

**A MODERN SCIENTIFIC INSIGHT OF *SPHOTA VADA*: IMPLICATIONS TO THE
DEVELOPMENT OF SOFTWARE FOR MODELING NATURAL LANGUAGE
COMPREHENSION**

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Sabdabrahma Siddhanta, popularized by *Patanjali* and *Bhartruhari* will be scientifically analyzed. *Sphota Vada*, proposed and nurtured by the Sanskrit grammarians will be interpreted from modern physics and communication engineering points of view. Insight about the theory of language and modes of language acquisition and communication available in the *Brahma Kanda* of *Vakyapadeeyam* will be translated into modern computational terms. A flowchart of language processing in humans will be given. A gross model of human language acquisition, comprehension and communication process forming the basis to develop software for relevant mind-machine modeling will be presented. The implications of such a model to artificial intelligence and cognitive sciences will be discussed. The essentiality and necessity of a physics, communication engineering, biophysical and biochemical insight as both complementary and supplementary to using mathematical and computational methods in delineating the theory of Sanskrit language is put forward. Natural language comprehension as distinct and different from natural language processing is pointed out.

Key Words: *Sabdabrahma Siddhanta*; *sphota vada*; natural language comprehension; flowchart and software of human language acquisition and communication; artificial intelligence; cognitive sciences; physiological psychology

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Introduction:

Ancient Indian wisdom as revealed in the *Upanishads* has a lot to say about human consciousness and mental functions [1-14]. 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 [2-14]. A physics and communication engineering model of human language acquisition and communication based on *Upanishadic* expressions and *Sabdabrahma Siddhanta* is presented here. *Brahma Jnana* or *Atma Jnana* is the basis of both *Vedanta* and *Sabdabrahma Siddhanta* [12-20].

Concept of mind as available in *Atma-* or *Brahma- Jnana/ AdvaitaPhilosophy* :

Atman or *Brahman* is *Sat-Chit-Ananda* (See Concept diagrams I to III)

Adi Sankara: *Brahma sat jagat mithya jivo brahma eva na apraha*

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.

*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 functions⁸. Maya (reflection of atma sakti or chit sakti in medha as chidaabhaasa) as *tamas* (i) conceals the *atmachaitanayam*; (ii) 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 (iii) *moham* and makes one see and experience *jagat* as *sukti-rajata-bhranti*; or *rajju-sarpa-bhranti* as *avidya* and (iv) makes *vidya* disappear from awareness (*dristi*); and (v) is transient, transitory and illusory reflection of *sat*.*

Because of these five kinds of illusions caused by *maya*, all inner mental world and mental functions (*prapancham* or *jagat* or *viswam* and self-consciousness) therein transpose themselves on *Atman* as pictures are superimposed on the cinema screen. *Atman* is like the cinema screen here. These pictures (cognitions, cognition related experiences, senses, meanings and self-consciousness) appearing on *Atman*-screen do not and can not 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* (conscious awareness), 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 *srusti* (mental cognitions and self-consciousness) are not separate from *Atman*. (See also Concept Diagrams I, II and III)

Inner mental world (*idam*) and mental functions (*jagat*):

Vedanta Panchadasi: Asti bhaati priyam namam roopamcheti amsa panchakam

AAdya trayam brahma roopam tato dwayam jagat roopam

is a famous expression of *Vedanta Panchdasi* by *Vidyaranaya*. 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* (potential) form. *Prapancham* becomes *jagat* (kinetic/dynamic) when retrieved and appears in the *dristi*. These *namam* and *roopam* also consist of words and forms we cognize and learn while learning languages, disciplines and skills and all kinds of knowledge

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., (See concept Diagrams II to V)

Consciousness is non-dual (*advaita*) awareness. It is experience as bliss/peace/silence when self-consciousness is absorbed or got absorbed in pure consciousness. Consciousness is also experience when no cognitions or cognition-related experiences are in the awareness of mind. Experienced awareness is consciousness. Awareness of nothing within or without the body is consciousness. It is peace, bliss and silence. Mind is dual (*dvaita*) awareness. Knowing, perception, thinking, doing intellectual operations, discrimination, feelings, having moods, urges, intuitions, understanding, getting and having insight, experiences are functions of mind.

Scheme of human mental acquisitions, functions and communications:

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 [2-14]. 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 [12-14].

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. This idea is further elaborated below [2-12].

Simply put, according to *Upanishads*, human mental functions are the forward and backward transformations of *chidabhasa* or *maya* or *pranavam* - 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, which include meanings of utterances, first and then *jagat* [inner world] as feelings/thoughts/perceptions) and *demodulated* to give humans knowledge, experiences etc. 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 [8] Most of present attempts aim at modeling machine cognition as an isolated process which is the result of sensing¹⁹. 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.

Four conscious states of mind, which are phases, cognitive and functional states of mind and seven cognitive states of mind: (*Sapta Lokas*) [7] (Concept Diagram III) and four modes of language acquisition and communication are available (Concept Diagrams I to VI). These ideas are further advanced as follows.

Vakyapadeeyam-Brahmajnana and sphota vada: Modern physics meaning of Brahman and maya/pranavam/sphota)- the ingredients for human consciousness, mental functions and language acquisition and communication process:

Brahma Jnana:

Vakyapadeeyam text endorses all the above understanding of concept of mind and its functions and describes, discusses and proposes insight relating to human language acquisition and communication. The following *sloka* from *Brahma Kanda* of *Vakyapadeeyam* is the gist of what all is discussed above.

**I anaadi nidhanam brahma sabdatatvam yat aksharam
vivartate arthabhaavena prakriyaa jagato yatah**

This *sloka* states *Brahma nityatvam* and *vivartanopadatvam* of *jagat* as meanings/senses (*artha*)/urges/thoughts/feelings (*bhava*) /expressions/utterances-the *arthabhavena prakriyaa*- from Brahman. *Sphota* is *upadana karana* – material cause of *jagat* which is a restatement of all that is discussed, the *Advaita* insight of Adi Sankara (*Upanishadic Commentaries*) and Vidyaranaya (*Vedanta Panchadasi*), in the earlier sections.

All this can be scientifically stated that, *Atman* or *Brahman* is the result of breathing process [19-20]. *Srestaprana*, (most possibly O₂, and the consequent rhythmic gaseous exchange taking place in the lungs) is given as the body (*tanu*) of *Atman* Vasista Ganapathi Muni [19-20]. *Atman* is always in motion (*yasya gamanam satatam tat atma* – which moves incessantly is *Atman*) and is the result of breathing process and in modern scientific terms can be termed as a bio-oscillator/bio-maser/bio-laser issuing out pulses of mental (*chit*) energy [8]. A period 10⁻¹ of a second, the time required to pronounce a short syllable like ‘a’ is put forward as the time- period of this oscillator {It is interesting here to mention that the mental rhythms detected by the experiment by German scientist Hans Berger [21] using EEG (electro-encephalogram) also have the same time- period of 10⁻¹ sec}. Thus this insight proposes *Atman* or *Brahman* as a biomechanical oscillator of frequency in the infrasonic (< or = 10 Hz) range [8-14].

Sphota Vada:

The above model of *Atman/Brahman* and *maya/pranavam* perfectly suits, reflects and represents *Sphota Vada* beautifully. *Maya*, also known as *pranavam*, and its transformations understood in combination with the *Sabdabrahma Siddhanta* throws light on language learning and communication processes. The exposition in *Vakyapadeeyam*, *jagannaidanam sphotakhyaha niravayavaha nityaha sabdaha brahmaiveti* clearly informs *atmachaitanyam* itself is *sphota*. Thus *sphota* is *Brahman* or *atman* or *chit sakti* in content. *Sphota* is *para vak* which precedes *pasyanti*, *madhyama* and *vaikhari* in the speaker/teacher and succeeds in listener./student/learner and transforms itself to be these three *vaks*. *Sphota* originates in the *Brahman* of speaker to be *upadana* (material) and *nimitta* (instrumental) *karana* (cause) for both communication and acquisition of languages/disciplines/knowledge/skills and merges in the *Brahman* of the listener to give meaning/experience and oneness with what is said and heard/cognized.

Though *para vak* nomenclature is later to Bhartruhari, it correctly and aptly fits in the scheme of explanation and understanding the process of language communication and acquisition in humans. This is available in the *Brahma Kanda* of *Vakyapadeeyam* (*slokas* 111 to 117) itself even though the term *para vak* is not used. The gist of these *slokas* pertains to the stating of the existence of a subtle energy [termed as *Jnaata* (which is *Atman/Brahman* itself)] and its *vivartanam- tirodhana purodhana yuta vartanam*-reversible becoming of *sphota* as *jagat* by *prakriyabheda* is very clearly put forward. Also *para* state is consciousness in *Advaita* (*Aham-Aham* series) phase and awareness in *dvaita* (*Aham-idam* series) phase (*Aham=Atman/Brahman, idam=prapancham, jagat or visvam* and corresponds to state of mental functions).

According another school of thought *para* is opined to originate at *mooladhara*, *pasyanti* is formed in *nabhi*, *madhya* in *hrudaya* and *vaikhari* at *kantha*. These actually correspond to the

evolution of physical form and shape of uttered sound-the *vaikhari* mode of language. *Para vak* becomes *pasyanti* and is in subtle form in *buddhi* (*bodha*-awareness) and this is what cognized by the listener. This will be in electrochemical form and originates in the brain. Brain signals are transmitted through spinal cord to the *mooladhara* and the physical sound form starts to take shape by combining with air (*pranavayu*) that is being breathed and culminates as audible sound in vocal chords transduced from electrochemical form to mechanical/sound form and is expressed by the movements of the cheeks, tongue, lips etc.,; all this is nomenclature for the physical evolution of uttered sound, *vaikhari*, whose origin is in the brain. *Dwaupadana sabdeshu..... sloka* also informs that *sphota* is the real *sabda* which is different from audible sounds and itself by transforming (actually transducing-changing from one form of energy into another form of energy)- *becomes* various sounds represented by various letters by associating with the movements of vocal chords which in turn are manifested in the movements of cheeks, tongue, lips etc.,

Sphota is thus synonymous with *pravanavam* and is the infrasonic form of sound energy pulses (frequency less than or equal to 10 Hz). This definition very well suits the traditional one that *sphota* is issued out, by *veechi-taranga* (air waves) *nyaya* or *kadamba-mukula* (*kadamba*-flower bud) *nyaya*. As is known the very term '*sphuta*' means which is issued out. Further the silent nature of the *sphota* is both because it originates from silence (nature and physical form of *Brahman*-the infrasonic oscillator of frequency 10 Hz). *Sphota* is *praakruta dhvani* (primordial sound, the *pranavam*) which reversibly transforms itself to make humans conscious, cognitive and communicative through language. Thus *Sphota* is physically infrasonic sound form and is responsible for all human mental functions both materially (*upadana karana*) and instrumentally (*nimitta karana*) [14].

Also according to *Upanishads* knowledge is of two kinds- (i) that acquired through the combined operation of sense organs, action organs and inner mental tools in the awareness of *Atman* (*Maitra Jnana*) and (ii) that is inherent / genetic/hormonal (*Varuna Jnana*) [7]. All our acquisitions of knowledge come under *Maitra Jnana* and the in-built senses (*iccha and artha saktis*), urges, volitions, body and mental abilities, capabilities, nature etc., come under *Varuna Jnana*. In both the kinds of acquiring and retrieving knowledge from without the body and within the body, *sphota* plays chief role.

Theory of language acquisition and communication:

Vivartanam is the type of change that *sphota* undergoes while *sristi* (creation of mental impressions or mental world during language acquisition and communication) takes place. When *sristi* is being created or is in the *dristi* (Conscious 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) [2-8]. Thus *Sabdabrahma Siddhanta* based on *Upanishadic* and *Advaitic* 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 [8],12-18]

Concept of *Bhakti* and *Vibhakti*:

Bhakti defined as

swa swaroopaanusandhanam bhaktirityabhidhiyate-tuning the mind to its origin and original form (*Upanishads*) or *cheto vrittirupetya tisthati sadaa saa bhaitirityuchyate*-the state in which the mind disengages itself from all *vrittis (Sivanandalahari)*- *antahakarana parinamas (manasika gathi)*- reversible transformations of inner mental tools-*manas, buddhi, ahamkaram and chittam*- and attains *nivritti* state (*nirmala manasika sthiti*) stays as that - 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 /pranavam//sphota* and *antahkarana*⁴⁻⁸. This is the state of *Atman* or *Brahman as tatpara* or *tatparya* or *rasa*.. In this state the *chidabhasa* or virtual chit -energy *maya/pranavam/sphota* – 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 to be (Concept Diagram I to V). Transformation of *maya/pranavam/sphota*, reverse transformation of *maya/pranavam/sphota* and cessation of transformation *maya/pranavam/sphota*-the *dvaita* and *advaita* conscious states respectively- taking place simultaneously, consecutively and alternately is the structure, form, function, state and essence of human cognitive, language acquisition and communication processes. All this is also embedded into the following *slokas* of *Brahma Kanda* of *Vakyapadeeyam*.

II *chatvaari srungaa trayo asya pada dwe seershe saptahastaaso anyah*

Tridha baddho vrushabo rooraveeti maho devo martyaan avivesa

III *chatvaari vaakparimata padaani taani viduhu braahmanaa ye maneeshinah*

guha treeni nihita nengayanti tureeyam vaacho manushyaah vadanti

IV *vaikhyaarya madhyamaayaascha pasyantyaascha etat adbhutam*

aneka teertha bhedaayaastriyaa vaachaha param padam

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

uto tvasmai tanvam visasre jayena patya usatei suvaasaah

and *Paanineeya Siksha* -

Aatma buddhyaa sametyarthaan mano yunkte vivkshaya

Manaha kaayaagnimaahanti sa preyarayati maaruthum

Maarutastoorasi charan mandram janayati swaram

According to theory proposed in the above expressions the human language communication process is a combination and quick successive forward and reversible transformations of four modes i.e.,

I. Speaker/Teacher: Language communication:

(a) Pure Consciousness/Purport/Unoccupied Awareness (Meaningful Experience or Experienced Meaning- *para*)

(b) Understanding/ Experience/ Sense/ Mood/Volition/ Intuition (*pasyanti*)

(c) Perception/Thinking/Feeling (*madhyama*)

(d) Utterance /Expression (*vaikhari*)

II. Knower/ Listener/ Learner: Language learning/acquisition and understanding:

(a) Knowing (through sense organs)- *vaikhari*

(b) Perception/Thinking - *madhyama*

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

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

In this theory the *advaita* state - *Jagrat Sushupti*- proposed by *Vedantins* corresponds to *para* mode of language communication process (Concept Diagram II to V). 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 [5], [9], [12-14].

When an object energy-form, the *tanmatra*, [objective energy forms- optical-light(eye), mechanical (ear) -sound chemical (nose and tongue), mechanical, thermal(skin) (Concept diagrams I and II) – 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 *sphota* (undergone *vivartanam*) (Concept Diagrams II to VI). 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 *sphota* 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 *sphota* - 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* or *pranavam* or *sphota*) 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/sphota* and *antahkarnas* in conjugation with sense organs and action organs, *karmendriyas* (Concept Diagrams II to VI).

The gist of all above expressions and discussions is:

Consciousness (Being-Sat)

Awareness (Becoming-idam)

Speaker: Modulation-*purodhana* 

Brahman/Atman chidaabhasa/maya/pranavam antahkaranani karmendreyani / jnaanendrayani

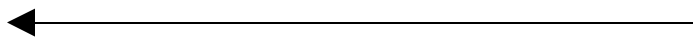
Import experience/understanding/insight feeling/thought/perception actions/reactions/cognitions

 *Vivartanam-Reversible Becoming* 

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

Para/tatpara/ Tatparya pasyanti madhyama vaikhari

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

 *tirodhana* - Demodulation : **Listener**

Application:

Several branches of learning take study of mental processes as one of their subject matters. Epistemology, psychology, physiological psychology, neurology, artificial intelligence and cognitive sciences contribute to the study of the mental processes in their own way. Up to now, however, little has been done to combine the approaches -- let us say -- of the physiological psychologists and neurologists who see cognitive process as a biochemical and biophysical energy transformation with the proponents of mind-machine modeling, who have a lot to say on pattern – recognition, memory and learning and the *Upanishadic* insight which has understood human consciousness and analyzed mental functions.

The insight of human consciousness and mind and its functions together with *Sabdmabrahma Siddhanta* and *sphota vada* in modern scientific terms presented in this communication can be used to develop the software to model human cognitive processes and language learning/communication processes going on within humans, and compare them with the working of the bio-chemicals and bio-materials and the energy transitions and transformations associated with such transitions..

Most of the present attempts try to model thinking as an isolated process which is the result of sensing. But if human mental processes are observed, it becomes obvious that thinking is but an intermediary process which transforms sensing into sense and sense into utterance/ expression. This sequence of human mental processes can be applied and the human cognitive model obtained thus can be refined and developed to build the soft-ware to model human understanding/experience process in conjugation with existing mind-machine models [22-27]. This can also be used by the physiological psychologists to model the biochemical and biophysical energy transforms that take place during human cognitive and language learning/communication processes.

Thus, this article presents human consciousness as a physical entity as an oscillating energy-presence issuing out infrasonic energy pulses constituting *sphota* proposed by Sanskrit grammarians. This oscillator has a time period 10^{-1} sec in accordance with both eastern and western knowledge. It will be beneficial to use *Upanishadic* insight, clubbed with *sphotavada* as is done here, in clearing conceptual issues relating to consciousness, experience, understanding, sense, mood, meaning etc., to reach the stage of extending available mind-machine schemes to model human consciousness, mental functions including language acquisition and communication processes. Translating software obtained thus into artificial intelligent, combining existing mind-machine models will be a useful application. Further, physiological modeling of mental functions by combining the study of bio-materials such as neurons and proteins and energy transformations by and through them clubbed with *Upanishadic* awareness of mind and its functions helps to understand the physiological processes relating to psychological processes.

Conclusions:

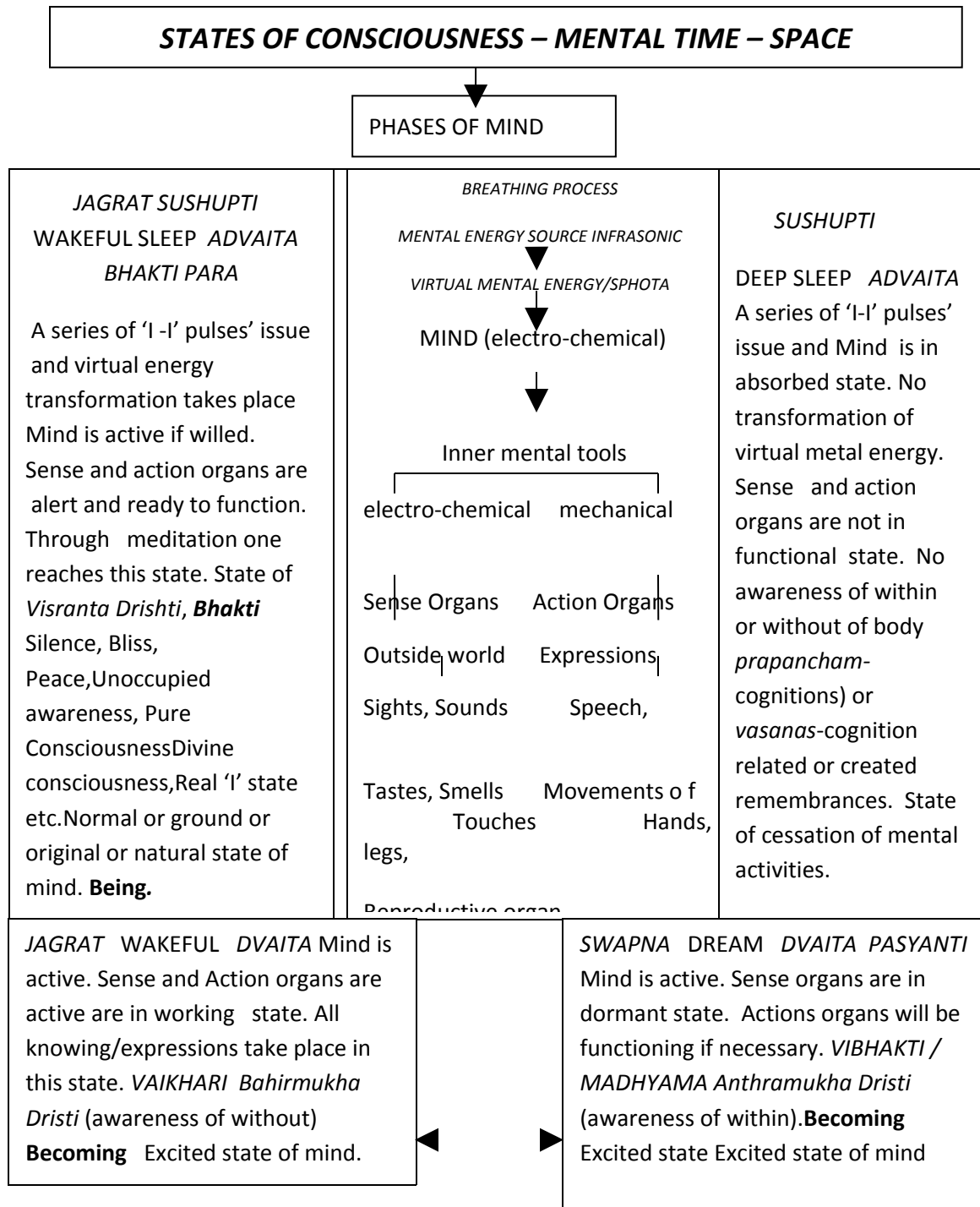
Sphota is an infrasonic form of energy issued out in *Bhakti/tatpara/tatparya* state of *Brahman* from *Brahman*. *Jagat* is tagging of *namam* and *roopam* to *sphota* and is modulated (in speaker)/demodulated (in listener) form of *sphota*. *Sphota* in conjugation of *icchasakti* and *artha sakti* (both are biochemical forms of energy and are genetic/inherent/hormonal to the organism i.e., human-beings) becomes *pasyanti* as verb form in present continuous or infinite form creating moods/senses/intuitions/volitons/urges bereft of subject and object and further becomes *madyama* into a sentence form in conjunction with *jnanasakti*, with subject and object tagged and gets transduced into sound form as *vaikhari* in conjunction with *kriyasakti* and is uttered. Both *jnanasakti* (electro-chemical form of energy) and *kriyasakti* (mechanical/sound form of energy) are biophysical forms of energy and are created by the combined operation of sense organs, action organs and inner mental tools (*anthakarranas*). In the organism human-being the hardware of this process is hormones, neurons and proteins which carry out the required energy-transitions and transformations through brain, spinal cord, nervous system which includes sense and action organs.

Penrose [24], [25] opines that the brain activity responsible for conscious understanding must depend upon a *physics* that lies beyond computational simulations. He also says that consciousness

and mental functions are not merely algorithmic and says that a robot functions at the expense of intuitive qualities. In the light of this and also our observation and experience, the *physics* behind human mental functions and language acquisition and communication processes is necessary to be understood and an attempt is made in this article for the same. *Sphota* is stated as infrasonic wave series and it is the real *śabda* and other modes of language are *its* forward and reverse becoming. So a physics and electronics insight provided here will be *complementary* and *supplementary* to mathematical and computational approaches in this field of research and understanding concerning theory of Sanskrit language and grammar.

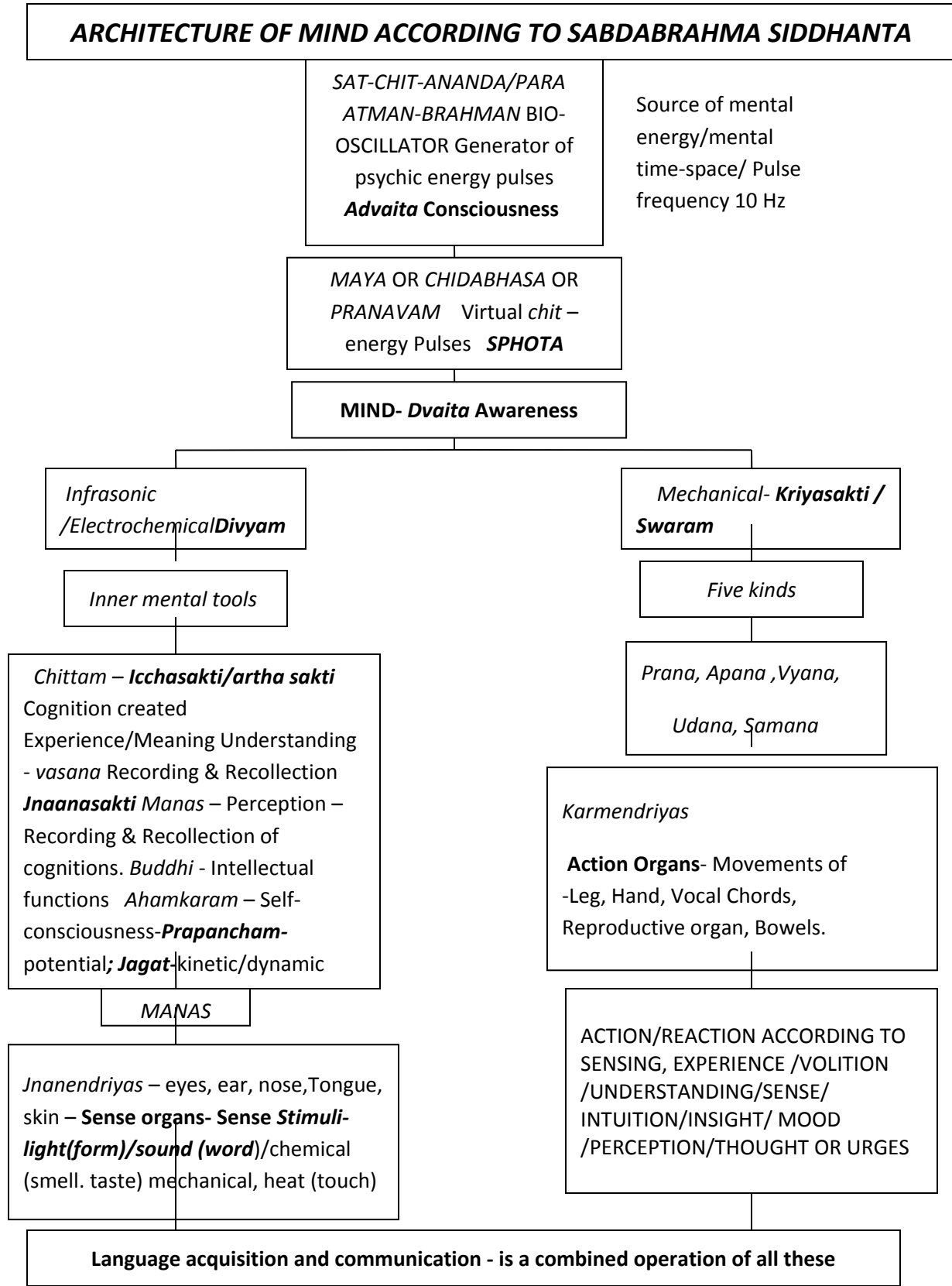
Thus functional structure of mind and its transformations while acquiring and communicating language, knowledge and skills will be better understood by physics and physicochemical theory of human cognitive functions and abilities. The software for all these is available in the Upanishads, *Advaita* Philosophy, *Gayatri Mantra*, *Śabdabrahma Siddhanta* and *sphota vada*. These expressions when translated into modern scientific terms making use of concepts available in physics and communication engineering, as is done in this presentation, will clarify and resolve conceptual difficulties regarding understanding and experience and provide flow-chart and gross energy transformation model which can automatically evolve into algorithms constituting the software for mind-machine models. The expressions, discussion and conclusions given here thus point out to the distinct and different nature of natural language comprehension to natural language processing. Natural language comprehension is biochemical and biophysical where as natural language processing is more computational. Natural language comprehension process when understood will be useful in developing mind-machines which can mimic more human mental functions.

CONCEPT DIAGRAM I

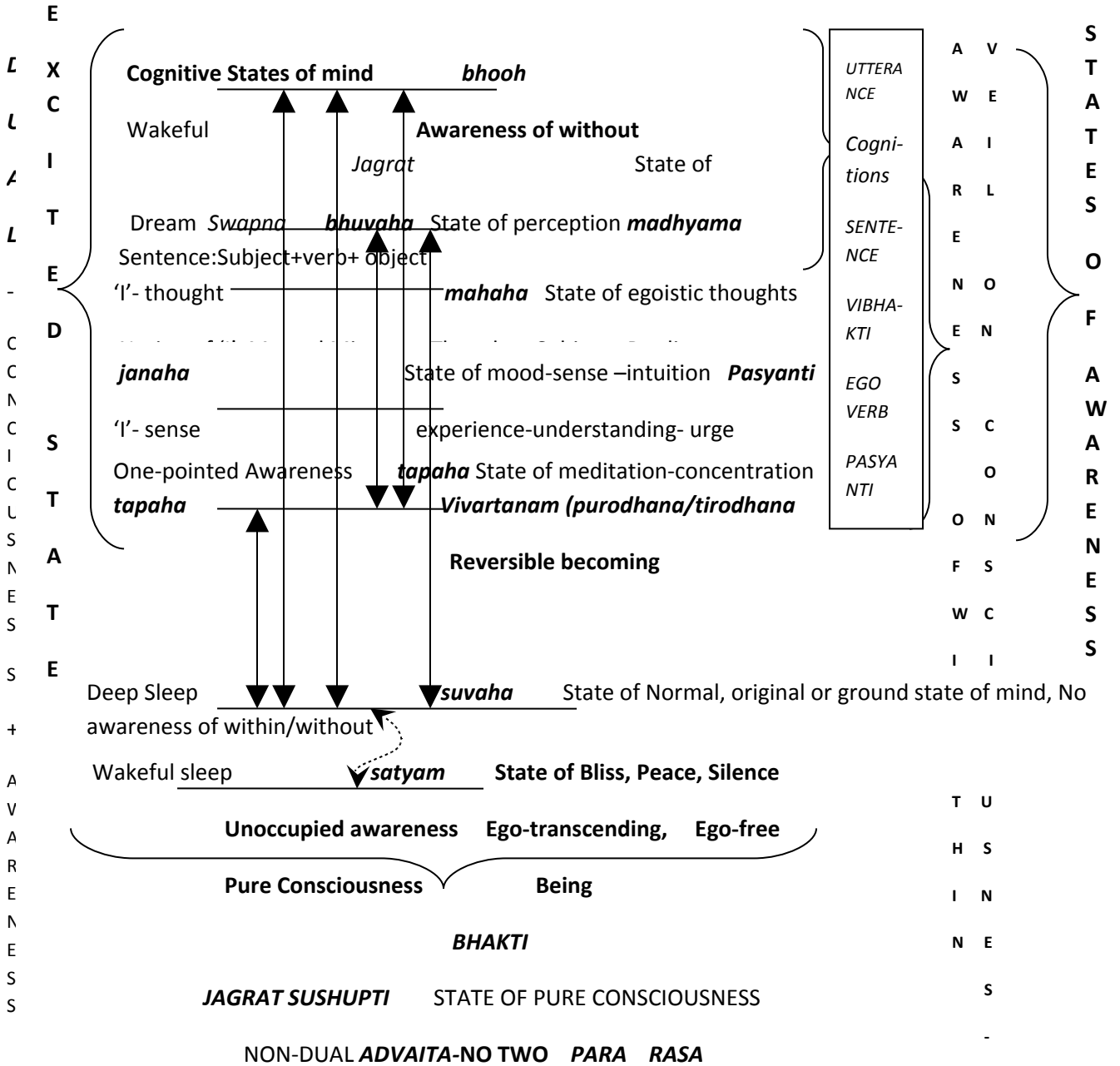


* Eyes, ears, nose, tongue and skin are *sense organs*. * Movements related to hands, legs, vocal chords, reproductive organ and bowels are *action organs*. ** *Manas, Buddhi, Chittam and Ahamkaram* are *antahkaranas* (inner mental toolshappening in *Jagrat* (wakeful) and *swapna* (dream) conscious states. *Sushupti* – State of cessation of mental activities. *Jagrat Sushupti* – Pure Consciousness Bliss Peace

CONCEPT DIAGRAM II



CONCEPT DIAGRAM III: STRUCTURE AND COGNITIVE STATES OF MIND



CONCEPT DIAGRAM IV

FLOW CHART OF HUMAN MENTAL FUNCTIONS INCLUDING LANGUAGE PROCESSING

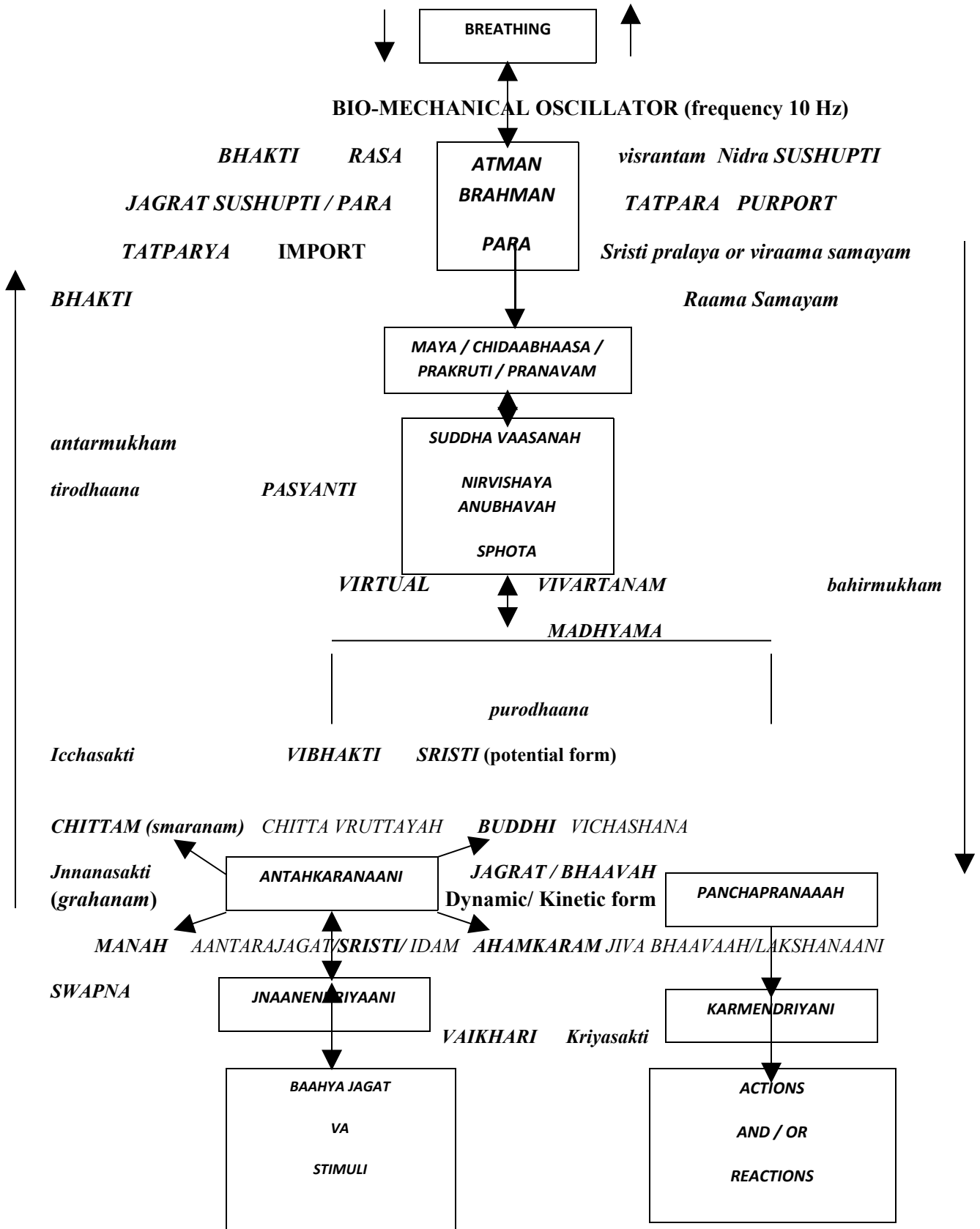
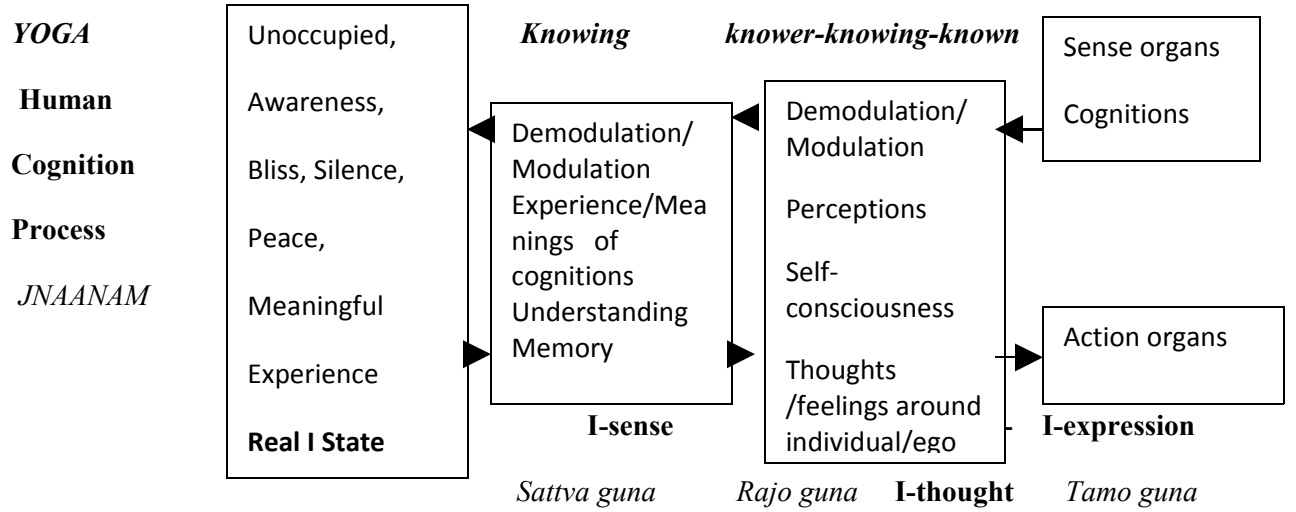


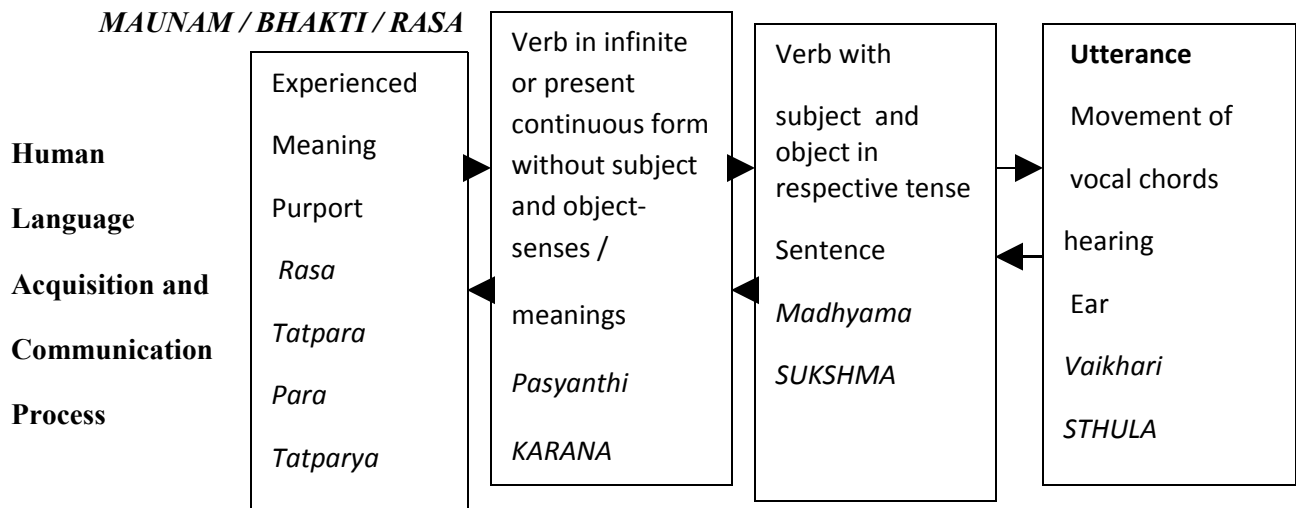
TABLE V

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



SPHOTA + VERB

VIBHAKTI (SPHOTA AS SENTENCE)



Pranavam/sphota + *Icchasakti/Artha sakti* + *Jnaasakti* + *Kriyasakti*

Volition /Urge

knowing

Expression

Intuition/insight /understanding

perception

Action

Mood/Sense/ Experience/meaning

logic/reasoning

Reaction

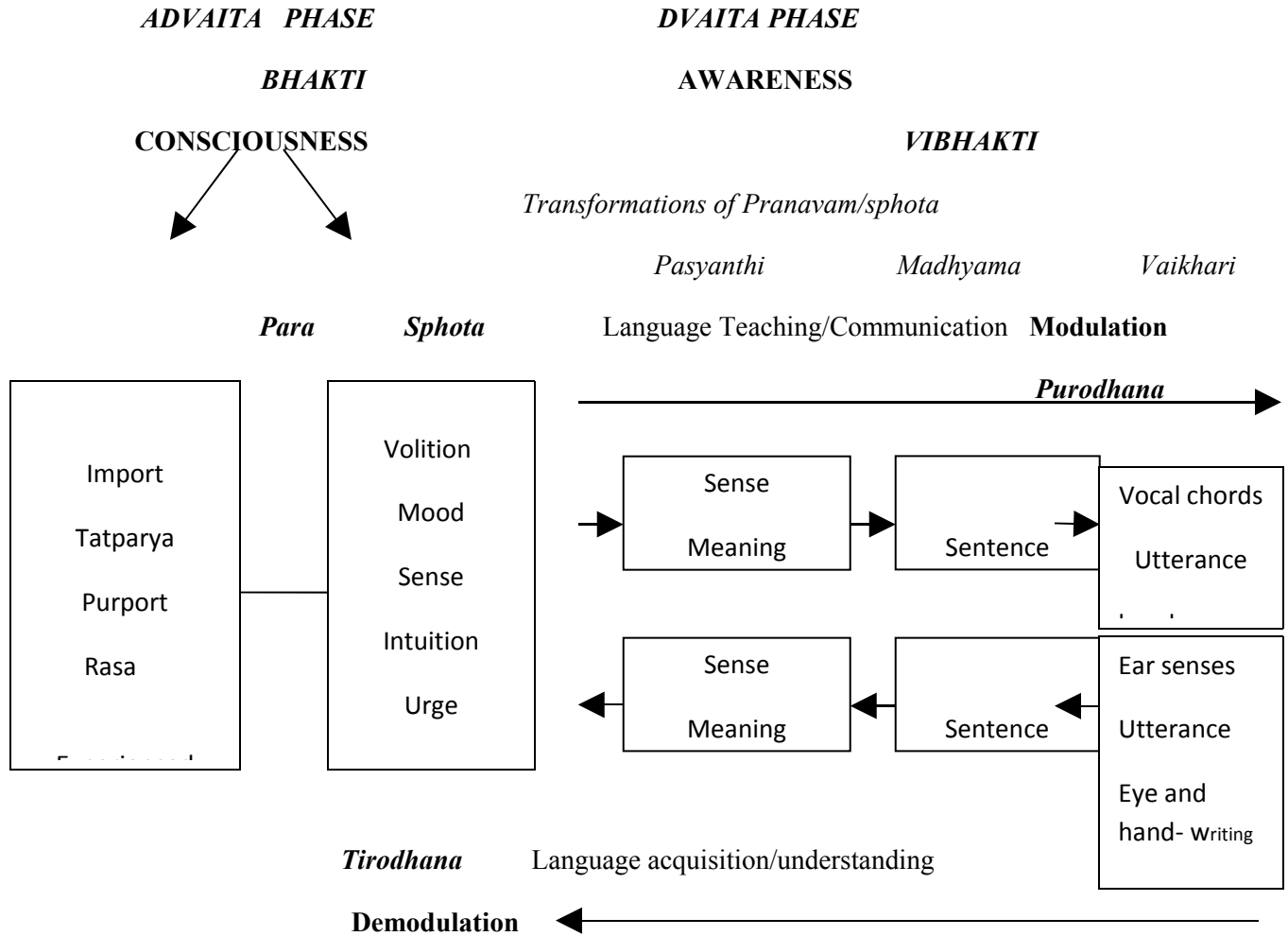
Biochemical/Genetic/ Inherent /HORMONAL

Biophysical

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

TABLE VI

MODES OF LANGUAGE ACQUISITION AND COMMUNICATION



Note: *Vivartanam = purodhana - tirodhana yuta vartanam 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 conjunction with cognitive states of mind and modes of language acquisition and communication.

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