**Introduction:**

 The *Upanishads* are replete with many expressions which deal with human faculties and mental processes which can be used to understand and model human cognitive processes[1-20]. Indian spiritual wisdom contained in the *Upanishads*, *Advaita siddhanta, Shad Darshanas* and other similar texts is not merely theological but is also psychological and scientific The *Upanishads* are traditionally commented on as theological texts [1]. But *Upanishads* are also texts of science of mind [2-10]. *Advaita* and *Dvaita* concepts can be successfully used to understand the theory of human mental processes [3-5]. *Atmajnana*, the essence of *Upanishadic* wisdom when interpreted from psychology and modern science point of view, yields a mine of information about phases of mind, cognitive states of mind and functions of mind [3-9]. The physical structure of mind and a model and possible theory of human cognition and language acquisition and communication processes can be presented when the ideas from *Upanishadic* wisdom, *Advaita* thought, *Gayatri Mantra* and *Sabdabrahma* theory are clubbed [6,7]. As a continuation to this approach, *Advaita* philosophy-the off-shoot of *Upanishads*, its chief idea *vivartanam*, *Atman* as the source of mental energy and mental time space by the generation of *maya* from ***Itself*** and transformation of *maya* to form *idam* consisting of *jiva, prapancham, jagat* etc., and their modern scientific implications are presented from physics and electronics view and understanding.

 *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***, theinner 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 material cause (***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 it [8], 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.

*Maya* thus is synonym for mental or psychic energy that creates and retrieves and is the raw material or energy that builds inner mental world (***jagat***) in the form of mental functions and their cessation [6-8]. *Atman* can be compared to present-day electronic oscillator and can be considered as a bio-oscillator issuing out psychic energy pulses of period 10-1 sec. [3-9] and thus relates to the field of bionics and cognitive sciences. *Atman* is construed to be the **Energy-Presence** which provides psychic or mental energy and mental time-space [4,5]. The psychic energy pulses when reflected in the *Medha* become *maya*- the virtual *chit* energy, *chidabhasa*.

 *Vivartanam* is the type of change that *maya* undergoes while *sristi* (creation of mental impressions or mental world) takes place.When *sristi* is being created or is in the *dristi* (Consciousness/awareness), we are mentally functioning. When *sristi* is in the awareness a veil is formed on *dristi* and creates *adhyasa*. According to *Advaita* thought only two mental situations are available for humans in the consciousness of the *Atman*. The situations are *nidra* or *sristi. Nidra* corresponds to the *sushupti* state of consciousness or phase of mind (Concept Diagram I). During this phase of mind, all mental functions cease to be in the awareness and *maya,* whose transformations these mental functions are, becomes *nirvishaya suddha vasanaa pravaaham*. During this phase of mind *maya* does not bifurcate as *divyam (jnana sakti)* and *swaram (prana sakti*) as in *jagrat* and *swapna* conscious states and both sense and actions organs remain dormant and functionless (also see Concept diagrams II to IV) [3-9].

 All human learning, knowing, communication, perception, reasoning, experience, understanding and a state transcending these mental functions are the combined and simultaneous operation of *Atman, maya, antahkaranas* (inner mental tools), *pancha pranas,* sense organs and action organs [3-12]. Mental functions take place as the inter-play of *advaita (vishranta dristi*-unoccupied awareness-pure consciousness) and *dvaita* (simultaneous presence of *antarmukha dristi*-awareness of within of the body and *bahirmukha dristi*- awareness of the without of the body. Sense organs are activated by the *antahkarana manas* and this forms the *baharmukha dristi*- awareness of the without of the body. During this awareness of mind *tanmatras* (object-energy forms) are sensed by sense organs by tuned *manas*. Perception is a construct from the inputs through sense organs and *manas****. Manas***gives ***dristi*** or awareness of without and within of the body concerning the sensing, sensed and experiencing creating object-energy forms (Concept Diagrams II to IV)

 *Advaita Siddhanta* is popular as *Vedanta Darsana*. Like *Vedanta Darsana,* *Sabdabrahma* *Sidddhanta*-the language theory proposed and developed by Indian grammarians also has *advaita* philosophy as its basis[23-28]. *Advaita* philosophy is an integrated psychology, which professes the sameness of the knower in both the self-conscious *(jivatma),* the state of Becoming- in forward and reverse directions - and the **Witness** in the transcendent pure-conscious *(paramatma*) state as Being during the processes of Expression/Teaching and Knowing /Learning [3-7].

1. ***Brahma sat jagat mithya jivo brahmaiva na aparah***- means

What is present always (in *dristi* and responsible for formation of *dristi*) is *Brahman* and *jagat* (which is moving or transient) is *adhyasa* (veil), over *sat* (*Brahman*); and *mithya* (unreal or virtual) *jiva* (self-consciousness or egoistic state of mind as *adhyasa* over *Brahman*) is *Brahman* (pure consciousness or unoccupied awareness) Itself, not different or separate.

 *Maya* as *tamas* conceals the *atma chaitanayam*; falsely identifies the individual with self-consciousness and forms ego - which are also part of inner mental world (*jagat*) by forming veil (*adhyasa*); thus causes *moham* and makes one see and experience *jagat* as *sukti rajata bhranti*; or *rajjusarpabhranti* as *avidya* and makes *vidya* disappear from awareness (*dristi*); and is transient and transitory as the reflection of *sat*.

 Because of these five kinds of illusions caused by *maya*, all inner mental world and mental functions therein transpose themselves on *Atman* as pictures are superimposed on the cinema screen. *Atman* is like the cinema screen here. These pictures (cognitions and self-consciousness) appearing on *Atman*-screen do not and cannot separate themselves from the screen and require the screen for their appearance, cognition and sustenance.

 All this is termed as *mithya* till the mental awareness becomes pure-consciousness and once this Truth becomes the *dristi* (consciousness), all these cognition and ego related-appearances are termed not separate from *Atman* but as part and parcel of *Atman*. *Dristi* (conscious awareness) is important. Just as waves are not separate from the sea so are the appearances as *sristi* (cognitions and self-consciousness) are not separate from *Atman*.

 The following chief ***Upanishadic maha vaakyaas*** are commented from psychological and scientific points of view to help in the furtherance of this understanding.

***Aham Brahma Asmi*  I AM BRHMAN**

The real identity of ‘I’ is Unoccupied Awareness.‘I’ is not a body, person, thought or not a sense. ‘I’ is pure consciousness.‘I’ is the impersonal **Seer** which is the source of mental energy and guide of and witness to transformation of mental energy as mental functions but unaffected by them and transcending both mental functions and their cessation.

***Tat Tvam Asi*  THAT IS YOU**

Self and Pure Consciousnesses are same in nature, content, structure, form (function) and presence. At a given moment either self-consciousness or pure consciousness will be present. Self-consciousness is super imposition over pure consciousness. Pure consciousness is continuous, self-consciousness is transient and transitory.

 ***Ayam Atma Brahma* THIS *ATMAN* IS *BRAHMAN***

*Atman* is *Brahman* – Unoccupied Awareness –- Energy Presence without transformation.

 ***Prajnanam Brahma PRAJNANAM* IS *BRAHMAN***

*Brahman*– as *Atman* –– Energy Presence – is Mental Time- Space and Continuous Awareness.*Prajnanam* is Unoccupied (by cognitions, thoughts, cognition-related and created experiences, senses or their retrieval) Awareness in Pure Consciousness.

 ***Anando Brahma* BLISS IS *BRAHMAN***

Unoccupied Awareness is bliss.

**II**  *Atman is sat-chit-ananda*. *Sat* is the present continuous form of the root (*dhaatu*) ‘***as***’ meaning ‘to be’ *Jagat* is the present continuous form of the root (*dhaatu*) ‘***jag***’ meaning ‘to move’. *Jagat* forms *adhyasa* on *sat* and pure consciousness (*paramaatma* state) (*chit*) becomes self-consciousness (*jeevaatma* state). Both *paramaatma* – ego-free or ego-transcending and *jivaatma* – egoistic mind are present continuous forms and refer to mental functions not taking place or taking place.

***Sarvam Khalu Idam Brahma* ALL *IDAM* IS *BRAHMAN***

*Idam*, (*prapancham* or *jagat* ) ( all the world - the collection of cognitions sensed by sense organs through the medium of *manas*) – is composed in, made up of, sustained by, rests in and ceases to be because of and part and parcel of psychic energy pulse generator – *Atman*.

The famous *Isaavaasyoopanishat* says

*Isaavaasyam* ***idam*** *sarvem* ***/*** *yat kim cha jagtyaam* ***jagat***

*tena tyaktena bhunjeethaah* ***/*** *maa grudha kasya vittdhanam*

 In this *sloka, Isa* refers to *Atman* or *Brahman*, *idam* refers to *prapancham* or *jagati* - to inner mental world created by sense organs together with *antahkanrnas –manas, buddhi, chittam and ahamkaram* and *jagat* refers to the current moment state of mental functions taking place with experience of ego (*jiva* state). Knowing that *jagat* or *jiva bhava* is *adhyasa* –veil, over ***sat-chit-ananda*** - the ever-present conscious state of *Atman* as peace (*santi*), bliss (*ananda* or *priyam*), silence (*mouna*) and also be aware of the fact about transient or transitory nature of *jagat* or *jiva bhava* as unreal (appearance over natural *Arman* or *Brahman* state) or virtual (present at one instant or in some phase and disappear next instant or in another phase of mind) and be rid of (*tyaktena-* by removing or sacrificing) the unreal or transient *jiva bhava* or *tanmatra* or *vishaya* to be set in eternal *paramaatmaanubhava* and live as that – our natural or original state- is the goal and essence of spirituality which enables one to mentally function efficiently without getting entangled in the stresses and strains caused by egoistic mind through wrong *anvaya* (identification). The true or proper or correct *anvaya* (identification) is that we are divine (ego-free or-ego-transcending) by nature which we experience the moment we stop falsely identifying with our body, mental traits, social status, gender, etc., [10]

 Human mind functions in *Jagrat* (wakeful conscious state) and *Swapna* (dream conscious state) – termed as *dvaita*  ( Two – ***aham- idam*** ) conscious states - using above mental tools and simultaneously uses these *Jagrat* and *Swapna* conscious states and alternates between *dvaita* and *advaita* No Two *– only* ***Aham – Aham***- the *Jagrat* *Sushupti-* conscious state and aids humans to know, reason, do intellectual operations, understand, experience and be blissful, peaceful and silent5 (Concept Diagrams I to VI).

 In the *dvaita* (***aham-idam***) conscious state a differentiated perception of knower and known exists while knowing/learning. Thus a triad *(triputi)* of knower-knowing-known exists and perceived. The perception of this triad is absent in *advaita* (***Aham-Aham***) conscious state; then perception of knower and known gets absorbed in knowing and only awareness of knowing in the form of meaningful experience/experienced meaning /understanding remains /results [2-22]. In *advaita* state experience / understanding / sense (of a word) becomes cognitive energy-form by and in **Eternal Awareness** *Prajnanam* , transcending *dvaita* conscious state. *Advaita* conscious state is also the state of purport - *tatpara, tatparya,* *rasa* or *bhakti* state.

**III**. ***asti bhaati priyam namam roopamcheti amsa panchakam***

***aadya trayam brahma roopam tato dwayam jagt roopam***

is a famous expression of *Vedanta Panchdasi.* This *sloka* says that *prapancham* (also known as *viswam*) is made up of **five** ingredients: *asti (sat* aspect*), bhaati (chit* aspect*), priyam (ananda* aspect*)-* the aspects of *Brahman or Atman, namam* (name) and *roopam* (form or sight or *drusyam* or *vishaya*), the aspects of *prapancham* or *jagathi* or *jiva*. Addition or tagging of *namam* and *roopam* to *Atman* forms *prapancham* in *jada* form. *Prapancham* becomes *jagat* when retrieved and appears in the *dristi*.

 In *jagat*, *Atman* is in three parts as *asti* – the *sat* aspect; *bhaati* – the *chit* aspect and *priyam* – *anandam* aspect, together with the two parts *namam* (name) and *roopam* (form). *Namam* is given by language and form is what the *vishaya* looks like or cognized like. It must be noted here that *prapancham* is created within as sensed by sense organs through the *antahkarana manas*. So obviously the smells (by nose), tastes (by tongue) and touches and feelings of hotness and coldness (through skin) are also part of *prapancham* in addition to sounds heard by ears and forms seen by eyes. This *prapancham* will be in *jada* (potential) form and becomes *jagat* as kinetic form when retrieved and perceived by manas forming thoughts/feelings etc.,

 Point **I** says that this *jagat* is *mithya*-which is only a reflection and projection and is transient which exists this moment and disappears next moment and it is formed by the transformation of *maya* as *antahkaranas; chittam* as *smaranam* and *manas* as *bhaavanam. Jagat* is thusformed by *maya* the reflected *chit* energyas *asti-bhaati-priyam* (the *brahma roopam* or *aatma roopam -* as *asti (sat)* gives us the ability to conscious, as *bhaati (chit)* the ability to know and as *priyam (ananda)* the ability to experience the fruits of the knowing/knowledge/perception/ego) attached by *namam* and *roopam* (*drisyam* referring to all *vishayas* in the form of *tanmaatras* (stimuli) sensed by sense organs (*jnaanendriyani*). When *jagat* is in *dristi* we experience, understand, have insight, intuit , be instinctive, have moods, urges, perceptions, thoughts, feelings, expressions, utterances act or react through gestures (ex; eye movement) and actions through action organs (*karmendriyanai*-vak (speech), pani (movement of hands), pada (movement of legs) , paayu (movement of bowels) and upastha (movements relating to reproductive organ). When *sristi*, the *adhyasa* forming entity over *sat* (state of *Atman*) is not in *dristi* we have *nidra* or cessation or mental functions. Cessations of mental functions (*nidra*) with *prajnaanam* or awareness or consciousness is experiencing the Self (Atman or Brahman) and is the conscious state of *jagrat sushupti* (wakeful sleep); *nidra* without awareness of within or without of the body is the conscious state or mental phase *sushupti* (deep sleep)*.*

 In *Advaita* (No Two or non-dual) state human mind possesses consciousness only. As *Prajnanam, Atman* gives *Dristi* to observe, be aware of and be conscious of understanding, meanings and senses of cognitions and cognition created experiences. During *advaita* phase, no transformation of *maya*-no creation, transformation and functioning of *antahkaranas* (inner mental tools) takes place but the **current of awareness** is connected to sense organs and action organs which are ready to function but not in a functioning state. In *dvaita* (two or dual) state of mind, human mind exists as consciousness and awareness. Upanishads call consciousness as *Aham* and awareness of *vasanas* and *prapancham* as *idam*. The awareness, the manifestation of human mental functions is transitory and exists or ceases to be depending on the phase of mind. Awareness is present in *Jagrat* (Wakeful) and *Swapna* (dream) conscious states or phases of mind. In *Jagrat Sushupti* (Wakeful Sleep) or *Sushupti* (Deep Sleep) consciousness states or phases of mind, awareness of mind as being intelligent to mental operations and doing mental functions will be absorbed in pure consciousness. In Wakeful Sleep conscious state awareness will be always on and mind functions if willed [1-7]. We, humans learn, know, communicate, teach, perceive, think, experience, understand etc., when an interplay of wakeful , dream conscious states happen simultaneously making use of dual (*dvaita)* and non-dual (*advaita*) conscious states during which time *maya*, the reflected chit energy transforms reversibly to facilitate us to perform mental tasks. This two-way- forward and reverse transformation of *maya*- is technically known as *vivartanam* in *advaita* thought. In dual (*dvaita*) state of mind, sense organs and action organs are active and function forming mental operations and thus enable us to perform all mental functions with the help of inner mental tools (*antahkaranas--manas, buddhi, chittam and ahamkaram*) which are two-way transformations of *maya* [4,5]. The alternating and simultaneous rise and set of dual mental state and ever present non-dual consciousness give us cognizing, communicative and other mental abilities.

 Most of present attemptsaim at modeling machine cognition as an isolated process which is the result of sensing [29-36]. But if human mental processes are observed, it becomes obvious that human perception is but an intermediary process which transfers sensing into sense (understanding/experience) and sense into expression. Human cognitive process can be stated sequentially as follows: (1) *sensing:* through sense organs (knowing), (2) *perception* (thinking, reasoning, decision making, etc.,), (3) *understanding/experience*, (4) *purport*- meaningful experience or experienced meaning. Human mental process is generally held to be a combination and quick successive transformations of four modes i.e.,

 **I Speaker/Teacher:** (a) Purport/Awareness (Meaningful Experience or Experienced Meaning (b) Understanding/Experience (c) Perception/Thinking (d) Utterance /Expression

**II Knower/Listener/Learner:** (a) Knowing (through sense organs) (b) Perception/Thinking (c) Understanding/Experience (d) Purport (Meaningful Experience/Experienced Meaning)/Awareness.

 Language is the chief communication tool in day-to-day transactions and also in learning, understanding and imparting various kinds of knowledge, disciplines and skills. This paper intends to show that the understanding of human cognitive processes could be improved if due attention were paid to relevant data of physics- energy and its transformations playing a vital role- and- more surprisingly and interestingly – to *Upanishadic* wisdom and *advaita* philosophy.

***Raso vy Saha* CONSCIOUSNESS OF MEANINGFUL EXPERIENCE (*TATPARA*)**

 **/ EXPERIENCE OF MEANING (*TAATPARYA*) IS *BRAHMAN***

Experience of Essence (*rasa*) of the meanings of all *vakyas* (sentences) - All Cognition-related experiences in the awareness of the *Atman*- Meaningful Experience. Silence. Peace. Bliss. Experienced meaning. Purport Import *Tatpara*  *Taatparya* *Iccha sakti jnaana sakti kriya sakti swaroopam / Para pasyanti madhyama vaikhari swaroopam. Suddhavaasanaapravaham*

 *Bhakti* defined *as* ***swa swaroopaanusandhanam bhaktirityabhidhiyate***  or ***cheto vrittirupetya tisthati sadaa saa bhaitirityuchyate*** is the normal or natural or ground –energy state of mind. This is the state of absence of mental functions - the two-way transformation of *maya* and *antahkarana* [4-8]*.* This is the state of *Atma* or *Brahman*. In this state the *chidabhasa* or virtual chit -energy *maya* – does not transform into *antahkaranas* (no *vivartanam* takes place) and no *antahkarana parinama* takes place. This state is also known as *suddha* *sattava guna* state, which amounts to *nirguna* state. *Rajo guna (antahkarana* mode) or *Tamo guna (antahkaranama parinama*-cognition of objective energy-form) cease be (Concept Diagram I to VII).Transformation of *maya*, reverse transformation of *maya* and cessation of transformation *maya*-the *dvaita* and *advaita* conscious states respectively- taking place simultaneously, consecutively and alternately is the structure, form, function, state and essence of human cognitive processes.

 Transformation of *maya* as *antahkaranas* and *pancha pranas* and thence activating sense and action organs respectively and simultaneously (wakeful and dream phases of mind) is the *vibhakti* state or the state of ego- *jivatma* -state. All knowings /learnings /expressions /teachings take place in this *vibhakti* state making use of all mental tools in the awareness of *Atma.* *Sabdabrahma* Theory as proposed by **Patanjali** and developed by **Bhartruhari** *et al* takes this *advaita/dvaita* concept and a theory of language learning/teaching, speaking/understanding in the four modes of mind ( *para, pasyanti, madhyama and vaikhari*) is developed using *sphota vada*, a consequence of *Sabdabrahma* Theory[23-28, 36].

***Vaakyapadeeyam*: (*Brahma Kanda*)**

*anaadi nidhanam brahma sabdatatvam yat aksharam*

*vivartate arthabhaavena prakriyaa jagato yatah*

*chatvaari srungaa trayo asya pada dwe seershe saptahastaaso anyah*

*Tridha baddho vrushabo rooraveeti maho devo martyaan avivesa*

*chatvaari vaakparimata padaani taani viduhu braahmanaa ye maneeshinah*

*guha treeni nihita nengayanti tureeyam vaacho manushyaah vadanti*

*vaikhyaarya madhyamaayaascha pasyantyaascha etat adbhutam*

*aneka teertha bhedaayaastryyaa vaachaha param padam*

*uta tvah pasya nna dadars vaacham uta tvah srunva nna srunoti enaam*

*uto tvasmai tanvam visasre jayena patya usatei suvaasaah*

 In this theory the *advaita* state - *Jagrat Sushupti-* proposed by *Vedantin*s corresponds to *para* mode of language communication process (Concept Diagram II to VII). This is the *tatparya* (purport) or *rasa* (experienced meaning) state. This *tatparya* state is a state of awareness of experience of meanings. And in this awareness the untransformed *maya* is the flow of *suddha vasanas.* *Pasyanti* mode of language is the state of senses (of words/sentences) or *artha sthiti* or state of verb. The verb will be in a **present continuous** or **infinite** form without subject and object.

 When an object energy-form. the *tanmatra* (Concept diagrams III A, III B to VII) – a *vishaya*- is sensed through *antahkaranas*, this verb state becomes a state of sentence – *bhava* or thought. This state is known as *madhyama* mode of language -the *vibhakti* state of sentence or thought and is the modulated *chidabhasa*  ( undergone *vivartanam*) (Concept Diagrams II to VII). This modulated energy- form gets transformed into sound energy through vocal chords’ movement and is expressed /uttered. This is the *vaikhari* mode of language. All this happens in the speaker/teacher.

 This uttered sound-energy (the *vaikhari* mode of language) is picked up by the ears (sense organs) of the listener/learner and becomes sentence in the *madhyama* mode- the modulated *chidabhasa* mode in conjugation with the *antahkaranas* (inner mental tools). This sentence-energy form in *madhyama* mode is in **subject-verb-object** (the triad*-triputi*) form. This mode of language gets demodulated (reverse transformation of *maya - the vivartanam* in the reverse direction) into meaning, resulting in understanding/experience in the *pasyanti* mode- to a verb (sense), in present continuous or infinite form, the subject and object being dissolved in the sense of uttered /expressed sound.. This, when meaningfully experienced in the awareness of *para* mode, is the purport or *rasa or tatparya* of the uttered word- Bliss, Being, Peace or Unoccupied Awareness , the normal or natural state of mind - *i.e,* the state of Self, *Atman or Brahman.*

 Thus *chit*-energy pulses, being issued out by *Atman* ***( Sat-Chit-Ananda)*** and after getting reflected in the *medha* as virtual or *chit*- energy *(chidabhasa* or *maya*) pulses , first get **modulated** from this *para / rasa / tatparya* state by cognizing stored energies in potential *(jada)* form–in the form of subject-object- free verbs/senses, experiences, intuitions, understandings, urges , volitions through the *antahkarna* *chittam* to be transformed in to the mode of *pasyanti;* then again gets transformed into subject-verb-object state, the *madhyama* mode - by simultaneously cognizing the object energy-forms –*vishayas,* stored as potential energy *(jada)* forms – as *idam*, *jagat* or *prapancham* through the *antahkarana, manas* in the awareness of within – *antarmukha* *dristi*- as *bhavas* or thoughts. Intellectual operations such as reasoning, decision making, take place in this awareness. When the *antahkarana, manas* is tuned to the object energy-forms (light-eye, sound-ear, chemical- tongue, nose and heat, mechanical-skin) through *jnanendriyas* –sense organs- then the awareness becomes *bahirmukha dristi*-awareness of without. This process (in expresser/teacher and the reverse of this process, (demodulation in listener/knower/learner) happen in human-beings while expressing/speaking or listening/learning- as transformation or reverse transformation respectively-together known as *vivartanam*- of *maya* and *antahkarnas* in conjugation with sense organs and action organs, *karmendriyas* (Concept Diagrams II to VII).

This is the essence or gist of human cognitive process and language acquisition and communication process as envisaged by the *Upanishads* and the *advaita* philosophy together with *Sabdabrahma* *Siddhanta* in terms of *vivartanam* (modulation and demodulation) (Concept Diagrams III A and III B). Thus this simple model of integrated psychology (the science of mind and mental functions) and language communication process when compared with the radio broadcasting and reception processes (modulation and demodulation), depicts the gross energy-transforms’ model of human cognitive process. This model provides necessary soft-ware while constructing machines which can perform human mental tasks which can be used in the disciplines of cognitive sciences and natural language comprehension branch of artificial intelligence.

**Form of pure consciousness and mental awareness *-* the ingredients of human consciousness:**

 Thus, *Atman’s* (Self) existence is proposed by the Upanishads [1]. 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 mind [2-18]). When studied with an open mind and further contemplation, thus it becomes clear that *Upanishads*are actually *texts of science on human mind* [2-17]. The Knowledge of Self as revealed in the *Upanishads* is *an integrated psychology*in mental energy-presence and transformation terms**.**

**The scientific insight of Pure Consciousness and mental awareness and functions based on above presentation:**

 *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 consciousness and mental functions and language acquisition and communication abilities. [8]

 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 revere-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 [4-8].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 Berger using EEG (electro-encephalogram) also have the same time- period of 10-1 sec] [29].

**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. 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 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 asreflected 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 [8].

**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 or 10 Hz and gets frequency – modulated/demodulated while mind is functioning during *jagrat* and *swapna* conscious states.

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 / (brain waves) 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.

 Human consciousness is the source, guide and energy-provider for the human mind and its activities. Human mind possesses three kinds of awareness consecutively/simultaneously. They are: (i) *unoccupied awareness or pure consciousness* (ii) *awareness of within of the body* and (iii) *awareness of without of the body* (last two together is known as occupied awareness).

 Human mind tunes itself to without of the body through sense organs and acts, reacts or interacts through action organs for cognitions and perceptions created by external stimuli from physical world outside the body. Information from external physical world is stored as inner mental world consisting of cognitions, perceptions and cognition-created or related experiences. All external physical world is projection of individual’s mind, with associated limitations and individuals deal with these mental projections some times in a biased way depending on individual’s ability to know, perceive, reason, feel, intuit, understand and experience the reality.

 Human mind tunes itself to the within of the body and senses aches, pains, inner mental world and also does intellectual operations. As described above inner mental world is made up of information known, sensed by sense organs and perceptions and experiences created by such cognitions and knowledge in the form of external stimuli. The same are retrieved by mind to create moods, intuitions in the form of verb, meaning, sense, understanding, insight, intuition, experience, urge, which become thoughts, perceptions and feelings in the form of sentences. The information about individual (self-consciousness with egoistic mind), the languages learnt together with meanings, senses of sounds (words) and utterances, forms of alphabet and objects of external physical world as words, sights, sounds, tastes, smells, touches and the perceptions and insight and understanding gained by the contemplation of perceptions, all form the inner mental world. All this knowledge acquired through sense organs in tune with mind can be termed as biophysical..

 Instincts, urges and similar impulses created and guided by hormones and gland secretions-which also constitute the knowledge possessed by the individual )organism) can be termed biochemical - also inspire and stimulate mind to act, react and interact. Human mind is also capable of being in a state where and when all mental functions and cognitions cease to be or the mind transcends ongoing mental functions and effects of stimuli from external physical world and will be a mere witness to them as an uninvolved and unaffected spectator or seer. This state is the original state of human mind similar to zero in number system and vacuum in physical sciences [2-22]. Then the state of mind is pure consciousness or unoccupied awareness and exists as peace, bliss and silence. Thus human mind is sourced from human consciousness both materially, energy-wise and functionally. Human consciousness is always present. Human mind rises and sets depending on the phase or conscious state.

**Conscious states or phases of mind in terms of virtual mental energy-reflection series and its transformation in terms of brain wave frequency modulation/demodulation:**

 Wakeful/Awakened, Dream (*Swapna),* Deep Sleep (*Sushupti)* and Wakeful Sleep *(JagratSushupti) -* are different conscious states of mind creating different phases of mind. *They are structure and phases of mental Time-Space and time created by the presence of mental energy source and transformations associated with virtual mental energy reflection.* Mind functions or ceases to function in these phases of mind.**:**

 At any instant brain neurons are generating millions of nerve impulses (action potentials). Taken together these electrical signals are called brain waves. Brain waves generated by neurons close to the brain surface, mainly neurons in the cerebral cortex, can be detected by sensors called electrodes placed on the forehead and scalp. A record of such waves is called an electroencephalogram or EEG. Electroencephalograms are useful both in studying normal brain functions, such as changes that occur during sleep, and in diagnosing a variety of brain disorders, such epilepsy, tumors, trauma, hematomas, .metabolic abnormalities, sites of trauma, and degenerative diseases. The EEG is also utilized to determine if “life” is present, that is, to establish or confirm that brain death has occurred.

 **Patterns of activation of brain neurons producing four types of brain waves and their correlation to corresponding conscious states of mind.**

**Alpha Waves:** These rhythmic waves occur at a frequency of about 8—13 Hz. One hertz is one cycle per second. Alpha waves are present in the EEGs of nearly all normal individuals when they are awake and resting with their eyes closed. These waves disappear entirely during sleep.

***Jagrat Sushupti* (wakeful sleep):**

 A series of ‘I -I’ pulses’ issue out and virtual energy creation and transformation, when necessary, takes place. Mind is active if willed. Sense and action organs are alert and ready to function. Through meditation one reaches this state. State of Unoccupied awareness PurportSilence, Bliss, Peace, Pure Consciousness Divine consciousness, Real ‘I’ state etc. Normal, original, natural or ground state of mind. **State of Being of mind.**

**Beta Waves:** The frequency of these waves is between 14 and 30 HZ. Beta waves generally appear when the nervous system is active—that is, during periods of sensory input and mental activity.

***Jagrat* (wakeful):**

Mind is active. Sense and Action organs are active are in working state. All knowing/expressions take place in this state. Meditation starts in this state. (awareness of without of the body). **Becoming of mind.** Excited and functional state of mind.

***Swapna* (dream):**

Mind is active. Sense organs are in dormant state. Action organs will be functioning if necessary. Meditation becomes one-pointed in this state ( awareness of within of the body).**Becoming of mind.** Excited and functional state of mind.

**Theta Waves:** These waves have frequencies of 4-7 HZ. Theta waves normally occur in children, and adults experiencing emotional stress. They also occur in many disorders of the brain.

**Delta Waves:** The frequency of these waves is 1-5 Hz. Delta waves occur during deep sleep in adults, but they are normal in awake infants. When produced by an awake adult they indicate brain damage.

***Sushupti* (deep sleep):**

A series of ‘I-I’ pulses’ issue outand mind is in absorbedstate. No transformation of virtual metal energy reflection takes place..Sense andaction organs arenot in functional state. No awarenessof within or withoutof the body*-*cognitions orremembrances-cognition related or created experiences or understanding or insight or intuition or urge. State of cessation ofmental activities- **State of Being of mind**

The above classification of brain waves sensed by EEG informs that the frequency of the brain waves changes while mental activity is going on (beta waves). And during deep sleep the frequency is 1-5 Hz (delta waves) for adults.

These observations validate the propositions of Ramabrahmam[ [15}, about the modulation /demodulation of infrasonic waves (brain waves) when learning/communication and all related or otherwise mental activities are taking place (Concept diagrams V, VI, VII).

Eyes, ears, nose, tongue and skin, stimulated by light, sound, chemical, mechanical and thermal forms of energy respectively, 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. Experiences created by perceived or retrieved object-energy forms are *remembrances and cognitions*-stored and retrieved collection of perceived object-energy forms is *inner mental world Jagrat Sushupti* (Wakeful Sleep) is *Unoccupied awareness*. Knowing/learning expression/teaching , thought, perception, experience, understanding, volition, urges etc., are *occupied awarenesses*, happening in *Jagrat* (wakeful) and *swapna* (dream) conscious states. *Sushupti* – State of cessation of mental activities.

 Humans know/learn and express/teach in these conscious states of mind [2-8].These conscious states or phases of mind are the result of transformation of psychic or mental energies in the *Unchanging and Ever-Present* Consciousness/Awareness present during all these conscious states as Energy-Presence. *Upanishadic* awareness calls such awareness as *Atman* or *Brahman or Prajnaanam*. *Atman* is normally referred to as Self. It is already informed above that *Atman* is present in us and is the result of the breathing process and is the Source of Mental-Energy. In modern scientific terms it is also *is* termed as a infrasonic bio-mechanical oscillator which issues out psychic or mental energy pulses of requency10 Hz [8]. Thus *Atman* is the oscillating (with infrasonic frequency of 10 Hz) psychic Energy-Presence denoting and providing Mental Consciousness/Awareness and Time-Space.

 As *Prajnanam,* or Continuous Conscious Awareness, *Atman* witnesses all our mental activities, related body activities and happenings within and without of the body and body’s reactions as thoughts and organ-movements to these happenings. Present as such a Consciousness/Awareness, *Atman* provides the energy required for guiding the mind to know/cognize/learn through sense organs, perceive, think, experience, understand, etc., and store such an information and retrieve the same in the four conscious states described above and makes us conscious of within and without of ourselves and ourselves. Such 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.

 Upanishads term Awareness of Self as psychological time-space [2-8]. Awareness of the Self is the mental phase without cognitions or cognition-related experiences taking place or retrieved (the Wakeful Sleep Conscious State). The three other conscious states – the Wakeful/Awakened, the Dream and Deep Sleep- Conscious states are alternate super-impositions over this continuously present conscious state. This state of mind transcends both physical and psychological times and time-flows. This is the *normal* or *original* state of mind and all mental activities are *excited states* of mind [4-8]. Inner mental tools perform various mental activities which are transformations of psychic energy (virtual mental energy-reflection) to cognize and create or retrieve thoughts/perceptions/experiences/understandings/meanings etc., in us. Thought-flow within us, which is the psychic-energy change during conscious states, also constitutes psychological time and time-flow. Thought process and thought-flow is the becoming of psychic energy which makes us conscious of time and time-flow. This insight is further explained in the following sections.

**The mechanics of mind:**

 The following is an interpretation and explanation of *being and becoming of mind* i.e., formation, structure and function of human consciousness, formation and retrieval of inner mental world and cognition-created experiences/senses/moods participating in the cognitive processes and explanation of mechanism of sensing/ knowing/ learning/ expressing/ teaching/ thought process/ perception/ experience/ understanding and experience of meaningful experience and experienced meaning as expressed in the *Upanishads***.**

 Human mind has four conscious states or phases, seven cognitive states and five kinds of functional states [5-26] (also see Concept Diagrams I to VI). They are:

**Conscious states or Phases of mind [8]:**

Wakeful Sleep, deep sleep, wakeful or awakened and dream. These are discussed in detail above. Human consciousness is always on as conscious awareness and only mind rises or sets during these conscious states of mind causing cognition and cognition-related experiences, storing and retrieving them in respective phases. Human consciousness is the form, the structure and the consequence of breathing process and generates psychic energy that does all human cognitions and cognition-related functions. Cognition and cognition-related functions are the result of reversible becoming of this psychic energy and human consciousness bifurcates as consciousness that is aware of the cognitions and related activities and the occurrence of the activities themselves. When these activities are taking place, such a dual role is played by the human consciousness. There is also a phase when no cognitions or cognition-related activity is taking place and it is the original or normal or natural state of human mind, the non-dual or peaceful, blissful or silent phase of mind.

**Cognitive States of mind [7]:**

Seven states of cognition are identified in relation to ego-transcending or egoistic or self-conscious state of mind. These cognition states function around the, ‘I’-consciousness, ‘I-sense, the I-thought or feeling and I-expression or utterance or in the absence of such identification. Then no individual- specific information will be in the mental awareness and the mind transcends to a state or phase when the mental awareness becomes one with the consciousness and non-duality in the form of peace, bliss, or silence is experienced. Cognitions cease to take place but will take place if willed or necessary. The seven cognitive states of mind are:

**Pure consciousness: Normal or original state of mind:**

1. “I” Consciousness – No “I” Awareness of and about individual
2. Meditative state of mind. One pointed awareness.

**Egoistic State of mind**

1. “I” Awareness/Sense/mood- Ego Sense - State of verb/meaning/understanding/experience/intuition/urge- Infinite form or present continuous form of verb without subject or object attached.
2. ‘I” Thought/Feeling (awareness of within of the body)- State of sentence with subject-verb-object-perception
3. ‘I” Thought/Feeling (awareness of without of the body) in relation to outside physical world. Mind tuned to outside world through sense organs
4. “I” Utterance/Expression/also reception of stimuli from outside world and expression through action organs.
5. No “I” Awareness of or about individual- No Self consciousness or ongoing of mental functions. State of cessation of all types of mental functions.

**Kinds of functional states of mind [2-22]:**

(a). Getting tuned to and sensing stimuli from external physical world through sense organs and reception.

(b). Actions, reactions or interactions with external physical world activated by hormones or stored information.

(c). Perception/thinking/reasoning/feeling in accordance with the stimuli from external world or information retrieved from inner mental world.

(d). Conversion of above information into intelligible information as understanding or insight or experience

(e). Awareness of Understanding/intuition/urge/mood/experience/meaning/experience.

All this happening in the consciousness of Self or Atman or Brahman-the infrasonic mechanical oscillator forming and functioning as human consciousness.

 While mind is functioning, there will be a differentiated perception of knower-knowing-known or subject-verb-object, which will be missing and absent when non-dual (*advaita*) awareness or pure consciousness becomes unoccupied awareness. Experiencing or understanding or getting insight of verb is state of experience and then knower-known or subject-object are not attached to the verb. Verb will be in a present continuous form or infinite form depending on it is absorption of information or understanding cognition or experiencing cognition or urge (to express or do) or intuition (result of perception or instinct took form or genetic knowledge expressed through hormones or like them) or sense or meanings of utterances received or to be expressed.

 We knowingly or unknowingly alternate between non-dual (*advaita*) and dual (*dvaita*) awareness while functioning mentally. Wakeful and dream conscious states of mind represent and account for the phase of mind when functioning and then we also are aware of and sense or perceive self-consciousness. Once mind ceases to function, we experience peace, bliss and silence within. If these are experienced our being aware them, the phase of mind then is known as wakeful sleep. If we are unaware, but are conscious of these, the phase of mind then is known as deep sleep. The phase of cessation of mental functions (also self-consciousness) is similar to zero in number system and vacuum in physical and biological sciences. Vacuum is inherent in matter and holds matter and is manifested when matter is missing or absent. Consciousness is awareness of mind when no mental functions are taking place.

 In *Advaita* (No Two or non-dual) state, human mind possesses consciousness only. As *Prajnanam, Atman* gives Consciousness and *Awareness* to observe, be aware of and be conscious of understanding, meanings and senses of cognitions and cognition created experiences. During *advaita* phase, no transformation of *virtual mental energy reflection*-no creation, transformation and functioning of inner mental tools takes place but the *current of awareness* is connected to sense organs and action organs which are ready to function but not in a functioning state. In *dvaita* (two or dual) state of mind, human mind exists as consciousness and awareness. Upanishads call consciousness as *Aham* and awareness of *experiences/meanings, perceptions and cognitions* as *inner mental world- idam*. The awareness, the manifestation of human mental functions is transitory and exists or ceases to be depending on the phase of mind. Awareness is present in*Jagrat* (Wakeful) and *Swapna* (dream) conscious states or phases of mind. In *Jagrat Sushupti* (Wakeful Sleep) or *Sushupti* (Deep Sleep) consciousness states or phases of mind, awareness of mind as being intelligent to mental operations and doing mental functions will be absorbed in pure consciousness. In Wakeful Sleep conscious state awareness will be always on and mind functions if willed. We, humans learn, know, communicate, teach, perceive, think, experience, understand etc., when an interplay of wakeful , dream conscious states happen simultaneously making use of dual (*dvaita)* and non-dual (*advaita*) conscious states during which time virtual mental energy reflection-*maya*, the reflected chit energy transforms reversibly to facilitate us to perform mental tasks. This two-way- forward and reverse transformation of *virtual mental reflection*- is technically known as *vivartanam* (reversible becoming) in *advaita* thought. In dual (*dvaita*) state of mind, sense organs and action organs are active and function forming mental operations and thus enable us to perform all mental functions with the help of inner mental tools (*antahkaranas--manas, buddhi, chittam and ahamkaram*) which are two-way transformations of virtual mental energy reflection*-maya*. The alternating and simultaneous rise and set of dual mental state and ever present non-dual consciousness give us cognizing, communicative and other mental abilities.

 Human mental process is generally a combination and quick successive transformations of four modes i.e.,

 **I Speaker/Teacher:** (a) Purport/Awareness (Meaningful Experience or Experienced Meaning (b) Understanding/Experience (c) Perception/Thinking (d) Utterance /Expression

**II Knower/Listener/Learner:** (a) Knowing (through sense organs) (b) Perception/Thinking (c) Understanding/Experience (d) Purport (Meaningful Experience/Experienced Meaning)/Awareness.

 *Human knowledge is of two kinds: (i) acquired knowledge (through sense organs in tune with inner mental tools, which can be termed as biophysical and (ii) inherent or genetic knowledge and which is hormonal, which can be termed as biochemical* [7-18]. Especially the instincts, urges, sense (meaning/understanding/insight/intuition/experience) are inbuilt biochemically in the organism. Both kinds of knowledge are activated and used in all the phases, cognitive states and functional states of mind. Indian knowledge systems as described above also named mind with separate name for each of its functions-collectively as inner mental tools- *antahakaranas*.

**Modes of language acquisition and communication:**

 Language is the chief communication tool in day-to-day transactions and also in learning, understanding and imparting various kinds of knowledge, disciplines and skills. *Maya* which is also known as primordial sound, and its transformations understood in combination with the *Sabdabrahma Siddhanta* throws light on language learning and communication processes. *Sabdabrahma Siddhanta* based on *Upanishadic* insight 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 [2-22]

 In the theory of language proposed by Sanskrit grammarians the *advaita* state – *Jagrat Sushupti-* corresponds to *para* mode of language acquisition and communication process. This is the purport or experienced meaning state. This state is a state of awareness of experience of meanings. And in this awareness the untransformed *virtual mental reflection* is the flow of *pure experiences. Pasyanti* mode of language is the state of sense (of words/sentences) or *artha sthiti* or state of verb. The verb will be in a *present continuous* or *infinite* form without subject and object attached

 When an object energy-form is sensed through *inner mental tools* , this verb state becomes a state of sentence – *feeling* or thought. This state is known as*madhyama* mode of language -the state of sentence or thought and is the modulated form of virtual mental energy reflection. This modulated energy- form gets transformed into sound energy through vocal chords’ movement and is expressed /uttered. This is the *vaikhari* mode of language. All this happens in the speaker/teacher.

 This uttered sound-energy (the *vaikhari* mode of language) is picked up by the ears (sense organs) of the listener/learner and becomes sentence in the *madhyama* mode- the modulated *virtual mental energy form* mode in conjugation with the inner mental tools. This sentence-energy form in *madhyama* mode is in *subject-verb-object* (the triad*-triputi*) form. This mode of language gets demodulated (reverse transformation of *maya - the becoming* in the reverse direction) into meaning, resulting in understanding/experience in the *pasyanti* mode- to a verb (sense), in present continuous or infinite form, the subject and object being dissolved in the sense of uttered /expressed sound.. This, when meaningfully experienced in the awareness of *para* mode, is the purport or import of the uttered word- Bliss, Being, Peace or Unoccupied Awareness , the normal or natural state of mind - *i.e,* the state of Self, *Atman or Brahman.*

 Thus *psychic* energy (virtual mental energy reflection) pulses, being issued out by *Atman* **[***Sat-Chit-Ananda* **(**Being-Pure Consciousness-Bliss**)]** and after getting reflected in the *medha*, (can be *medulla oblongata* or *reticular formation?*) as virtual or *chit*- energy (virtual mental energy reflection) pulses , first get modulated from this *para / rasa / purport* mode by cognizing stored energies in potential *(jada)* form–in the form of subject-object- free verbs/senses, experiences, intuitions, understandings, urges , volitions through theinner mental tool *chittam* to be transformed in to the mode of verb, mood, experience-*pasyanti;* then again gets transformed into sentence -subject-verb-object state, the *madhyama* mode - by simultaneously cognizing the object energy-forms – stored as potential energy *(jada)* forms – as inner mental world through the inner mental tool, *manas* in the awareness of within –- as feelings or thoughts. Intellectual operations such as reasoning, decision making, take place in this awareness. When the inner mental tool*, manas* is tuned to the object energy-forms (light-eye, sound-ear, chemical- tongue, nose and heat, mechanical-skin) through–sense organs- then the awareness becomes -awareness of without. This process (in expresser/teacher and the reverse of this process, (demodulation in listener/knower/learner) happen in human-beings while expressing/speaking or listening/learning- as transformation or reverse transformation respectively-together known as reversible becoming- of *maya* and inner mental tools in conjugation with sense organs and action organs.Further the inner mental tool *buddhi* takes care of intellectual operations and other mental tool, *ahamkaram* takes care of self-consciousness. Both *buddhi* and *ahamkaram* are electro-chemical forms of mental energy reflection *maya*.

This is the essence or gist of human cognitive process and language acquisition and communication process as envisaged by the *Upanishads* and the *advaita* philosophy together with *Sabdabrahma Siddhanta*in terms of *vivartanam* (modulation and demodulation of psychic energy). Thus this simple model of integrated psychology (the science on mind and mental functions) and language communication process when compared with the radio broadcasting and reception processes (modulation and demodulation), depicts the gross energy-transforms’ model of human cognitive process. This model provides necessary soft-ware while constructing machines which can perform human mental tasks which can be used in the disciplines of cognitive sciences and natural language comprehension branch of artificial intelligence.

**Conclusions:**

 Adrian [29, 30] made the first electrical recordings of the activity of individual nerve fibres. He discovered a universal law, for it would be impossible to understand the brain without this law: neurons communicate with each other by sending bursts of brief electrical pulses along their fibres. The pulses do not vary in size; but only in the frequency of their bursts, which can be up to a thousand impulses in a second.

 The human consciousness, the result of breathing process and subsequent rhythmic gaseous exchange taking place in the lungs, is the mechanical oscillator of infrasonic frequency. It provides both mental energy and mental time-space in the form of consciousness; by the transformation of its virtual mental energy reflection in *medulla oblongata* or *reticular formation*, provides various conscious states or phases of mind, cognitive and functional states of mind. The mechanical energy thus produced gets bifurcated into electro-chemical and mechanical branches to activate sense and action organs respectively.

 Thus in the interplay of these conscious states the virtual mental energy reflection-pulse series - brain waves- having mechanical wave frequencies in the range of frequency 3 Hz -30 Hz, undergoes *frequency modulations* in the expresser/teacher and *frequency demodulations* consecutively in the receiver/knower/learner to give us knowledge, perceptions, experiences, understandings , meanings and skills in the simultaneous use of *Atman* (consciousness/awareness), *maya* (current of awareness flowing throughout the body), transformations of this virtual mental energy reflection as inner mental tools *-* electro-chemical branches –and mechanical energy branches, activating and using sense organs and action organs.

 Thus human mental functions are the forward and backward transformations of the carrier cognitive-energy pulse series, *modulated* by energies sensed through sense organs or the stored information as potential energies retrieved (as *remembrances* – memory/ experiences/understanding/meaning/ sense- first and then active inner mental world as feelings/thoughts/perceptions) and *demodulated* to give humans knowledge, experiences etc. The transformation and reverse transformation of virtual mental energy reflection and its cessation of transformation – the dual- *dvaita* and non-dual- *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. All this constitutes the *being and becoming of mind.*

*SWAPNA* DREAM *DVAITA PASYANTI*Mind is active. Sense organs are in dormant state. Actions organs will be functioning if necessary. *VIBHAKTI / MADHYAMAAnthramukhaDristi* (awareness of within).**Becoming** Excited state Excited state of mind

*JAGRAT* WAKEFUL  *DVAITA* Mind is active. Sense and Action organs are active are in working state. All knowing/expressions take place in this state. *VAIKHARIBahirmukhaDristi*(awareness of without) **Becoming** Excited state of mind.

**CONCEPT DIAGRAM I**

*JAGRAT SUSHUPTI*  WAKEFUL SLEEP *ADVAITA BHAKTI PARA*

 A series of ‘I -I’ pulses’ issue and virtual energy transformation takes place Mind is active if willed. Sense and action organs are alert and ready to function. Through meditation one reaches this state. State of *VisrantaDrishti*, ***Bhakti*** Silence, Bliss, Peace,Unoccupied awareness, Pure ConsciousnessDivineconsciousness,Real ‘I’ state etc.Normal or ground or original or natural state of mind. **Being*.***

*BREATHING PROCESS*

*MENTAL ENERGY SOURCE INFRASONIC*

*VIRTUAL MENTAL ENERGY/SPHOTA*

 MIND (electro-chemical)

 Inner mental tools

electro-chemical mechanical

Sense Organs Action Organs

Outside world Expressions

Sights, Sounds Speech,

Tastes, Smells Movements o f Touches Hands, legs, Reproductive organ

 Bowels

 *SUSHUPTI*

DEEP SLEEP*ADVAITA* A series of ‘I-I’ pulses’ issueandMind is in absorbedstate. No transformation of virtual metal energy.Sense andaction organs arenot in functional state. No awarenessof within or without of body*prapancham-*cognitions) or*vasanas*-cognition related or created remembrances. State of cessation ofmental activities.

***STATES OF CONSCIOUSNESS – MENTAL TIME – SPACE***

PHASES OF MIND

**Becoming**

\* 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* ***antahkaranas***(innermental tools) active in *Jagrat* (wakeful) and *swapna* (dream) conscious states. *Sushupti* – State of cessation of mental activities. ***JagratSushupti*** – Pure Consciousness Bliss Peace

**CONCEPT DIAGRAM II**

*SAT-CHIT-ANANDA/PARA ATMAN-BRAHMAN* BIO- OSCILLATOR Generator of psychic energy pulses ***Advaita* Consciousness**

*MAYA* OR *CHIDABHASA* OR *PRANAVAM* Virtual *chit* – energy Pulses  ***SPHOTA***

*Infrasonic/biochemical/Electrochemical* ***Divyam***

*Mechanical-* ***Kriyasakti /Swaram***

*Inner mental tools electrochemical*

*Five kinds*

*Chittam* – ***Icchasakti/arthasakti***biochemical/ Cognition created Experience/Meaning Understanding - *vasana* Recording & Recollection ***Jnaanasakti****Manas* – Perception – Recording & Recollection of cognitions. *Buddhi* - Intellectual functions *Ahamkaram* – Self-consciousness-***Prapancham-*** potential***; Jagat-***kinetic/dynamic

*Prana, Apana ,Vyana,*

*Udana, Samana*

*Karmendriyas*

**Action Organs**- Movements of -Leg, Hand, Vocal Chords, Reproductive organ, Bowels.

*MANAS*

*Jnanendriyas*– eyes, ear, nose, Tongue, skin – **Sense organs- Sense *Stimuli-light(form)/sound (word***)/chemical (smell. taste) mechanical, heat (touch)

ACTION/REACTION ACCORDING TO SENSING, EXPERIENCE /VOLITION /UNDERSTANDING/SENSE/ INTUITION/INSIGHT/ MOOD /PERCEPTION/THOUGHT OR URGES

**The structure and function of mind - is a combined operation of all these**

Source of mental energy/mental time-space/ Pulse frequency 10 Hz

***ARCHITECTURE OF MIND ACCORDING TO SABDABRAHMA SIDDHANTA***

**MIND- *Dvaita* Awareness**

**CONCEPT DIAGRAM IV: STRUCTURE AND COGNITIVE STATES OF MIND**

**Cognitive States of mind *bhooh***

Wakeful **Awareness of without** *Jagrat* State of Knowing***vaikhari***

 ‘I’- expression Learning/expression

Dream *Swapna****bhuvaha*** State of perception ***madhyama***Sentence:Subject+verb+ object

‘I’- thought ***mahaha*** State of egoistic thoughts Notion of ‘I’, Me and Mine Thoughts- Subject +Predicate

***janaha*** State of mood-sense –intuition ***Pasyanti***

‘I’- senseexperience-understanding- urge

 Meaning: verb (infinite form)

meaning volition verb-infinite

One-pointed Awareness***tapaha***State of meditation-concentration ***tapahaVivartanampurodhana/tirodhana***

**Reversible becoming**

**E**

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 **A**

 **I**

 **T**

 **A**

**STATES**

**O**

**F**

**AWARENESS**

Deep Sleep ***suvaha*** State of Normal, original or ground state of mind, No awareness of within/without

Wakeful sleep ***satyam*State of Bliss, Peace, Silence**

 **Unoccupied awareness Ego-transcending, Ego-free**

**Pure Consciousness Being**

***BHAKTI***

***JAGRAT SUSHUPTI*** STATE OF PURE CONSCIOUSNESS

NON-DUAL ***ADVAITA-*NO TWO  *PARA RASA***

***BHAKTI PURPORT IMPORT* - CONSCIOUSNESS ONLY**

***ASTI (****SAT****) BHAATI (****CHIT****)PRIYAM (****ANANDA)*

 BEING PURE CONSCIOUSNESS BLISS

*UTTERANCE*

*Cogni- tions*

*SENTE-NCE*

*VIBHA-KTI*

*EGO VERB*

*PASYANTI*

**CONCEPT DIAGRAM V**

**FLOW CHART OF HUMAN MENTAL FUNCTIONS AND LANGUAGE PROCESSING**

**BREATHING**

**PROCESS**

 **BIO-MECHANICAL OSCILLATOR (frequency 10 Hz)**

 ***BHAKTI RASA Nidra/ SUSHUPTI/deep sleep***

***ATMAN***

***PARA***

**SELF**

 ***JAGRAT SUSHUPTI / PARA TATPARA PURPORT***

 ***TATPARYA* IMPORT *State of cessation of mental functions***

 ***UNOCCUPIED AWARENESS***

***PRANAVAM Infra-sonic energy form***

 ***Modulation***

***Demodulation***

***SUDDHA VAASANAH***

***NIRVISHAYAANUBHAVAH***

***SPHOTA***

***Awareness of within***

***backward PASYANTI Verb in infinite form (biochemical)***

 ***VIRTUAL VIVARTANAM awareness of without***

 ***MADHYAMA Mind subject-verb-object forward***

***Volition VIBHAKTI mental impressions*(potential form)**

***CHITTAM (recollection/memory)****Mental functions* ***BUDDHI*** *Intellectual Operations*

 ***Jnnanasakti*** ***JAGRAT / BHAAVAH*  (*cognition*) Dynamic/ Kinetic form**

***Inner mental tools electrochemical***

***mechanical energy***

 ***MANAH I****nner mental world/mental impressions* ***AHAMKARAM*** *Self-consciousness*

***Sense Organs***

***Dream consciousness***

***Action organs***

 ***VAIKHARI Kriyasakti***

***Outer objective world***

***STIMULI***

***ACTIONS***

***AND / OR***

***REACTIONS***

 **Wakeful**

**CONCEPT DIAGRAM VI**

**COMPARISION OF HUMAN COGNITION AND LANGUAGE ACQUISITION AND COMMUNICATION PROCESSES – *YOGA. JNAANAM* AND *BHAKTI***

Unoccupied,

Awareness,

Bliss, Silence,

Peace,

Meaningful

Experience

**Real I State**

Sense organs

Cognitions

Stimuli

***YOGA Knowing knower-knowing-known***

Demodulation/Modulation

Perceptions

Self-consciousness

Thoughts /feelings around individual/ego

 **Human**

Demodulation/ Modulation Experience/Meanings of cognitions UnderstandingMemory

**Cognition**

**Process**

 *JNAANAM*

Action organs responses

 **I-sense**  I**- I-expression**

*Sattvaguna Rajoguna* **I-thought** *Tamoguna*

 ***SPHOTA +* VERB** ***VIBHAKTI (SPHOTA AS SENTENCE)***

 ***MAUNAM / BHAKTI / RASA***

Verb with

subject and object in respective tense

Sentence

*Madhyama*

*SUKSHMA*

Experienced

Meaning

Purport

*Rasa*

*Tatpara*

*Para*

*Tatparya*

**Utterance**

 Movement of

vocal chords

hearing

Ear

*Vaikhari*

*STHULA*

Verb in infinite or present continuous form without subject and object-senses /

meanings

*Pasyanthi*

*KARANA*

**Human**

**Language**

**Acquisition and**

**Communication**

**Process**

*Pranavam/sphota + Icchasakti/Arthasakti + Jnaasakti + Kriyasakti*

 Volition /Urge knowing Expression

 Intuition/insight /understanding perception Action

 Mood/Sense/ Experience/meaning logic/reasoning Reaction

Biochemical/Genetic/ Inherent /HORMONAL Biophysical

*Experiences/Perceptions of* mind are the reverse process of generation of *bhavah / artha*(thought/feeling/sense/meaning/understanding/insight)

**CONCEPT DIAGRAM VII**

 **MODES OF LANGUAGE ACQUISITION AND COMMUNICATION**

 ***ADVAITA PHASE*** ***DVAITA PHASE***

***BHAKTI*  AWARENESS**

 **CONSCIOUSNESS** ***VIBHAKTI***

 *Transformations of Pranavam/sphota*

 *Pasyanthi Madhyama Vaikhari*

 ***Para Sphota*** Language Teaching/Communication **Modulation**

 ***Purodhana***

Import

Tatparya

Purport

Rasa

Experienced meaning

Volition

Mood

Sense

Intuition

Urge

Instinct

Intuition

Ear senses

Utterance

Eye and hand- writing

Vocal chords

Utterance

hand-Writing

Sense

Meaning

Sentence

Sense

Meaning

 Sentence

***Tirodhana*** Language acquisition/understanding

  **Demodulation**

**Note:***Vivartanam = purodhana - tirodhanayutavartanam*or *parivartanam* is Reversible Becoming of *sphota*, the infrasonic mental energy pulse series-facilitating human language acquisition and communication.

Language acquisition/communication is a combined operation of ear/vocal chords (pronunciation), Eye/hand (to see and write shapes of alphabet) in conjugation with cognitive states of mind and modes of language acquisition and communication.

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