
BEING AND BECOMING:
A PHYSICS AND UPANISHADIC
AWARENESS OF TIME
AND THOUGHT PROCESS

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ABSTRACT. Understanding time, construed as movement, change and becoming, is explained taking examples from the natural sciences. Durational and metrical aspects of time are elaborated. General assumptions about the passage of time are listed. Indian, Chinese and later insights of time are figured. Physical and psychological times are differentiated and explained using Energy-Presence (Being) and Energy-Transformation (Becoming) concepts. Concepts of *Time at rest* and *Time in motion* are proposed.

The meanings of time-space, time-flow, different phases of time-conscious and time-transcendent mind and thought processes are interpreted from basic physics principles and *Upanishadic* awareness. An attempt is made to present a comprehensive insight of the nature of time, thought process and conscious states (phases) of mind.

KEY WORDS. Physical time, psychological time, time at rest, time in motion, *Upanishadic* awareness of time, being, becoming, thought process, conscious states (phases) of mind.

Thinkers have been attempting to understand the nature of time since the beginning of civilizations. Many intellectuals through generations have been expressing thoughts trying to understand the nature and structure of time¹⁻¹⁵. Ancient Indians, the Chinese and the Greeks, and many Western and Eastern scientists and philosophers have made substantial contributions in this regard (tables I and II). An attempt is made in this article to advance an understanding of time and thought process using basic physics principles and ancient Indian wisdom as revealed in the *Upanishads*.

Our observation and experience recognize physical and psychological existences of time¹³.

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PHYSICAL EXISTENCE

Natural sciences such as physics, chemistry and biology give us a varied insight of time. Movement, change and becoming are three available classifications of time¹. These classifications can be understood by observing physical, chemical and biological processes as follows:

i) Movement: Matter and energy are engaged in natural or non-natural processes. Matter can exist as solid, liquid, gas (vapor) or plasma (ionic form) at a given time and space; energy can exist in many forms¹³.

Matter and energy can be in: (a) a state of rest or (b) a state of motion. Aristotle conceived time as counting of and reciprocal to motion¹. Motion associated with matter can be translation, rotation and vibration, and periodic or non-periodic. Plato thought time to be generated by cosmological movements¹. Thus movement has been construed to be time and also the cause of time.

ii) Change: The phase or state of matter is changed by energy and the form of energy is changed through matter¹³. Thus transformation of phase or state of matter or form of energy takes place within mutual influence. Natural or non-natural processes involve transformation of both matter and energy bringing out changes within or without matter. Thus all physical and chemical changes are constructed as time.

iii) Becoming: biology is the natural science dealing with living systems. We are aware of physical changes of an organism—the result of physico-chemical changes within—as growth or decay^{13,18,19}.

A plant becomes a tree. A girl becomes youthful. These two becomings (transformations) are growth of organisms. Tree becomes deadwood. A young woman becomes an old woman. These two becomings are decay or degeneration of the organisms.

The psychological process of a human being *becoming* angry and *being* peaceful after the anger subsides, are also biological processes involving changes in its psychic energy. Human knowing, learning, thoughts, perceptions, understandings and experiences are other mental processes that are two-way becomings of psychic energy²³⁻²⁶.

Thus all physical, chemical and biological matter has phases of origin, *being/becoming* and dissolution (cessation) which are becomings associated with matter and energy. Thus becoming is construed as time.

The above three insights of time essentially concern changes. Thus, changes of place or phase to matter or change of form to energy can be construed as time. External monitoring of the duration of these changes are measurements of time and passage of time. All these measurements concern the physical existence of time. Thus physical existence of time consists in changes and the measurement of the duration of such changes. Simply, *change is time* (concept diagram I). *Energy-form-change through matter or changes in or to matter by energy is time*¹³.

DURATIONAL AND METRICAL ASPECTS OF TIME

The nature of time, when studied, reveals two aspects of itself: *durational* (period) and *metrical* (counting). We are aware of both these aspects in our daily world and in scientific usage. We have clocks, watches, calendars, almanacs to monitor and measure time as a duration and flow¹³.

The durational aspect of time comes into picture when the period of a process concerning matter or anti-matter or energy in space is compared with an external uniform process—the process going on in a time-measuring device¹⁴. Actual processes, natural or non-natural, are initiated and go on guided by natural forces and cease to happen because of natural forces. It is known to us that the nature of such natural forces varies depending on the size and form of matter, and the domain of activity and magnitude of the energies and time-periods involved. So far, we have identified four such natural forces—the gravitational, electro-magnetic, strong and weak nuclear forces^{10,11,17}. These four natural forces cause movement (transition), change (in phase and state of matter and form of energy) and becoming (e.g., growth of organism) to matter and/or energy.

We utilize the durational aspect of time also to 'record' the periods of various processes taking place in the universe, which none of us can experience. We have identified many periods of happenings, from the period of nuclear transition (10^{-23} sec.) to the age of the universe (10^{17} sec.)^{4,17}. The instruments developed by us can 'experience' the durations of events whose magnitude is in tiny fractions of a second. The devices can follow and monitor such extensions. The interval between two moments, the beginning and cessation, is the duration of that process or the '*absolute period*' of that process.

Time, in the sense of instants of time, is the numerable or metrical aspect of time. These instants serve exactly the same purpose as page numbers in a book. Imagine that a book is bound properly in the order of the narration and the page numbers are not present. Does the absence of the numbers on the pages of such a book change, alter or influence the course of the narration? No. The page numbers just facilitate us a quick reference. Similar purpose is served by the instants of time, which facilitate us to refer to what had happened prior to our presence, what is happening in our presence and what will happen later to our presence. As individual numbers they do not have any other significance except for being in sequential order; individual instants of time also do not have any other significance than being the divisions of duration, of movement of the earth around the sun or of the process going on in a clock.

Thus, instants of time are just 'numerals' that are used to signify or characterize the duration of various processes. This type of metrical aspect of time is the other sense in which time is understood. It is important here to realize that any movement, change or becoming concerning matter or

anti-matter or state or form of energy *create* time. In other words time is *caused* by the processes, natural or non-natural.

A period is absent in the absence of a process. Duration is absent in the absence of a period. 'Time' is absent in the absence of duration. Thus time is missing in the absence of a process, natural or non-natural. Time is dependent on a natural or non-natural process for its being. It has no independent existence from the process or event or happening—physical, chemical, biological, psychological, cosmological, social, political or likewise. Such a physical existence as flow and period of a happening is the physical time. Thus the being and becoming of matter and energy is physical time.

PASSAGE OF TIME

The following phenomena are normally assumed as the passage of time:

- a) Movement—translation, rotation or vibration—(or transition) of matter in space.
- b) Changes in the state or phase of matter (with of energy).
- c) Transformation of energy from one form to another form either through matter or otherwise.
- d) Being and becoming (growth and decay) of organisms.
- e) The in-built order of happenings guided by natural forces in natural or non-natural processes.
- f) The ability of human mind to perceive, record, retrieve and expect various happenings taking place in physical time.

Figure I displays various propositions on the locus (path) of time while 'flowing'.

The observation of the figures demonstrates that the locus of time-flow is none other than the course of the path and direction of the course of the process selected. Actually there is no passage of time. There is only ongoing of processes involving changes of matter and energy.

PHYSICAL TIME MEASUREMENT AND THE FLOW OF TIME

When analyzed, it would be interesting to note that in all time-measuring devices, internally an energy transformation takes place ^{14,16}. This energy transformation within occurs as a non-periodic, linear or periodic process. The energy-presence (being) and energy transformation (becoming) there-in, are the result of a mechanical, electrical, electronic or atomic process taking place and going on within the clock, and the same is manifested as movement of hands or display of digits on the dial, depending on the technology used. Thus *energy-presence* and *transformation* of that energy from one form to another form are essential for time-measurement, to monitor the passage of time and even *for time to exist*.

Energy-Presence (being) confers the scope for the durational aspect of time. Thus, *Energy-Presence* is *Time-Space*. Time-space as Energy-Presence can be termed *Static Time* or *Time at Rest*. Transformation of such an Energy-Presence creates time-flow or passage of time. This time-flow within a clock monitors the time-flow or time-taken concerning an *external* on-going process-physical, chemical, biological, astronomical, cosmological or psychological. Energy-Transformation is the time-flow aspect of time which when divided as seconds, etc., becomes the metrical aspect and is the dynamic aspect of time. So energy-transformation is *Dynamic Time* or *Time in Motion*. The measure of this Energy-Transformation decides the speed of the respective time-flow.

From Newton's laws of motion we know that a body is in a state of rest or uniform motion unless acted upon by an external force. Inertia means the state of rest and velocity signifies the state of motion. Potential energy is the state of rest and kinetic energy is the state of motion by energy. State of rest or uniform motion (being) gives time-space and change in these (becoming) gives time-flow. Thus inertia (potential) and movement (kinetic) are implicit and associated with a body/charge/particle in a physical phenomenon. Mass is inherent to inertia and location, and shape of matter and static-charge to potential energy and velocity is inherent to movement, and time is explicit and non-inherent to a physical phenomenon. Change of velocity and/or acceleration can influence movement, but change of time cannot and will not. Thus, the above discussed nature of time as dependent on energy and energy transformation points to review the status of time as a fundamental physical quantity.

PSYCHOLOGICAL OR MENTAL EXISTENCE

All the events that take place during the physical time are followed by us with an egoistic mind. Such an identification of 'I', 'me' and 'mine' with objects, persons, events, ideas, nations, etc., creates a *psychological time* in us²⁴. Such a 'mental time' is created in the *Jagrati* (Wakeful/Awakened) Conscious State of mind. Wakeful/Awakened, Dream (*Swapna*), Deep Sleep (*Sushupti*) and Wakeful Sleep (*Jagrati Sushupti*) [Concept Diagram II and III] are different conscious states of mind creating different phases of mind. They are structure and phases of Mental Time-Space²⁰⁻²⁶ [see Table III].

We know/learn and express/teach in these conscious states of mind²³. These conscious states or phases of mind are the result of the transformation of psychic or mental energies in the Unchanging and Ever-Present Awareness, present during all these conscious states as Energy-Presence²³. *Upanishadic* wisdom calls such an Awareness as *ATMAN* or *BRAHMAN*. *Atman* is normally referred to as *SELF*. *Atman* is present in us and is the result of the breathing process²³. According to *Upanishads*, *Atman* is the Source of

Mental-Energy. In modern scientific terms *Atman* can be termed as a BIO-OSCILLATOR, which issues out psychic or mental energy pulses^{23,26}. *Atman* is the oscillating psychic Energy-Presence denoting and providing Mental Awareness and Time-Space.

As *Prajnanam*, or Continuous Conscious Awareness, *Atman* witnesses all our mental activities, related body activities and happenings within and without the body and body's reactions as thoughts and organ-movements to these happenings^{23,26}. Being such an Awareness, *Atman* provides the energy required for guiding the mind to know/cognize/learn through the sense organs, perceptions, thoughts, experiences, understandings, etc., and store such information and retrieve it in the four conscious states described above, and makes us conscious of within and without ourselves [Concept Diagram II]. 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 (*Atma Drishti*) as time¹³. Awareness of the Self (*Atma Dristi*) is the mental phase without cognition 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 alternative superimpositions over this continuously present conscious state. This state of mind transcends both physical and psychological times and time-flows. This is the *normal* or *ground* state of mind and all mental activities are *excited states* of mind^{22,26}.

Antahkaranas (inner mental tools) perform various mental activities which are transformations of psychic energy (virtual *chit-energy-maya*) to cognize and create or retrieve thoughts/perceptions/experiences/understandings/meanings, etc., in us²⁶ [see Concept Diagram III]. 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 that makes us conscious of time and time-flow.

This article is an *experience* of physical and psychological times in a thought-form and other mental processes, their form, nature and transcendence, in terms of Energy-Presence (Being) and Energy-Transformation (Becoming) based on basic physics principles and *Upanashadic* wisdom.

CONCLUSIONS:

1. Matter or energy at rest or in motion or under transformation is the physical manifestation of time and constitutes physical time.

2. The physical manifestation of flow of time or passage of time is the ongoing processes involving transformation of energy through matter or change of phase of matter with the aid of energy.

3. Matter- or Energy-Presence is Time at Rest or Static Time or Time-Space or Durational aspect of time.

4. Matter- or Energy-Transformation is Time in Motion or Dynamic Time or Time Created or Metrical aspect of time.

5. Time-Space is defined, created, controlled and ceases to be dependant on Energy-Presence and the energy/matter available and amenable for and cause of transformation.

6. Time is not a physical quantity. Time is an awareness. Time is a sense. Passage of time is an observation and a mental experience in a particular conscious state of mind.

7. Rise and fall of and flow of conscious states of mind and thoughts and other mental functions constitute psychological time.

8. Psychological past is a record of happenings and psychological future is an apprehension about happenings caused by the egoistic mind during the passage of physical time.

9. Both psychological past and psychological future are thought-forms in the physical present involving psychic energy transformations in the wakeful and dream conscious states of mind.

10. Physical present is the same everywhere in the universe and only observation and counting occur at different instants.

11. Counting of physical present is a function of geographical location.

12. Continuous presence or continuous flow of matter or energy without transformation or change is Time-transcendence or Thought-transcendence or Timelessness. This means continuous state of rest or uniform motion is Timelessness.

13. Time flow signifies the speed of conversion of energy in a process.

14 Time flow is a measure of Being (presence) and Becoming (transformation) of matter and energy in space.

Table I

DEFINITIONS OF TIME

1. Awareness of Self (*Atman*) is Time (*Upanishads*).

2. Transformation of *Chit* (psychic) energy is Time (*Vedanta Darsana*).

3. *Chinese* say that Time is discontinuous.

4. *Plato* is the first to distinguish Time as it is in itself from our awareness of Time and from events in time. He regarded Time as being actually produced by revolutions of the celestial sphere.

5. *Zeno* related Time to motion.

6. *Pythagoras* tended to identifying the chronological with the logical.

7. *Aristotle* (possibly influenced by *Pythagoras*) felt Time is counting of motion in respect of before and after. He regarded Time and Motion as reciprocal. Time does not exist without motion. Time is numerable aspect of motion.

8. *Polonius*: Motion Time can not be, since motion takes place in Time.

9. *Heraclites*: Time signifies the period of world from its function to its destruction and rebirth.

10. *Galileo*: Time is a geometrical straight line.

11. *Barrow*: Time is the continuance of anything in itself in its own being.

12. *Newton*: An 'absolute time exists whose equable flow is independent. Absolute, true and mathematical time of itself and its own nature flows equably without relation to anything external.

13. *Leibniz*: The order of successive existents is Time.

14. *Kant*: Time is an aspect of experience and Time has no existence in external reality.

15. Einstein: Relative Time: Time is relative. Speed (passage) of time and time measurement are relative.

16. Time is movement, change or becoming.

17. Ramabrahmam: *Es gibt keine Zeit. Es gibt nur prozeâe.* There is no time. There is only ongoing of processes.

Table II

DIFFERENT VIEWS, CONCEPTS AND SENSES OF TIME VIEWS

a. Idealist: Time is nothing but a concept and therefore dependent on (human) consciousness only.

b. Realist: Time is self-sufficing entity, which is not dependent on anything else.

c. Relational: Time is also a concept, and therefore dependent on consciousness, but at the same time it is a function of the events happening in nature.

CONCEPTS:

a. Time of theoretical physics

b. Time of thermodynamics and of the evolutionary sciences such as biology.

c. Time of conscious awareness.

SENSES:

- a. A moment, an exact date, a point of time.
- b. Period of time, a span of time and time interval.
- c. Duration, the length of time period.
- d. An all embracing period of time.

Figure I

PICTORIAL REPRESENTATION OF VARIOUS
PROPOSITIONS OF PASSAGE OF TIME

Ancient Indian View — Cyclic

Chinese View — discontinuous

Modern View - linear

Thermodynamic View — reversal of a process

Fundamental Particle Physics View — Time reversal

Vedanta View — Reversible psychic energy transformation

Being Becoming

Table III

**PSYCHOLOGICAL AND SCIENTIFIC MEANINGS OF CHIEF
UPANISHADIC MAHAVAKYAS**

1. *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.

2. *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.

3. Ayam Atma Brahma / THIS ATMAN IS BRAHMAN

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

4. 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.

5 Raso vy Saha / AWARENESS OF EXPERIENCE/EXPERIENCE OF MEANING IS BRAHMAN

Experience of Essence 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.

6. Anando Brahma / BLISS IS BRAHMAN

Unoccupied Awareness is bliss.

7. 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*.

Concept Diagram I

NATURE OF TIME

PHYSICAL TIME (change of energy-form or matter)

MOVEMENT

CHANGE

BECOMING

TIME

PAST

PRESENT
CONTINUOUS

FUTURE

TION

MEMORY

BEING

IMAGINA-

ACHES SENSES EXPERIENCES
DOUBT WORRY

ANXIETY FEAR

THOUGHTS

THOUGHTS

BECOMING

PSYCHOLOGICAL TIME
(change of psychic energy)

* 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 tools). Experiences created by perceived object-energy forms are *vasanas*. Stored and retrieved collection of collection of perceived object-energy forms are *prapancham, idam, jagat or viswam*.

NOTES

- 1 Zwart, P.J., *About Time*. Amsterdam-Oxford: North-Holland Publishing Company, 1976.
- 2 Jiri Zeman, *Time in Science and Philosophy*, Elsevier Publishing Company, Amsterdam-London-New York, 1971.
- 3 Denbigh, K.G., *Three Concepts of Time*, Springer-Verlag, Berlin-Heidelberg-New York, 1981.
- 4 Fraser, J.T., *The Genesis and Evolution of Time: A Critique of Interpretation in Physics*, University of Massachusetts, Harvester Press, 1983.
- 5 Landsberg, P.T., *The Enigma of Time*, Adam Higler, Bristol, 1982.
- 6 Clarke, C.J.S., *Nature* 306, (1983) 131.
- 7 Elton, L.R.B. and Messel, H., *Time and Man*, Pergman Press, Oxford-New York-Toronto-Sydney-Paris-Frankfurt, 1981.
- 8 Parsons, E., *Time Devoured*, George Allen and Unwin Ltd., London, 1964.
9. Davies, P., *New Scientist*, August 9, 1979.
- 10 Stephen W. Hawking., *A Brief History of Time*, Bantam Books, New York, 1989.
- 11 Stephen W. Hawking, *The Universe in a Nutshell*, Bantam Books, New York, 2001.
- 12 Ramabrahmam, V., "Necessity for an integrated understanding of time," unpublished communication.
- 13 Ramabrahmam, V., "Kalah Nama—Time means," *Sambhashana Sandeshah*. June, 2000, 4.
- 14 Ramabrahmam, V. "Is time fundamental?," unpublished communication.
- 15 Krishnamurty, R. "Surya Siddhanta," *Astrological Magazine*, May 1946, 308.
- 16 Jim Jardine, *Physics is Fun: Book Three*, Heinemann Educational Books Ltd., London, 1969.
- 17 Weidner and Sells, *Elementary Physics—Classical and Modern*, Bacon Inc., Boston-London-Sydney-Toronto, 1973.
- 18 Vasanta Pattabhi and Gautam, N. *Biophysics*, Narosa Publishing House, New Delhi Chennai-Mumbai-Kolkata, 2002.
- 19 Stryer, L. *Biochemistry*, W.H. Freeman and Company, New York, 1995.
- 20 Ramabrahmam, V., "Upanishads texts of science?" *Bharatiya Bauddhika Sampada*, May, 2001, 8.
- 21 Ramabrahmam, V., "Nature of Maya—a modern scientific awareness," *Bharatiya Bauddhika Sampada*, August, 2002, 9.
- 22 Ramabrahmam, V., "The significance and use of absence," *Bharatiya Bauddhika Sampada*, November, 2003, 7.
- 23 Ramabrahmam, V., "A modern scientific awareness of Upanishadic Wisdom: Implications to Physiological Psychology and Artificial Intelligence," *Proceedings of the World Congress on Vedic Sciences, Bangalore (2004)* 562.
- 24 Ramabrahmam, V., "Meditation on the self through physics," *Proceedings of the World Congress for the Synthesis of Science and Religion, Calcutta, 1997*.
- 25 Ramabrahmam, V., "Atma Manah Dhyanam Cha-Self, Mind and Meditation," *Sambhashana Sandeshah*, June 2001, 25.
- 26 Ramabrahmam, V., "Human cognitive process—An ancient Indian model", *Proceedings of the International Vedic Conference on Contribution of Vedas to the World, Haridwar, 2005*.