

QUANTUM MECHANICS AND COGNITIVE SCIENCE: THE PROBE AND PROBED¹

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Abstract: Attempts are currently being made to use quantum mechanics as a probe to unravel the mysteries of consciousness. This paper examines this probe, quantum mechanics and its usefulness in getting an insight of working of human consciousness. The formation of quantum mechanics based on certain axioms, its development to study the dynamical behavior and motions of fundamental particles and quantum energy particles moving with the velocity of light, its insistence on wave functions, its probability approach, its dependence on uncertainty principles will all be critically discussed. The result of this discussion will be presented. Its limitations in unraveling the form, function and biological nature of consciousness will be presented.

The alternative probe available and being used – the translation of *Upanishadic* insight and *Advaita* philosophy into cognitive science elements in delineating the definition, form and function of Consciousness will be given. The usefulness of this modeling and analysis in understanding the consciousness, mind and its functions in cognitive science and theory of human language acquisition and communication will also be presented. The physic-chemical nature of ideas, senses, thoughts, feelings, utterances will be grossly dealt with. The functions of consciousness and mind, in knowledge and language acquisition and communication will be dealt with.

KEYWORDS: Quantum mechanics; Cognitive science; Upanishads; *Advaita* philosophy; Language acquisition and communication theory; Physicochemical nature of thoughts and ideas

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INTRODUCTION

The study of the human consciousness, mind, their nature, structure and function is generally believed to be a subject matter outside the realm of the disciplines of physics and chemistry (Taylor and Green, 2002). Others feel that the study of human consciousness belongs to the domain of philosophy and psychology and concepts of physics and chemistry are not sufficient enough to explain the nature, structure and function of human consciousness. Such *feelings* convey that the consciousness of living organisms certainly cannot be described in terms of physics and chemistry, even though the neurophysiologists can describe the working of the single neuron in physicochemical terms.

Scientifically, human consciousness, knowing, perception, reasoning, intellectual abilities, understanding, experience etc., are mental processes of the vertebrate human- being, belonging to *Homo sapiens* species. Thus human mental processes are biological, involving physicochemical energy transitions and transformations relating to brain, spinal cord and the nervous system (Guyton and Hall, 2004), Blakemore, 1977). Mind, which is an expression and part of consciousness, is an aspect of human body. Mind does all human mental functions which are physiological processes. Thus psychology is physiology.

As visualized by some, consciousness is the collection of millions of neurons and their electrochemical states, even if we have no real knowledge of chemical nature of thoughts and ideas. According to them, we neither have understood completely how living organisms originated and evolved. They feel that we may not be able to define precisely what life is nor whence it came from. All that we can do according to them is to describe the observable phenomena that distinguish living from non-living matter.

Mathematics and modeling by computational activity can explain understanding and consciousness. About 2300 years of philosophy, 100 years of mathematical logic and 50 years of computational intelligence have been trying to understand human consciousness and model its form and function, and still a clear model is eluding scientific community (Perlovsky, 2001-chapters 11 and 12). Theorems and other concepts developed by Gödel, Turing, Penrose and Putnam on mind and machine have not been sufficient to model intellect, understanding, experience and other mental processes. (Perlovsky, 2001) and

Penrose (Perlovsky, 2001) sustain that the brain activity responsible for conscious understanding must depend upon a physics that lies beyond computational simulations.

Further, we are yet to formulate neural structures of consciousness. “The Physics of spiritual substance” is yet to be proposed and develop. We have also to understand the

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physics of the nature of free will and the creativity mysteries. We have also to probe and determine whether consciousness is a hitherto not known new physical phenomenon or otherwise. A future direction for this research lies in the path to understand the physical nature of the symbol and emergence of consciousness using many sources including spiritual expressions..

THE PROBE AND THE PROBED

THE QUANTUM MECHANICS AND COGNITIVE SCIENCE

Many are also trying to bring in quantum mechanics to unravel the working of human consciousness and mind and various types of approach to understand human consciousness are proposed and discussed. Cognitive science is union of all the studies on consciousness, mind, language acquisition and communication, natural language comprehension and many related fields. A correlation of these various propositions and discussions will be inherently influencing the studies on human consciousness and mind.

This article deals just with the limitations and unsuitability of quantum mechanical approach in human consciousness studies and cognitive science which includes theory of language acquisition and communication studies.

UPANISHADS, QUANTUM MECHANICS AND VEDANTA

Ancient Indian wisdom as revealed in the *Upanishads* has a lot to say about human consciousness (Radhakrishnan, 1994, Ramabrahmam, 1997, 2004, 2005a, 2005b, 2007a, 2014, 2016). The expressions of the *Upanishads*, when translated into the modern scientific terms will benefit the fields of physiological psychology; the natural language comprehension branch of artificial intelligence, and the modeling of human cognition, language communication and understanding processes. In addition the expressions of seers and *Vedantins* can also be analyzed.

It is the philosophical belief of the physicalists that a phenomenon has to be reduced to its smallest components to achieve a complete explanation. This is generally interpreted as

meaning that explanation could be achieved only at the lowest level of organization. This conclusion would be particularly disturbing for biologists, because at the lowest levels of organization such a reduction abandons biology, human consciousness, mind and subtleties of their working and deals exclusively with physical phenomena.

This is one limitation of quantum mechanics. However such reduction is not only not necessary but indeed quite impossible in consciousness studies. The support for reduction is in part the result of confusion with the process of analysis (Mayr, 2005). Analysis is and always will be an important methodology in the study of complex systems.

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Reduction, on the other hand, is based on invalid assumptions and should be removed from the vocabulary of science (Mayr, 2005).

In many processes of biology like consciousness studies, ageing; theoretical physics solely has no role to play. Any physical theory clubbed with chemistry and in finite times with finite velocities only will succeed with phenomena relating to human consciousness and mind. Phenomenon dealing with fundamental particles and energy particles represented by a wave function and probability of happening by integrating in tau space the wave function and its complex conjugate must be suitable in tiny dimensions of space, matter and time which only is the range of quantum mechanical approach.

Quantum mechanics is developed based on axioms and not on proven theorems.

Quantum mechanics could not explain spectra of various atoms beyond hydrogen.

MENTAL CONJECTURES IN MODERN PHYSICS AND COSMOLOGY IN TERMS OF TIME AND ENERGY:

Worm-holes; black holes; white holes; time travel; twin paradox; time dilation; singularities; real and imaginary components of time; big bang; big crunch etc., is the vocabulary that dominates the discussion of nature of time (Stephen Hawking 1989, 2001), Peter Coveney and (Roger Highfield 1991). The quantum cat paradox, Wigner's friend, parallel universes, the EPR paradox, which deal with quantum mechanics make the understanding of nature of time further confusing than clarifying (Peter Coveney and Roger Highfield 1991).

These attempts to express the nature of time using advanced mathematics seem more as intellectual exercises and the propositions based on them as mental pictures confined to the realm of happenings concerning the universe or quantum mechanics than explaining physical realities actually present in the universe, especially on planet earth as studies in various disciplines and fields like chemistry and biology. Broadly speaking, quantum

mechanics incorporates four classes of phenomena that classical physics cannot account for: (i) the quantization (discretization) of certain physical quantities, (ii) wave-particle duality, (iii) the uncertainty principle, and (iv) quantum entanglement.

These phenomena have no application in consciousness studies as consciousness is the result of breathing process as is envisaged by Upanishadic seers and other theological interpreters and is solely classical in nature in relation to energy transformations and organic nature of matter simultaneously existing in all phase of matter.

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WAVE FUNCTIONS – PROBABILITY DISTRIBUTIONS AND UNCERTAINTY PRINCIPLE: LIMITATIONS OF QUANTUM MECHANICS IN CONSCIOUSNESS STUDIES AND COGNITIVE SCIENCE

Wave functions are functions of both time and space and can change as time progresses. An equation known as the Schrodinger equation describes how wave functions change in space and time, a role similar to Newton's second law in classical mechanics. The Schrodinger equation, applied to our free particle, predicts that the center of a wave packet will move through space at a constant velocity, like a classical particle with no forces acting on it.

However, the wave packets will also spread out as time progresses, and this means that the position becomes more uncertain. This also has the effect of turning position eigen states (which can be thought of infinitely sharp wave packets) into broadened wave packets that are no longer position eigen states.

Some wave functions produce probability distributions that are constant in time. Many systems that are treated dynamically in classical mechanics are described by such "static" wave functions. The time evolution of wave functions is deterministic in the sense that, given a wave function at an initial time, it makes a definite prediction of what the wave function will be at any time. During a measurement, the change of the wave function into another one is not deterministic, but rather unpredictable, i.e., random.

Thus the choice of wave functions – to choose, time dependent or time independent – wave functions will be major obstacle in the application of quantum mechanics as consciousness studies deal with both space and time consciousness. And randomness has no use for the precise working of human consciousness and mind.

In relation to working of human consciousness and mind; the energies taking part are not quantized nor the matter involved is neither particle nor have a wave function representation - as electron – and in nature – actually exists simultaneously as solid, liquid, gas and plasma phases – and does not travel with the velocity of light.

But in relation to working of human consciousness, mind and related mental functions all the happenings and events are classical i.e., velocities are not equal to velocity of light, the energies transform or change continuously and matter exists in all the four phases simultaneously and neither matter nor energy is dual in nature in these studies and is purely classical in nature.

Classical description is also an important view of nature. Just because quantum ideas have been introduced, gravitational forces did not cease to control movements of heavenly bodies i.e., cosmic bodies like sun, planets and host of such heavy masses.

However the classical picture finds a limit in the quantum domain. However scientists do not know what to replace it with. This aspect of Reality, i.e. the classical limit as well as non-immutability of the particle view of nature should be discussed. It is a major issue in Science today. However consciousness cannot be modelled in this way considering the dual nature of matter and or

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energy. In reality consciousness is the form of infra sonic energy reflected as brain waves produce by breathing process. (Ramabrahmam, 2016).

Under other conditions, the same type of objects exhibit wave-like behavior, such as interference. We can observe only one type of property at a time, never both at the same time. And this suits the classical nature of human mental functions whereas quantum approach has limitations in observing the existence of one of **position or momentum or time or energy.**

Another quantum effect is quantum entanglement. In some cases, the wave function of a system composed of many particles cannot be separated into independent wave functions, one for each particle. In that case, the particles are said to be “entangled”. If quantum mechanics is correct, entangled particles can display remarkable and counter-intuitive properties. For example, a measurement made on one particle can produce, through the collapse of the total wave function, an instantaneous effect on other particles with which it is entangled, even if they are far apart.

The quantum mechanical approach though is successful in describing the motions of fundamental particles and photons, will be of no use while dealing with the macroscopic and microscopic physicochemical changes associated with various types of conscious happenings in the observation of consciousness. And quantum mechanics is successful when clubbed with statistical mechanics in view of large number of material or energy particles.

Human consciousness modeled divorced of biological, species basis will not be truthful.

Thus quantum mechanics deals with the motion of fundamental particles and energy quanta,

their transmission, absorption and transfer through matter or vacuum. The velocities associated and the sizes of particles/photons are not comparable to the neuron signal transmissions which happen in ionic phase through liquid medium.

Quantum mechanics at present is not in the stage of clubbing these ionic-matters and energy-forms (electro-chemical and mechanical) which are classical rather than “quantal”. It is also not known whether these transmissions are analog or digital. The time-periods and nature of energy transfers or transformations of these happenings are more nearer to classical transformations rather than quantum transformations at the gross level. We all know the energy transformations involving quantum processes are discrete in nature. But neural transmissions are continuous in nature.

The probabilistic nature of quantum mechanics thus stems from the act of measurement. This is one of the most difficult aspects of quantum systems to understand. And quantum mechanics could not explain spectra beyond hydrogen atomic spectrum.

Depending on such a method where and when the matter and energies involved are in classical range and the energy transformations are not quantum in nature, the quantum mechanical approach to understand human consciousness has limitations and

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is unsuitable in the infrasonic, chemical, physical, electrochemical energy reversible transformations which constitute the working of human consciousness and mind (Ramabrahmam, 2007, 2013, 2016).

GIST OF LIMITATION OF QUANTUM MECHANICAL APPROACH

Based on axioms (1) Deals with atomic and sub-atomic material particles and energy particles (2). The particles move with velocity of light. (3) Uncertainty is inbuilt. (4) Uses wave-functions and probability distributions. (5) Energy emissions, absorptions and transformations are discontinuous - quantum in nature. (6) This conclusion would be particularly disturbing for biologists, because at the lowest levels of organization such a reduction abandons biology, human consciousness, mind and subtleties of their working and deals exclusively with physical phenomena.(7)

Quantum approach does not talk about mental phase, process of mental functions, cognitive states, functional states of mind and control of mind and its functions.((8))

Consciousness energies are infra sonic, in nature and are reflected in and manifested as brain waves.(9)

All other mental energies are biochemical, electro-chemical and mechanical.(10) Does not say anything about theory of language acquisition and communication which is done by

the same mind (brain and nervous system).(11)

Upanishadic insight takes care of points 8 to 11.

UPANISHADIC INSIGHT OF CONSCIOUSNESS

The continuous and simultaneous or alternate rise and set of the conscious states or phases of mind is an aspect of psychological time and its flow and quantum ideas have no role to play in these classical processes.

Atman (yasya gamanam satatam tat atma) and maya (yaya asantam pasyati sa maya or ya ma sa maya) together constitute and compose of human consciousness and are the ingredients that construct and operate human consciousness and human mental functions)⁸.

poornam adaha pooram idam poornat pootnam udachyate poornasya poornam aadaya poornam eva avasisshyate The above Upanishadic expression informs about Atman (adaha or aham) and idam, the inner mental world and mental functions taking place therein. Idam comes out as full from adaha – the full and after this release the adaha remains full. This means adaha or Atman or Brahman is both the instrumental and substantial cause

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(upaadaana kaarana) for the formation of inner mental world. Atman also gives us dristi or consciousness. Atman, which moves always, rather oscillates in tune with the breathing process and is the result of it⁸, is both the source, guide of and absorber of maya, the chit aabhaasa or pranavam, the reflected form of the chit energy. And inner mental world is constructed by maya and associated mental functions are transformations of maya in forward and reverse directions, technically known as vivartanam. “mayaamayam idam jagat” sentence informs this.

HUMAN CONSCIOUSNESS AND MENTAL FUNCTIONS: THE BEING AND BECOMING OF MIND

Cognitive sciences often rediscover philosophical analyses painstakingly. A better policy to understand and model human consciousness and mental functions would be first to learn what philosophy (Eastern or Western) teaches us about human consciousness and mind in this regard, and then move on to experimentation and model–building within the scope of positive sciences. The aim of this research paper is to present such a possibility of using Upanishadic insight to model and understand the form, structure and functions of

human consciousness and mind, and to provide as well necessary hints to develop software which would model the tasks of mind.

Ancient Indian philosophical insight as revealed in the Upanishads has a lot to say about human consciousness¹⁻¹⁴. The expressions of the Upanishads, when translated into the modern scientific terms will benefit the fields of physiological psychology; the natural language comprehension branch of artificial intelligence, and the modeling of human cognition, language communication and understanding processes.

FORM OF PURE CONSCIOUSNESS AND MENTAL AWARENESS - THE INGREDIENTS OF HUMAN CONSCIOUSNESS

Thus, Atman's (Self) existence is proposed by the Upanishads¹. Upanishads are source-books of Atmajnana, the Knowledge of the Self. Upanishads, as described above, construe the state of Atman or Self as the real 'I' state. Upanishads say that the 'I'- awareness is human consciousness. They understood the state of Self - pure consciousness or unoccupied (mental) awareness - as the real identity of "I", and proposed that state as the natural, original and ground state of human mind⁴⁻⁶. When studied with an open mind and further contemplation, thus it becomes clear that Upanishads are actually texts of science on human mind. The Knowledge of Self as revealed in the Upanishads is an integrated psychology in mental energy-presence and transformation terms.

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THE SCIENTIFIC INSIGHT OF PURE CONSCIOUSNESS AND MENTAL AWARENESS AND FUNCTIONS:

Atman provides pure consciousness and it is the human consciousness and has following structure: Human consciousness, in the form of and characterized by Being-Pure Consciousness-Bliss is:

- i) an Oscillating Energy-Presence i.e., an infrasonic bio-mechanical oscillator, which is the result of breathing process and the subsequent rhythmic gaseous exchange in the lungs, issuing out mental energy pulses frequency of 10 Hz (a time-period of 10^{-1} sec) is the real source of mental energy, the Being of Mind and*
- ii) its reflected (in medulla oblongata or reticular formation) virtual energy-pulse series (becoming of mind – mental awareness) together constitute human consciousness and are the ingredients of human consciousness⁸*

Human consciousness based on this proposition can be viewed as comprising of Pure Consciousness (Being of Mind) and Awareness (becoming of mind). Atman (mental or psychic energy source) takes care of the consciousness part and maya (reflected mental

energy virtual form) and its forward and reverse-transformations take care of the awareness part. Thus Atman is proposed to be an infrasonic mechanical oscillator giving out mental energy pulses of frequency 10 Hz (time-period of 10^{-1} sec.) 10 Hz is the frequency of this mechanical oscillator according to both western science and eastern philosophy and theory of language acquisition and communication. The enormous number (300 million) and surface area (70 square meters) associated with alveoli constituting this bio- oscillator/.bio-maser produces enormous amount of mental energy though the frequency is in the infrasonic range. [It is interesting here to mention that the mental rhythms detected by the experiment by German scientist Hans Berger¹⁵ using EEG (electro-encephalogram) also have the same time- period of 10^{-1} sec]

PHYSICAL OPTICS ANALOGY OF FORM OF PURE CONSCIOUSNESS- BEING AND MENTAL AWARENESS AND FUNCTIONS-BECOMING OF MIND *The*

famous bi-prism experiment of Fresnel in physical optics studies describing and explaining the formation of interference pattern of dark and bright bands on a screen from a point light source is a very apt analogy to state, describe and understand the real nature of the Atman as an oscillating source of mental energy and the virtual (unreal) nature of maya as reflected virtual mental energy pulse series. Atman is similar to the point source of light and maya to the virtual (unreal) source(s) formed from light reflections in the bi-prism (Concept Diagram II). As is known, the two virtual sources thus formed in turn serve as the two coherent sources responsible for the formation of interference pattern during which process the real point light source remains untouched and unchanged but its presence is essential for the formation of the virtual (unreal) sources and consequent interference pattern. So also transformations of maya give rise to various mental phases, functions and activities, while the real source of mental energy, Atman, is untouched and unchanged or not transformed but is essential for the

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existence of awareness as (human) consciousness and simultaneously for the awareness of activities of the mind and body as transformations (beings / becomings) of Atman and maya Thus mental energy pulse series reflected in Medha,(can be medulla oblongata or reticular formation?) termed as maya, are virtual (unreal-mithya), but are same in content, form and nature as the real mental- energy presence (Atman) just as reflected light energy is same as light energy from source in content, form and nature. Maya is also known as reflected chit and or primordial sound (Ramabrahmam, 2005 to 2016).

THE GIST OF ABOVE PROPOSITION:

1. *Human consciousness is an energy-presence in the form of bio-oscillator /maser/ laser issuing out mental energy pulses.*
 2. *Human consciousness is a series of awareness responsible for and constituted by mental energy pulses generated by breathing process and the consequent gaseous exchange taking place in the lungs.*
 3. *The time period of one mental energy pulse is 10^{-1} sec.*
 4. *Human consciousness as oscillating energy-presence is the provider of mental energy, mental time space and awareness.*
 5. *Human consciousness is an awareness of both mental activities and their cessation.*
 6. *Modulation and demodulation – the forward and reverse becoming - of virtual mental energy carrier pulse series maya in two stages is the process of all human sensing/ learning/ knowing/ expressing/ teaching/ perceiving/ doing intellectual operations/ thinking/ understanding/ experiencing associated with human acquiring and imparting knowledge through languages or otherwise about the disciplines and skills (painting, singing, dancing, car-driving etc., and the ability to perform the skills.*
 7. *Human consciousness is the result of breathing process and is an oscillating energy presence. Energy released from such an energy presence and its flow is the current of awareness flowing throughout the body and makes the body active cognitively by activating neurons, proteins-the biochemical hardware, similar to electric current flowing throughout a television set makes it active in conjunction with hardware within and apparatus that sense, receive and reproduce the information.*
- Human consciousness creates conscious relationship between body functions and mental functions and also can dissolve such relationship. When such relationship is dissolved the right identification of “I” happens. The real identification of ‘I’ provides the natural or normal or ground state of mind.*
- The natural or normal state of human mind is peace; bliss; silence. Mental functions form veil over this natural state and superimpose themselves on this pure consciousness as awareness and pure consciousness transforms into simultaneous existence of consciousness and awareness. The awareness creates self-consciousness also in the individual and then the individual relates oneself to the body, gender, social status, nationality, mental traits etc., and “falsely” identifies with all of them with an egoistic mind.*
- Simply put, according to Upanishads, human mental functions are the forward and backward transformations of chidabhasa or maya - the carrier (in the sense of carrier radio wave in broadcasting and reception process) cognitive-energy pulse series, modulated by energies sensed through sense organs*

or the stored information as potential energies retrieved (as vasanas - object-experiences first and then jagat [inner world] as feelings/thoughts/perceptions) and demodulated to give humans knowledge, experiences etc. (Concept Diagrams). The transformation of maya, reverse transformation of maya and cessation of transformation of maya - the dvaita and advaita conscious states respectively- taking place simultaneously, consecutively and alternately is the structure, form, function, state and essence of human consciousness, mental functions and cognitive processes (Concept Diagrams).

Maya which is also known as pranavam, and its transformations understood in combination with the Sabdabrahma Siddhanta throws light on language learning and communication processes. Sabdabrahma Siddhanta based on Upanishadic wisdom provides four modes of language communication and reception process; para-- mode of awareness--; pasyanti –mode of verb or sense or mood--; madhyama -mode of sentence,-- and vaikhari –mode of utterance in sound form, which can be successfully used to understand human language acquisition, communication and usage processes.

CONCLUSIONS

1 Human consciousness is awareness of human mind. 2. Human consciousness is the result of the breathing process and the consequent rhythmic gaseous exchange in the lungs and is an oscillating energy-presence in the form of a bio-oscillator issuing out mental energy pulses of frequency 10 Hz. 3. Human consciousness is **not** a term denoting any of an individual, individual's body, self-consciousness, the social status, age, gender etc., 4. Human consciousness is the **unoccupied awareness** in the individual in the *Jagrat Sishupti* (wakeful sleep) consciousness state when peace, bliss, silence and oneness or non-duality is experienced. 5. Human consciousness is not a person, a thought, a sense, an experience or an understanding. It is a **consciousness** which transcends all these and is a non- transforming **seer** and **witness** to all these and is revealed and experienced as peace or bliss or silence in wakeful sleep conscious state- the mind-transcending phase when all mental activities in the form of thoughts and senses etc, -cease to be. And one has to refer to this natural and normal mental state when one refers to human consciousness. 6. Human consciousness is unceasing, undivided continuous blissful awareness. 7. Human consciousness is a consciousness present always and is super-imposed but untouched by mental functions during wakeful (*Jagrat*) and dream (*Swapna*) conscious states and becomes sense/mood or thought or expression. Self-consciousness arises in these two states and then 'I' is identified with individual's body, sense and thoughts about I, me, mine, mental capabilities, gender, social status, age etc, and masks pure consciousness /. In deep sleep (*Sushupti*) conscious state (like zero in number system without value but is

essential and significant) there is no awareness of the body, the within or without of the body. No 'I' expression, thought, feeling or sense or experience relating to individual exists in this mental phase.

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8. Human consciousness is an eternal consciousness transcending the three conscious states – wakeful, dream and deep sleep- and observes all the mental activities or cessation of such activities taking place in these three mental phases. It is also present during these phases as continuous consciousness/awareness to happenings within and without of the body. 9. Human consciousness sources the mental energy and mental time-space necessary for the origin, form, structure, function and cessation of human mind and its activities. 10. Human consciousness is divided into four consciousness states of mind. They are Wakeful Sleep (*jagrat sushupti*), DeepSleep (*sushupti*), Wakeful (*jagrat*) and Dream (*swapna*) providing unoccupied awareness, awareness of without of the body and awareness of within of the body respectively giving *advaita* and *dvaita* conscious states of mind 11. Human mind is a combined operation of human consciousness (**Self-Atman**) and transformations of its reflected and virtual mental energy reflection *maya* or *pranavam* - comprising of modulations and demodulations to it-constituting inner mental tools associating closely with, stimulating and receiving stimuli from sense organs and action organs. 12. Human mind is the manifestation and functional form of human consciousness. It is a tool for human cognition and communication, intellectual operations, storing and retrieval of human experiences/understanding/sense (meaning of an utterance/expression) and relates the individual to the body, personality traits and social status. Human consciousness both observes and transcends all these. 13. Human cognition takes place in the simultaneous play of *dvaita* and *advaita* states of human mind. In *dvaita* state a differentiated perception of *knower-knowing-known* is experienced. In the *advaita* state the sense/understanding/meaning of utterance/expression becomes cognition element to consciousness and the knower and known dissolve into knowing. Only consciousness is present in the *advaita* state. Consciousness is split into consciousness and awareness in the *dvaita* state. 14. Human language learning/understanding and communication processes happen in the interplay of *Bhakti* (*advaita*) and *vibhakti* (*dvaita*) states of mind. 15. Human knowing and communication process is a quick successive transformation of four modes of cognition/language. The modes are:

*I. Speaker/Teacher:
communication:*

(a) **Infrasonics:** Pure Consciousness/Purport/Unoccupied Awareness (Meaningful Experience or

Experienced Meaning- *para*) *Bhakti* : experience of import *Infrasonics*

(b) **Biochemical:** Understanding/ Experience/ Sense/ Mood/Volition/ Intuition (*pasyanti*) state of verb

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(c) **Electrochemical:** Perception/Thinking/Feeling (*madhyama*) *vibhakti* : state of subject-verb-object

(d) **Mechanical:** Utterance /Expression (*vaikhari*) *vibhakti* state of subject-verb-object in audible form

II. Knower/ Listener/ Learner: knowing/ learning, cognition and understanding:

(a) **Mechanical/and other energy forms' stimuli:** Knowing (through sense organs)- *vaikhari*

(b) **Electrochemical: Perception/Thinking** - *madhyama*

(c) **Biochemical: Understanding/** Experience/Sense/mood/Volition/Intuition -*pasyanti*

(d) **Infrasonics: Pure Consciousness/Purport** (Meaningful Experience/ Experienced Meaning)/Unoccupied Awareness- *para*.

16. Human cognition and communication is the result of modulations and demodulations relating to mental energy pulse series similar to the modulation and demodulation happening to carrier radio wave during transmission and reception of radio and television broadcast and telecast.

The aid of philosophical insights of consciousness and mind and its functions available in eastern and western systems have to be taken as presented in this article In view of its essential nature and features – wave functions, wave-particle duality of matter and energy-dealing with only inorganic phase of matter; and various quantum effects, produced; discussed in this paper, not suiting classical behavior of matter being present in all phases and classical energies - mechanical, chemical, electrochemical, biochemical, transforming continuously, thus classically - dealt with quantum ideas have no role to play in consciousness studies, cognitive science including theory of language acquisition and communication.

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CONCEPT DIAGRAM I and II

STATES OF CONSCIOUSNESS – MENTAL TIME - SPACE

PHASES OF MIND

WAKEFUL SLEEP

JAGRAT SUSHUPTI

BEING Mind is active and functions if willed.

Sense organs are alert and in functioning state and action organs are ready to function. Through Meditation one reaches this state. Also known as State of Self, Silence, Bliss, Peace, **Unoccupied awareness** Pure consciousness Divine consciousness Real 'I'-state etc. **Time and Thought- transcendent phase of mind.** Natural or original or ground state of mind

WAKEFUL *Jagrat* Self Consciousness **Mind is active.** Sense and Action organs

Virtual "I" are active are in working state. All learning/expressions take place in this

Reversible Becoming state. known Phase **Idam** as *awareness* of thought *of* processes. *without* state. Also

IDAM

Time-conscious JAGRAT

SELF **ATMAN** REAL 'I' Source of mental energy Mental time-space Continuous Consciousness

INTRASONICS / BIOCHEMICAL/ ELECTROCHEMICAL

MIND AWARENESS

Electro-chemical / Mechanical

Cognition Cognition-related Process organ movements Inner mental Five kinds tools of action Sense Organs /reaction

Action Organs

DEEP SLEEP *SUSHUPTI* **Mind is dormant** and absorbed in *Maya* (*virtual* mental energy) and not active. Sense and action organs are not in functional state. No awareness of cognitions or inner mental world or memory No thought process takes place. State of cessation of mental activities. **Time-unconscious and thought, sense- or urge– absent phase of mind.**

DREAM Self-consciousness **Mind is active.** Sense organs are in dormant state. Action organs will be functioning if necessary. Phase of thought processes. Also known as *awareness of within* state. **Time -conscious. SWAPNA.**

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Transformation of Maya

* Eyes, ears, nose, tongue and skin are *sense organs*. * Movements related to hands, legs, vocal chords,

reproductive organ and bowels are *action organs*. ***Manas, Buddhi, Chittam and Ahamkaram* are inner mental tools (*antahkaranas*). Experiences created by perceived object-energy forms memory are (*vasanas*). Stored and retrieved collection of collection of perceived object-energy forms and is called inner mental world (*prapancham, IDAM., jagat or viswam*). *Maya* is also the **current of awareness**.

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II - ARCHITECTURE OF MIND AS EXPRESSED IN THE UPANISHADS

Mental time- space/Natural state of mind

SELF

Source of mental energy

Pure Consciousness

Being

Infrasonic Oscillator 10

Virtual Mental energy

*Infrasonic form
Cognition/Urge related Mechanical actions*

Conscious awareness - Mind

Inner mental

tools

Five kinds of action

Cognition/biochemical Electro-chemical

Manas–Perception – Recording & Recollection of cognitions.

Five types of mechanical energy transduction

Buddhi - Intellectual functions *Chittam* –

Cognition created

Experience/Moods/Meaning/

Senses/Understanding /Memories

Recording & Recollection

Ahamkaram – Self-consciousness

Action Organs- Movements relating to -Leg, Hand, Vocal Chords, Reproductive organ and Bowels.

Modulated mental tool- *Manas*

	Tongue (chemical)& (mechanical/heat)	Skin
Sense organs – Eyes (light), Ear (sound), Nose,	ACTION/REACTION ACCORDING TO SENSING, EXPERIENCE /VOLITION /UNDERSTANDING /MOOD PERCEPTION, THOUGHT OR URGES OR ACTIVATION OF MEMORY/MEANING (SENSE)	

Structure and function of mind is a combined operation of all these

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CONCEPT DIAGRAM III

THE GIST OF HUMAN COGNITION AND COMMUNICATION PROCESSES

Consciousness (Being-*Sat*) Awareness (Becoming- *idam*)

Speaker: *Modulation-purodhana*

Infrasonics Infrasonics/biochemical electrochemical mechanical/stimuli

Brahman/Atman chidaabhaasa/maya/pranavam antahkaranan karmendreyani / jnaanendrayani

Import experience/understanding/insight feeling/thought/perception actions/reactions/cognitions

Vivartanam-Reversible Becoming

Bhakti sphota+iccha/artha sakti vibhakti / jnana sakti ucchaarana/kriya sakti

Para/tatpara/ Tatparya pasyanti madhyama vaikhari

Purport mood/ urge/sense/ verb sentence/ subject-verb-object sentence in sound form *Infrasonics*

Infrasonics/biochemical electrochemical^mmechanical/stimuli

tirodhana - Demodulation :

Listener

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