar measurements return similar results. We find objects (धर्मी) that have independent existence and that exhibit certain properties (धर्म). The objects are matter (द्रव्य), which is not conscious (जड). But this doesn’t apply to energy (शक्तिः), which is one and universal, though it appears different when it is associated with different discreet objects (वस्तु) or fields (क्षेत्रम्). Energy is dark (कृष्ण - not directly perceptible, but only inferred from its effect on matter - motion - शक्तिः कार्यानुमेया हि यद्गतैवोपलभ्यते) on its base or other objects (तद्गतैवाभ्युपेतव्या स्वाश्रयान्याश्रयापि च). While energy is necessary for all perceptions (प्रत्यक्ष) as an accessory to uncover, and since it can’t exist independently, and matter is inert, we must search for a base other than matter, to locate Consciousness. Physics doesn’t explain all the phenomena in the universe beyond material reality. Even energy is not fully understood. Hence, it can’t explain consciousness.

Consciousness is wrongly equated with mental activity, which is, in some ways, correlated to the behavior of the material brain. The material brain remains same even after death, but it can’t be said to be conscious. Some argue that consciousness is a mirage produced by sophisticated neural mechanisms in the brain - all we need is a better understanding of how the brain creates models of the world and about a self, subjectively experiencing the world. This means the existence of an external world (बहिर्जगत्, दृश्य | अभव - अभूत्वा भाति) of name and form (नाम-रूप) common to all, that is space and time variant (देशकालनिबन्धनम्). And an internal world of the Observer (अन्तर्जगत्, आभु - आसमन्तात् भाति) of images (प्रतिविम्बम्) that is different for different observers and is invariant in space and time (देशकालातीत) – doesn’t evolve, though it gets updated due to new light (ज्योतिः) removing the ignorance (तमसावरणम्) in phases.

The apparent randomness of quantum theory as against the deterministic worldview, is due to our ignorance of the total factors affecting any operation (कर्मण्येवाधिकारस्ते मा फलेषु कदाचन) as well as wrong interpretation of the right observation. Processes such as the spontaneous emission of light, radioactive decay, etc., are part of time evolution, which takes place in six steps (षड्भावविकाराः): from “being” as cause (जायते), to “becoming” as effect (अस्ति), to growth due to accumulation of similars (बद्धते), to transformation due to accumulation of harmonious others (विपरिणमते), to transmutation due to the opposite effect (अपक्षीयते), to decay and dissolution (विनश्यति) to be recycled again. The statistically determined behavior is not scientific. For example, any mechanical operation is repetitive, unless some hidden variable affects it. Thus, contrary to popular belief, Bell’s inequality actually proves hidden variables.

The concepts of complementarity and quantum entanglement are grossly misunderstood and fictionalized. Simultaneous measurement of position and momentum is not possible, because both are mutually exclusive (अन्योन्याभावः). A body, which has a fixed position (दिक्, स्थिति) with reference to a frame of reference (आवपनम्), has zero value for momentum (गति) with reference to the same frame of reference and vice versa. Thus, multiplying both will return zero every time. In fact they can’t be multiplied, as multiplication is non-linear accumulation, where both the factors have partly similar components. Being mutually exclusive, there is no commonality between position and momentum to be multiplied.

Modern concepts of superposition (अध्यास) and collapse (व्याप्ति) are also misplaced. Two waves collapse to be in a superposition of states. Objects can have internal structure (स्वांश) or without internal structure (निरंश) like water (आपः) or light (ज्योतिः). Electrons and photons also do not have internal structure (though wrongly classified as fermions). Objects

with internal structure have fixed position (आवपनम्) and oppose other objects from occupying their position (विष्टम्भकत्व – स्थानावरोध – exclusion principle). Objects without internal structure can co-exist (सामञ्जस्य - bosons) through collapse (व्याप्ति), when it is impossible to separate the earlier components. Collapse can be of two types. If the two components without internal structure are of the same type (similar in form and characteristic), they collapse into superposition of states (ऐक्यव्याप्ति or एकात्म्य). If they are of different types, they collapse into merger (संयोगव्याप्ति or एकभाव्य). Collapse has nothing to do with observation. The cat will be found dead, if it is observed after 20 years. Once two objects collapse into superposition, nothing, observation included, can make them acquire a fixed state.

The idea that memory states are like many-particle systems - as inequivalent representations of vacuum states of quantum fields – is also not correct. The content of any knowledge is of a form: “I know ... (about this) or जानाम्यहम्”. Though the object of knowledge, which is external to the observer and common to all (this), may be different, the content “I know” remains uniform in all perceptions. Some people point to the ‘Morphic resonance’ and ‘Morphic fields’ concepts of Rupert Sheldrake to describe the effect of consciousness as a field on such activities like behavior of dogs or movement of birds. Sheldrake is a botanist, who jumped from the concept of morphogenesis of plants to coin these terms by borrowing from grammar, mathematics and animation (morph) and physics or literature (resonance/fields) to imply that similar forms reverberate and exchange information within a universal life force. He defines it as “the idea of mysterious telepathy-type interconnections between organisms and of collective memories within species”.

Morph means to undergo or cause to undergo a gradual process of transformation (phenotypically distinct form of an organism or species), like a caterpillar changing into a butterfly, where the interim changes are individually perceptible and not mysterious. Field in physics is related to regions of space within a boundary. When we enter that region, if we experience a force, we call that region of space a field, and name it according to the nature of the force (energy) experienced: gravitational field, electric field, magnetic field, etc., just like football field, basketball field, etc. If we do not enter the field or do not interact physically with it, we will not even know about its existence. There is no proof that consciousness is a field, though conscious actions take place in a different type of fields. It is not a region of space we are conversant with. In fact, contrary to the unscientific descriptions of modern science, there are only two types of fields (स्थूल-सूक्ष्मविभागेन द्विधा क्षेत्रमवस्थितम्). One field is within two boundaries of (अन्तरिक्षम् – अन्तरिक्षान्तं भवति) external objects (कार्यपोडशकं स्थूलम्) and the other internal and individual to each observer (सूक्ष्मं बुद्ध्यादिमात्रजम्). We can notice it everywhere – even without interaction. Thus, by field, Sheldrake must mean ‘a specific branch’ (he defines morphology as “fields of information”). In a separate paper, I had refuted Penrose and Penrose/Hameroff and Sheldrake’s views.

The so-called conflict between physical determinism and conscious free will is misguided, as the so-called freewill is not totally free, though we enjoy limited degrees of freedom, we can’t do whatever we want. Our powers are limited locally. Whenever individual actions are grouped with a view to get desired results (अपेक्षाबुद्धिकृत कर्म), it generates an induced inertia (कर्मव्यूह) that changes the nature of time evolution. In automated action (अपेक्षाबुद्धिकृत कर्म) like those of galaxies, quarks, atoms or our internal body systems, etc., the time evolution is perpetual and deterministic. This appears as self-organization.

Recent research in neurogenesis shows the growth of neurons in the dentate gyrus - a portion of the hippocampus (which controls learning and short-term memory) in mice placed in a stimulating environment. Scientists have grafted immature cells from the spinal cord to the hippocampus and found that they produced new neuronal cells. Neurological research has also produced some success getting neurons to work better with ampakines - chemical compounds sometimes called “memory drugs”. These results should compel those who think memory is a function of some non-physical reality, to reflect. There is growing support for the notion that exercising the body and the brain tend to preserve neurons - “Use it or lose it”. It is a mechanical process - functional ease (patutwa - पटुत्व), wherein a machine that repeats an operation frequently, becomes easier to handle. But this cannot give Sheldrake a conceptual framework wherein information is transmitted mysteriously and miraculously through any amount of space and time without loss of energy – may be without loss or change of content - like the mutation in DNA replication. That the physical characteristics of organisms are contained inside the genes, can be thought of as analogous to transistors tuned in to the proper frequencies for translating invisible or codified information into visible/decoded form. But that does not make the transistor conscious.

PNA, tPNA, RNA, DNA, TNA, PAH, proteins, amino acid, etc., that are termed Neural Correlates of Consciousness (NCC) can be likened to accessories (for example: like electric wires, switches, bulbs, etc.), but they are not the energy (like electricity) that powers the system to make them functional. Atoms also are able to reproduce (so-called decay to other atoms or isotopes or isomers), able to grow (similarly as stated) and able to respond to stimuli (charge interaction). Since according to modern science these are features of life, atoms also can be described as having a life (scientists frequently use the term half-life). However, they are not sentient (prasupta spandana - प्रसुप्तस्पन्दन). Plants and animals have limited intelligence (savaasanaavilaa - सवासनाविला). Human beings exhibit increased intelligence (pravrhddha spandana - प्रवृद्धस्पन्दन). There are higher forms (prakshipta spandana - प्रक्षिप्तस्पन्दन) also.

REDEFINING MASS.

The modern concept of mass is totally misplaced and has replaced weight (गुरुत्व), which is wrong. Weight (and not gravity) makes the apple to fall because of penetrability of objects into a less dense medium (संयोगाभावे गुरुत्वात् पतनम्). Mass comes from the Latin word, “Missa”, by which people were dismissed: “Ite, missa est”, meaning “Go, you are sent”. It means spread of objects (विस्तारः). According to Vedic concepts, everything that is a composite: from Mesons (द्राणुक) to the universe itself (विश्वम्) - are entangled (छन्दित, सम्बरणम्) in 4 – nucleus, intra-nucleic field, crust or exterior, and zone of influence or atmosphere (मा छन्दः, तत्पृथिवी, अग्निदेवता ॥ १ ॥ प्रमा छन्दः, तदन्तरिक्षम्, वातो देवता ॥ २ ॥ प्रतिमा छन्दः, तद् द्यौः, सूर्यो देवता ॥ ३ ॥ अस्त्रीवि छन्दः, तद्दिशः, सोमो देवता ॥ ४ ॥) and 7 – seven types of creation of mass (गायत्री छन्दः, तदजा, बृहस्पतिर्देवता ॥ ६ ॥ त्रिष्टुप् छन्दः, तद्धिरण्यम्, इन्द्रो देवता ॥ ७ ॥ जगती छन्दः, तद्द्यूः, प्रजापतिर्देवता ॥ ८ ॥ अनुष्टुप् छन्दः, तद्वायुः, मित्रा देवता ॥ ९ ॥ उष्णिहा छन्दः, तच्चक्षुः, पूषा देवता ॥ १० ॥ पङ्क्तिश्छन्दः, तत्कृषिः, पर्जन्यो देवता ॥ ११ ॥ बृहती छन्दः, तदश्वः, परमेष्ठी देवता ॥ १२ ॥) different ways. In fact, this provides everything their mass (वयोनाधः, अबच्छेदक, सीमामर्यादा).

Any object (वयुन) has two parts. Like skin in our body demarcates our spread (वयोनाध), but is different from the “content” (वय) of our body, even though both are formed from the same quantum particles, all objects (वयुन) have these two divisions. Like positive charge is centralized, but negative charge is spread out around the positive charge and confines it, the exterior (वयोनाध) of the object is spread out and confines the content (वय). It defines spread (dimension - विस्तारः) and provides the form. Like the nucleus describes the atom, the totality of the interior describes the object. Dimension is a description that defines the spread of objects in mutually perpendicular directions that retain the form invariant under mutual transformations (विस्तारस्य यथैवार्थ आयामेन प्रकाशितः । तथारोहसमुच्छ्रायौ पर्यायवाचिनौ मतौ ॥ परिमाणानुसरेण वर्णनोयाः क्षितौ नराः ॥). Since we observe form through electromagnetic radiation, where the electric and magnetic fields and their direction of motion are mutually perpendicular, we have three mutually perpendicular dimensions, which can be resolved to ten dimensions retaining the form invariant. I had published a paper on this.

DEFINING LIFE.

Some scientists have concluded that ‘Consciousness’ is the universal and ubiquitous foundation of life. But what is consciousness? In quantum mechanics (QM), there is the famous Copenhagen interpretation of Bohr, which talks about observer created reality. The observer is said to be an intelligent agent. There is much controversy about the observer. Is the “Schrödinger’s cat” intelligent? Is it an observer? Bohr’s view has lost its exalted status, except in some fringe interpretations of QM. There is search for ‘life’ and ‘extra-terrestrial intelligence’ on different planets and galaxies. Though consciousness and life have been defined variously, till date there is no precise definition of what constitutes life.

Life is said to be that aspect of existence, which can perform various processes like actions, reactions, evaluations, and evolves through growth, reproduction and metabolism, etc. Action takes place due to four reasons: 1) weight of the object (गुरुत्व), 2) fluidity (द्रवत्व), 3) application of force by a conscious being (प्रयत्न) or 4) contact with something (संयोग). A crucial difference between life and non-life is that life uses energy for physical and conscious transformations (प्रयत्न). Vedic science defines life as that which exchanges energy with the external world through breathing or similar process (प्राणधारणं जीवनम्). An alternative definition is: possession or non-possession of senses differentiates the living from the inert or the dead (सेन्द्रियं चेतनं द्रव्यं निरिन्द्रियमचेतन्).

DEFINING SENSE ORGANS:

What are the senses (इन्द्रियम्)? That which ignites and acts as fuel (इन्धनम् – बलस्य निखिलाकृतिः) for the reception of specific impulses (तन्मात्रा) from our environment. The vital energy (Prana Vayu - प्राणवायु) is the first among the five functions of the vital energy, which, according to Ashtaanga Hrdayam, activates all sensory agencies. Thus, possession of sensory agencies is the sign of life. These agencies are distinguished by the accumulation of one specific impulse in that body part. The sensory organs are body matter and distinguished from sensory agencies – “indriyam (इन्द्रियम्)” - literally meaning dedicated to “Indra - इन्द्र”, which, according to Shatapatha Braahmanam 6-1-1-2, means; instrumental through energizing (indhana - स योऽयं मध्ये प्राणः । एष एवेन्द्रस्तानेष प्राणान्मैन्द्र इत्याचक्षते परोऽक्षं परोऽक्षकामा हि देवास्त इन्द्राः सप्त नाना पुरुषानसृजन्त ...).

For example, eyes are sense organs for vision, because only they have the capacity to receive electromagnetic impulse (रूपतन्मात्रा) through which we perceive form, and transport it to the brain through the mind for processing (the object to be measured and the unit must have similar properties). The energy that powers the capacity for such reception and transmission is called sensory agency (indriyam – ज्ञानेन्द्रिय) for that purpose (it includes mind मनस्, which is the carrier of all such impulses). These provide the organisms a strong sense of self-recognition and self-identity, and these play a significant role during the life time. They purposefully utilize physical laws to carry out their biological functions. These are cognitive functions (kriyaa – क्रिया or Shakti - शक्तिः), but are not the same as consciousness (kartaa – कर्ता, क्रियानुकूलकृतिमत्त्वम् or shaktimaan - शक्तिमान्). The sensory agencies of action (कर्मेन्द्रिय) are not so defined, as they are not exclusive organs for their functions.

According to Rik Veda 1-164-15, the sensory agency (इन्द्रियम्) are (Devajaah – देवजाः) expressed through energies whose effects are perceptible as heat that moves away through conduction (Agni - अग्निम्), air that moves through convection, but non-heat (Vayu - वायुः), radiation (Aaditya - आदित्यः) etc. Though inherently mobile in nature, they remain fixed in their spheres (Teshamishtaani vihitaani dhaamashah - तेषामिष्टानि विहितानि धामशाः). Yet they create deformations in fixed living organisms (sthaataa - स्थाता) by deforming themselves through association (Sthaatre rejante vikrtaani roopashah - स्थात्रे रेजन्ते विकृतानि रूपशाः).

The sense organs function in that way (paraanchikhaani vyatrhnat swayambhuh – पराञ्चिखानि व्यतृणत् स्वयम्भूः) – they move out from their base in the body (like eyes etc) to interact with their respective objects, interact with them to prepare a mould-type picture and transport back so that we get a proper pictures unlike inverted pictures in earlier cameras. These are sent to the brain through neurons with the help of mind for processing, where it is compared with our memory to cognize a pattern. Then our ego (अहङ्कारः) says: “I know (this is that - जानाम्यहम्)”. But this ego is also not conscious (अस्मिता) and functions mechanically. It is like we see everything in sun-light. But sunlight is not Sun.

The difference between neurons in the eye and the sensory instrument for ocular perception (darshanendriya - दर्शनेन्द्रिय) is that, while the former is a huge collection (bhoota भूत from bhoomaa - भूमा) of minimum units of form (roopa tanmaatras - रूपतन्मात्रा) that radiates electromagnetic energy, the latter is a derivative (vishesha - विशेषः) of reflected consciousness (asmitaa - अस्मिता). Like the image of the Sun reflected in water (hence paraanchikhaani - पराञ्चिखानि) appears disturbed (chidaabhaasa - चिदाभास) when water is disturbed, but the real Sun remains unaffected. Similarly Conscious self, which reflects Ultimate Consciousness, is involved in actions, while the Ultimate Consciousness remains unattached and only appears to act from a distance (aaraadupakaaraka - आरादुपकारक).

The entire body functions are powered by the fundamental energy called mukhya praana - मुख्यप्राणः. While moving through different body parts, its effects appear to be modified following the laws of fundamental interaction in modern physics. Once it interacts with body matter, it behaves differentially. This energy (called anya praana - अन्यप्राणः) energizes all sensory agencies in five different ways (pancha praana – पञ्चप्राणाः). These can be linked to the fundamental interactions of Nature (alpha decay and beta decay are treated differently). We are not discussing it here. Coupling between the body matter and the sensory agencies in specific proportions (eigen value) starts life forms. Extreme change in their proportion (ativartana अतिवर्तनम्) leads to destruction of that life form. Then, the different components disintegrate and merge with

their constituent causes. Self is conscious and is different (अपरिणामी - नित्यः सर्वगतः स्थाणुरचलोऽयं सनातनः) because it is universal, has no transformation (अवस्था परिणाम), no time evolution (अक्रमदर्शी) and without motion (लाक्षणिक परिणाम).

Gita (18-14/15) distinguishes mechanical motion from conscious speech, mental and physical actions. It says all these have five concurrent causes: 1) base or ground or physical body on which action takes place (adhistaanam - अधिष्ठानम्), 2) freewill or causal body (Ego, which is the apparent kartaa - कर्ता), 3) different sensory instruments (karanam - करणम्), 4) energy that operates all systems (cheshtaa चेष्टा) and 5) external influences (daiva - दैवम्). Gita (18-16/17, also 13-27 to 32) declares that anyone, who thinks that the Self or Aatmaa (आत्मा) does not induce, but does things; is misguided. While describing how a person after death acquires a new body; Gita 2-22 uses the word 'dehee - देही' to indicate the causal body (linga shareera - लिङ्गशरीर) – not Aatmaa (आत्मा). Let us discuss the sensory process, as it is a sign of life.

THE SENSORY PROCESS:

We recognize something based on five factors: the core that makes it what it is - classification (Principal quantum number - आश्रयभावः – which is Vyakti – व्यक्तिः), the limits of its extent (angular or azimuthal quantum number – प्रयोजकभावः – which is Aakriti - आकृतिः), pattern recognition (magnetic quantum number – स्थायीभावः – which is Jaati - जातिः - Anuvritti Pratyaya - अनुवृत्तिप्रत्ययः), and the frame of reference (the fifth quantum number - सञ्चारीभावः – which is Dikkala - दिक्कालः). When we see a stranger and think having seen him earlier, though not sure where and when, it can be attributed to a pattern recognition (जातिः - Jaati). The fourth quantum number spin is an intrinsic angular momentum (व्यञ्जकभावः) due to the universal principle of motion. Imprecise information and part-similarities are responsible for that. In a reductionist approach. Vyakti (व्यक्तिः), Aakriti (आकृतिः) and Dikkala (दिक्कालः) become vital.

Pattern-Recognition techniques can improve efficiency by restricting the application of the Machine's methods to appropriate problems - Vyakti (व्यक्तिः). But how does a machine learn? You can teach somebody (program). But you can't make him learn (नायमात्मा प्रवचनेन लभ्यो न मेधया न बहुना श्रुतेना यमेवैष वृणुते तेन लभ्यस्तस्यैष आत्मा विवृणुते तनू स्वाम्). Neither a system without an efficient command and control mechanism, even if related to many others to run at a tandem or in isolation, can learn properly (नायमात्मा बलहीनेन लभ्यो न च प्रमादात्तपसो वाप्यलिङ्गात्).

The impulses from the various sensory apparatus are carried upwards in the dorsal column or in the antero-lateral spinothalamic tract to the thalamus, which relays it to the cerebral cortex for its perception (samgyaanam - संज्ञानम्). However, both for consolidation and retrieval of sensory information, the holographic model requires a coherent source which literally 'illuminates' the object or the object-projected sensory information (pragyaanam - प्रज्ञानम्). This may be a small source available at the site of sensory repository. For retrieval of the previously consolidated information, the same source again becomes necessary. Since the brain receives enormous information that is present for the whole life, such source should always be illuminating the required area in the brain where the sensory information is stored. Even in dream state, this source must be active, as here also local memory retrieval and experience takes place. This illuminating source (शुद्धप्रकाशमात्र रूपः) is the apparent Consciousness (vigyaanam - विज्ञानम्). Explanation of this will require another paper.

The brain acts like a computer. In communication technology, in addition to encryption (language phrased in terms of algorithms executed on certain computing machines - sequence of symbols), compression (quantification and reduction of complexity - grammar) and data transmission (sound, signals), there is a necessity of mixing information (mass of text, volume of intermediate data, time over which such process will be executed) related to different aspects (readings generated from different fields), with a common code (data structure - strings) to bring it to a format "it is like/ not like that". Such mixing is done through data, text, spread-sheets, pictures, voice and video. Data are discretely defined fields. What the user sees is controlled by software - a collection of computer programs. What the hardware sees is bytes and bits.

In perception, data are the response of our sensory agencies to individual external stimuli. Text is the excitation of the neural network in specific regions of the brain. Spreadsheets are the memories of earlier perception. Pictures are the inertia of motion generated in memory (thought) after a fresh impulse, linking related past experiences. Voice is the disturbance created due to the disharmony between the present thought and the stored image (this or that, yes or no). Video is the net

thought that emerges out of such interaction. Software is the memory. Hardware includes the neural network. Bytes and bits are the changing interactions of the sense organs (string) with the respective fields generated by objects evolving in time.

It requires an agent to mix these signals and convert them to electro-chemical information and submit to a conscious agent (operator) to cognize and utilize them. In perception, the former tasks are done by a transitory neural activity in brain called intellect. Though, it is not directly perceptible (prakrhtilayaah - प्रकृतिलयाः), it is inferred from its actions - firing of positrons in specific areas of brain during perception. Hence even after the breath stops, a person may not be brain dead as the intellect (बुद्धिः and not the transport agency mind) may still be functional. While mind facilitates the transport of various external impulses (सङ्कल्पः), the interpretation after mixing (vikalpa - विकल्पः) of the state of superposition of various thoughts/inputs in memory (चित्त), is done by transitory intellect (बुद्धिः). The apparently Conscious Self (अहङ्कारः) that cognizes it, is different from all these.

When we write on a computer, it had to move a collective of 0's and 1's - the machine representation of a Word document - from a temporary memory area (RAM) and send it to the CPU, through a bunch of wires. The CPU transforms the data into letters that we see on the screen. To keep that particular sentence from vanishing once we turned our computer off, the data representing it had to travel back along that bunch of wires to a more stable memory area such as a hard drive. Our mind and sense organs function like that.

At any moment, our sense organs are bombarded by a multitude of stimuli. But only one of them is given a clear channel at a time to go up to the thalamus and then to the cerebral cortex, so that like photographic frames, we perceive one discrete frame at every instant, but due to the high speed of their reception (manojavittwa - मनोजवित्त्व), mix it up - so that it appears as continuous. Unlike the sensory agencies that are subject specific (eyes can only receive electromagnetic radiation, ears only sound, etc.); the transport system within the body functions for all types of sensory impulses. This occurs against concentration gradients with the input energy like the sodium-potassium pump in our body, which moves the two ions in opposite directions across the plasma membrane through break down of Adenosine triphosphate (ATP). When sodium interacts with the surrounding water, reaction starts in less than a millisecond. After 0.4 ms, 'spikes' of metal shoot out from the droplet, too fast to be expelled by heating. Each of the atoms at the surface of the cluster loses an electron in picoseconds (10^{-12} s), and the electrons shoot into the surrounding water, where they are solvated (surrounded by water molecules) giving a deep blue color (pataro viklidhah pingah etat Varuna lakshyanam – पटरो विक्लिधः पिङ्गः एतत् वरुणलक्षणम्).

In the sodium-potassium pump, concentrations of the two ions on both sides of the cell membrane are interdependent, suggesting that the same carrier transports both ions. Similarly, the same carrier (called ubhayandriya manah - उभयेन्द्रियमनः) energizing inter-neurons, transports the external stimuli from sensory agencies (sensory neurons and gnyanendriya ज्ञानेन्द्रियम्) to the cerebral cortex and back (through motor neurons and karmendriya - कर्मेन्द्रियम्) as a command. These carriers are the "indriyam". Gita (3-42) indicates this sequence. Mind cannot be perceived, but is inferred from the knowledge or lack of external stimuli. Only if the mind transports different external impulses to the brain for mixing and comparison with the stored data, we (Self) know about that (for first time impulse received about something, there is no definite 'knowledge - ज्ञानम्). Only one who knows the true nature of consciousness, can learn properly (एतैरुपायैर्यतते यस्तु विद्वान्स्तस्यैष आत्मा विशते ब्रह्मधाम॥).

CONSCIOUSNESS:

We can know about something that exists only when it is revealed to our Self for observation. All revelations involve instantaneous transfer of energy, whose existence is realized only during change of state of the observed (रजसा उद्धाटितम्). Since the basic concepts cognized by all persons at all times are similar, and since the cognition of "I" is always related to all perceptions, it must be universal. It does not grow or reduce. It is not affected by these transformations, like the Sun is not affected when the water flows or is muddied though its reflection is affected by such actions.

When water flows from a higher position to lower down, if it faces an obstruction, it takes whatever channel is available and goes till its surface balance is maintained. On the other side (side facing Earth), it acquires the shape of the Earth's surface. It is like casting of a die for using a mould to create a shape. Similarly, all impulses carried by mind are mixed and presented through reflection by intellect (बुद्धिः) for observation by apparently Conscious Self, which is our Ego (अहङ्कारः – अहमिति ज्ञानं क्रियतेऽनेन). Chitta (चित्त) is the repository – hence memory - of all concepts received from our past experience (मनोबुद्धिरहङ्कारश्चितं करणमान्तरम् । संशयो निश्चयो गर्भः स्मरणं विषया अमी). After it is compared with the data bank (memory – स्मृतिः - स्वात्माश्रितक्रियाजन्यसंस्कारजन्यज्ञानम्) of concepts, we cognize it as 'I know this (the object) is like that (the concept) - जानाम्यहम्. That 'Knower - ज्ञाता' or 'Observer' - द्रष्टा is only witness (साक्षी) to these transactions.

Information encoding that passes from a cell to its descendants can go in many directions. RNAs can be written back into DNAs or a DNA strand can be reoriented by a protein, thereby changing the genetic program. Information polymers are molecules, which themselves are broken apart in water. In replication, cells create copies of themselves using enzymes, which are the proteins that underpin complex reactions, such as digestion. One property that distinguishes living beings from inert objects is their freewill - capacity to initiate action (pravṛti saamarthya - प्रवृत्तिसामर्थ्य). Inert objects cannot do this – they only respond to stimuli. The effect (phala - फल) of Freewill is either harmonious to our genetic composition (sukha - सुख) or not (duhkha - दुःख) based on release of free radicals or not. This determines our response to subsequent impulses making everything deterministic.

Freewill of living beings can be physical, mental or through speech form. While the first two are similar to mechanical functioning, inert objects cannot initiate these functions. The third function has two divisions (Saraswati Vaak – सरस्वतीवाक् - a derivative of Bhṛghu - भृगु and Ambhrhni Vaak - आम्भृणीवाक् – a derivative of Angiraa - अङ्गिरा, both derivatives of Parameshthee Prajaapati – परमेष्ठी प्रजापति). While the latter is mechanical and related to functioning of the physical world (as explained in Rik Veda 10-125), it requires a conscious agent to program or initiate it (Aham Rudrobhih... - अहं रुद्रेभिर्वसुभिश्चराम्यहमादित्वैरुत विश्वदेवैः । अहं मित्रावरुणोभा बिभर्म्यहमिन्द्राम्नी अहमश्विनोभा). The former is a fully conscious process and though some machines or computers can mimic human speech, they cannot interpret the meaning according to the context. Writing through computers we find proof for this. If you type deer in place of dear, it accepts without question. As a lady complained, when she types her name Dipti, it suggests modifications including dirty.

All life forms evolve inside the analog Conscious Sea that pervades everything, like the natural sea pervades coral, sea weed and fish. Structures form and perish - the sea is unaffected. Since it is analog like space and time and contains everything, it is called Brahman (Brhhattwaat - बृहत्त्वात् and Brhhanattwaat - बृहणत्वात्) and Mahaan (महान्). Since it is present in the smallest of particles, it is called Anu (अणु). We are inside the sea, but being ignorant, are searching for the sea.

The science of origin of Consciousness goes to the mechanism before creation when one primordial Energy became three (शक्तित्रयविशिष्ट – एतासु विवृतशक्तिः प्रथमेति प्रकीर्तिता । द्वितीयाव्यापकाशक्तिश्चिच्छक्तिस्यात्तृतीयका). In a long chain of interactions, it led to structure formation. The structures led to the development of our sense organs, which will be discussed separately.