

Vedic and Psychological Perspectives of Time

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ABSTRACT

The concept of time has engaged the attention of practitioners of scientific thought as well as scholars of Vedic literature with the sole aim of investigating the true nature of time, the associated dynamical paradigms and the interpretation of various time spans in the context of a universal system. We wish to present a cohesive discussion in terms of the modern cosmological framework and juxtapose the same with the deep studies in the realms of Vedic system. Time is thought of simply as one of the geometric coordinates in the overall fabric of the 4-dimensional continuum of spacetime within the framework of Einstein's formulation of the theory of relativity, whereas time is considered to be the controller of the movements of all heavenly bodies organised by the Supreme Lord- the Brahma. The units of time in the Vedic domain are defined in terms of the day/night, month, year of the sages who have acquired progressively higher echelons of divinity by their meditation, namely, Pitris, Devas (demigods), and the Supreme Brahma. Dividing the span in terms of the four Yugas, namely the Satya, Treta, Dvapara, and Kali, (and translating these durations to the more familiar earth years) helps in comprehending the extent of their largeness. The total time span of the 4 yugas is estimated to be 4320 million earth years and this defines one cycle. The Vedas stipulate that this cycle must keep repeating periodically in the scheme of things of the universe. Such an interpretation is also consistent with the Hindu religious scriptures. However, among the crucial links between the two streams is the concept of time dilation according to which the rate of flow of time is governed by the motion of the object with respect to the observer, the more the relative motion the less is the rate of time propagation. It is, therefore evident that our modest attempt delineated here offers a reasonably cogent and systematic framework which is capable of accounting for the observations in both the domains. Turning to the psychological aspects of time flow we recognise that the time fluidity is indeed an extremely crucial ingredient in studying its profound psychological impact on physical and emotional paradigms in a variety of contextual situations. We make a modest attempt to highlight some of these daunting and perceptible effects in the background of our experiences.

Keywords: *Vedas, Yugas, Time fluidity, Time perception*

Scientific researches, particularly investigations in the field of physics, have resolved many mysteries and conundrums, yet there are many that still remain to be unravelled. It has engaged the attention of the brightest of minds in science and mathematics to address some of these challenges and puzzles. It would indeed be tantalizing to attempt a

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plausible description of time, particularly in view of its deeply mysterious nature. Arguably, time is a fundamental aspect of our reality and yet revelations about its true nature have thus far proved to be elusive. Although Einstein's theory of relativity revolutionized our understanding of the concept of time as a relative attribute, the rate of flow of time as well as the specificity of its directionality, generically referred to as the "arrow of time", have continued to baffle scientists even to this day. However, an explanation based on the principles of thermodynamics alluding in particular to the idea of entropy has addressed the problem but only partially.

Before we venture to delve into the beautiful universe envisaged by the great sages, authors, and scholars of the Vedas, it would be appropriate to know as to how time is actually defined. First of all, let us consider the conventional definition of time within the domain of modern science, particularly the cosmological interpretation where mathematical exactitude is inherently regarded as sacrosanct.

In physics, as also in cosmology, time is treated as a dimension in precisely the same way as space within the general framework of what is known as the concept of spacetime continuum [1]. The apparent discrepancy in the consistency of the physical units and dimensions of these two sets of coordinates, namely, time and space is easily resolved by augmenting the time coordinate by multiplying it with the speed of light, which is a constant quantity, called c , so that the time and the space coordinates have the same units in this description of four-dimensional spacetime (one dimension of time and three dimensions of space). Therefore, the time coordinate and the spatial coordinates have been accorded the same status for the mathematical formulation underlying the celebrated theory of special relativity. In that sense, time is often considered to be one of the fundamental aspects of the universe.

In this prescription, time can be understood as the dimension of this spacetime continuum in which events take place, thereby causing a change in the system. Thus, time can be thought of as a measure of the duration of the event. In other words, time is the measured or the measurable period during which a process, an action, or a condition occurs or continues. Equivalently, time may also be defined as the duration in a 1-dimensional non-spatial continuum and is measured in terms of the sequence of events that succeed one another from the past through the present into the future. It is a component quantity of various measurements, popularly referred to as a fourth dimension along with the three spatial dimensions. The concept of time with the meaning and definition enunciated herein above, can not only be used to compare the duration of events or the intervals between them, but also to effectively quantify the rates of change of quantities commensurate with the material reality. This perception finds equally profound applications in diverse and seemingly unfathomable domains such as those alluding to ecstatic experiences encountered in the non-materialistic paradigms of deeper and truly sublime reaches of consciousness. These realms are attainable only by elevated souls such as the demigods or Devtas who are able to transcend the physical limits/boundaries of the ordinary mortals and enter into the conscious regimes through deep thoughts and meditation.

We shall venture to address the all-encompassing interpretation in relation to the fluidity of time, for time is never perceived as being static. In view of the dynamical nature of time, it is, therefore, imperative to consider the flow of time for a systematic understanding of events taking place in the realms of not only the physical laws governing spacetime but also the perceptibility of experiences at the level of consciousness. While doing so, it might entail

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considerations that may at first appear to be too prosaic, simplistic, and even challenging, yet perseverance and conscientious investigations may well give rise to outcomes that are unequivocally rich in content and profound at the level of consciousness. We shall endeavour to juxtapose a comparative study of the possible impact of this time fluidity on our physical as well as emotional being.

Physical Vs Philosophical Interpretations

We now venture into a credible comparison of the nature of time in terms of the established principles of physics on the one hand and philosophical understanding on the other. While in physics, time is specifically treated only as a dimension just like the three spatial dimensions and is mathematically described using the concept and prescriptions of spacetime continuum, time is not absolute but relative to the observer according to the special theory of relativity. In other words, time may indeed appear to move slower or faster depending on the position and velocity of the observer. This phenomenon is referred to as 'time dilation' in which time moves differently for different observers in the same inertial frame (non-accelerating). In particular, time moves slower for an observer who is in motion relative to another observer. If T is the time observed, T₀ is the time observed at rest, v is the velocity of the object, and c = velocity of light = 3 x 10⁸ m/s, we have

$$T = T_0 / \sqrt{1 - (v/c)^2}$$

As an illustrative example, for an object moving as fast as 99.5% of the speed of light c, the observer would see the clock moving 10 times slower than normal. However, if v = 99.99% of c, the corresponding factor becomes 22 times, whereas, it increases at a much faster rate when the velocity gets progressively closer to the velocity of light c, the factor becoming as high as 707 at 99.9999%, and eventually infinite at v = 100% c (!) – a situation where time completely stops moving and stands still. The veracity of this simple formula has been proved unambiguously in a variety of situations/events investigated in physics under similar conditions.

These observations have a profound bearing on the nature of time and its rate of flow in the context of Vedic perspectives in different stages of quiet contemplations and transcendental meditations.

Digressing a little bit, It would now be appropriate to take a look at the philosophical understanding of the very nature and concept of time. There exist a number of different theories aimed at unravelling the true nature of time. While some of these theories advance arguments to justify that time is an objective reality that exists independently of the human perception, while others, equally vociferously, suggest that time is a subjective experience that arises conceivably from the complex (possibly neurological) processes taking place at the level of our minds. Yet there is a group of other philosophers who outrightly discard both the above ideas of objective reality or subjective experience; and propose, on the other hand, that time is an illusion, or at best, simply a useful concept whose utility manifests only in making sense of a host of our experiences. It is worth exemplifying these statements by some rudimentary illustrations which may a priori seem rather trivial, nonetheless they comprise the gamut of real experiences vis-à-vis time and the rate of flow thereof: These are succinctly collated in the aphorism:

Time is Slow: when you wait; Fast: when you are late; Deadly: when you are sad; Short: when you are happy; Endless: when you are in pain; Long: when you are bored.

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These observations constitute just a small sample of common day-to-day experiences, typified by the workings of the processes believed to be occurring in the human mind in different settings and prevailing conditions.

There is certainly no attainment of finality about the exact nature of time. It continues to be a complex, enigmatic and intriguing phenomenon, waiting for a universally acceptable resolution, where both the communities of physicists and philosophers must come to a reasonable consensus for the sake of better understanding. Fortunately, there is a renewed zeal and enthusiasm among physicists, philosophers, and other scholars to continue the debate and to study this simple and yet mysterious concept to arrive at a credible explanation and rigour.

TIME IN THE VEDIC SYSTEM

As opposed to the modern concept (primarily due to Einstein) where time is treated as a geometric coordinate in the fabric of spacetime or simply just a number, however in the Vedic system, time is regarded as the active potency of the Supreme – the almighty invisible Godhead Hari, who controls all physical movements in the world and in that sense, He manipulates the material energy. The Vedic Science envisages different dimensions of time, there being various inferences and references of time (Kala) in the Vedic literature. The starting point refers to what is called the ‘**atomic time**’ where one can estimate time by measuring the movements of the atomic combinations of the physical bodies. The measurement of time is facilitated according to its covering a particular atomic space. The time that covers the un-manifest, aggregate of all atoms, is called the **great time**.

Units of Time

There are a number of units of time of various sizes mentioned in Vedic literature. Among them the shortest is called ‘Truti = 1/1687.5 sec which is equal to the time required to integrate 3 Trasarenu. The unit of time applicable to the period of ordinary human life during the day is known as ‘Prana’ which is equivalent to the duration of a gentle breathing = 4 sec (rough figure). Another meaning is that the number of pranas in one (24-hour) day is equal to the number of minutes of arc in a circle. That is, with each breath (4 sec), the stars and planets undergo rotation through one minute of arc.

These rotations of the planetary systems, which are going on all the time, are called the *kala-cakra*, literally meaning the wheel of time. It turns out that many of the units of time in the Vedic system bear direct relationship with Astronomy. Then we have another unit of time as the solar day which is the duration from sunrise to another sunrise. Yet another unit is the lunar day (also called *tithi*) = 1/30th of a month, and a month is the time from new moon to new moon. A month is the period of the day and night of the *pitris* (ancestors). The *pitris* (when a person dies after having earned some pious credits, he can take birth as one of these *pitris*). The *pitris* live in a nice situation in the universe, and their day and night is described as one month, and they are believed to be living ideally on the moon, but also on the lower planetary systems of the universe. According to this logic, the day and night of the demigods (*Devas*) is one year for people on earth. The year of the *Devas* is thus defined as being equal to the 360 days of the *Devas*. This is the time scale of the *Devas*.

The Four Yugas

The time scale of the *Devas* is further divided into periods of time called *Yugas*, which is yet another time scale in the universe. There are four Yugas, namely, **Satya Yuga, Treta Yuga, Dvapara Yuga, and Kali Yuga**, the time durations of which are progressively, being

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characterized respectively by 4000, 3000, 2000, and 1000 years of demigods or Devas. Each one of these has periods of *Sandhya*, designated as equal to $1/10^{\text{th}}$ of the duration of a particular Yuga at the beginning and also at the end. The time durations of these yugas can be readily computed;

- Satya Yuga, $(4000 + 800) \times 360 = 17,28,000$ earth years,
- Treta Yuga, $(3000 + 600) \times 360 = 12,96,000$ earth years:
- Dvapara Yuga, $(2000 + 400) \times 360 = 8,64,000$ earth years,
- Kali Yuga, $(1000 + 200) \times 360 = 4,32,000$ earth years .

The total period of the 4 Yugas is 4,320,000 earth years. According to the Vedic science these Yugas repeat in a cycle, the duration of one cycle having been worked out as shown herein.

For the purpose of illustration, consider the case of the last one, Kali Yuga, the duration of 1000 years must, therefore, be augmented by $1/10^{\text{th}}$ on either side, aggregating to a total of 1200 years of the Devas. When converted to the earth years, it works out to be 4,32,000 earth years for the Kali Yuga, with the period of *Sandhya* being $100 \times 360 = 36,000$ earth years in the beginning and also 36,000 earth years at the end, which is quite significant on account of various religious activities taking place during these periods of *Sandhya*. At present we are in the Yuga *Sandhya* period of the Kali Yuga and this is the period when Lord Chaitanya's movement takes place.

The Manu Period and Span of Brahma

The Manu period corresponds to 71 Yuga cycles which lasts for about 306 million earth years ($71 \times 4320000 = 306,720,000$ earth years). This is described as the life span of most of the major Devas. **One day of Brahma**, the chief of all Devas, is equal to 14 Manu periods, each of 71 Yuga cycles of ($14 \times 71 = 994$) about 1000 years duration which when converted to earth years is equal to $1000 \times 4320,000 = 4320$ million earth years. An equivalent period defines the night time of Brahma. The total life span of Brahma is 100 years ($100 \times 360 \times 4320,000000 = 155.52$ trillion earth years), of which he has already lived for 50 years of his life span. So, 155 trillion years have already passed in the time span of Brahma and an equal amount of time span still remains to be completed! This is the kind of time scale that exists in the Vedic system.

As a matter of conjecture, time is relative but subjectively different living beings essentially experience time in different ways. For Brahma, the rate of flow of time is different from that for us. But He can also speed things up in order to experience time at our level on earth. In such scenarios, it would seem plausible to invoke the concept of time dilation. Accordingly, in certain inertial frames, time might even completely cease to flow as would be the case for the Supreme. Different rates of time flow are experienced when the relative velocities of the objects are different. Evidently, there is a striking confluence of time spans and movements of objects in Vedic systems and the corresponding attributes within the general framework of the special theory of relativity and modern cosmological perspectives based on rigorous mathematical foundations.

THE PSYCHOLOGICAL ASPECTS OF FLUIDITY OF TIME

It is pretty obvious that human emotions have a strong bearing on how we experience the flow of time. There have been several investigations to uncover the mystery by virtue of which the passage of time is influenced by the role played by emotions, such as anger,

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sadness, grief, frustration, depression, disease, and fear etc., assimilating all negative aspects on the one hand while fun, pleasure, etc., comprising the positive ingredients, on the other. Equivalently, we might as well state that time perception is fundamentally subjective and essentially depends on our prevailing circumstances and experiences. For instance, for emotional trauma, distress, mental stress and moments of boredom or disappointment the duration of the flow of time may appear to be interminably long, whereas for emotions comprising deeper realms of joy, occasions of excitement and motivation, the time seems to flow at a dizzyingly fast pace [3,4]. The above contrasting (extremes) of emotions illustrates how attentional and emotional states of mind affect our perception of time.

Emotions determine how we perceive our world, organise our memories and thoughts, and thereby try to make our important decisions. We also realise that time perception depends not only on the physically accurate clock mechanisms but also, perhaps to a greater degree, on the unimpaired attention and memory processes. If time flows in one direction (i.e., positive), memory flows in different direction. One tends to lose memory, or have a sense of its retardation, as time moves forward by a substantial degree. So time and memory are essentially going in opposite directions, thereby preventing explicitly flawless paradigms frameworks far from being straightforward.

Neuroscientific Explanation

The important question as to what causes time perception can perhaps be traced to the domain of neuroscience. While the neural mechanisms of time perceptions are fully understood at present, nevertheless it is pertinent to remark that the neurons that are believed to be the carriers of these various brain dynamical activities respond to these emotions of negativity and positivity in different ways altogether. While negative emotions create a constrained environment for the neurons to interact such that the time perceived during these processes gets increasingly long, whereas the positive ones respond completely unhindered and interact rather easily and quickly without taking too much time to respond to these emotions such that the time fluidity becomes faster, leading to a short span of time perception. As a result of sustained research, neuroscientists have identified the frontal cortex, basal ganglia and cerebellum as the key components in this neural dynamics. It is surmised that these different components collaborate to process temporal information covering a particularly wide spectrum of time intervals ranging from milliseconds to hours!

DISCUSSION AND CONCLUSION

The attempt made here in this presentation has been to highlight some aspects of time that belie common expectation. As a result of the deep studies pertaining to time and consequently its flow, it has been found that the Vedic version interpretation closely agrees with the physical/cosmological development arguably based on sound mathematical formulations and is compatible with the current observations and exactitude of theoretical advancements. The fluidity of time has stood the scrutiny of its veracity in various physical domains of human endeavours but has had to navigate through the so-called landmines both at the level of model constructs as well as the observational sophistication to come to fruition.

However, the psychological implications of perception of time flow continue to be dogged in the possibility of divergent interpretations alluding to different emotional situations corresponding to the neurological states of mind. We have argued that arousal may drive changes in time perception, with highly arousing stimuli essentially slowing down the perception of time flow. Positive emotions are known to contribute to our perception of time

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in a positive light, while the negative ones usually are reminiscent with gloom and pessimism triggering anxiety and experience of time contraction. We firmly believe that these psychological aspects deserve to be thoroughly researched for a clearer understanding of emotive scenarios in the context of time fluidity.

We conclude the discussion with an important caveat. As of now there is no precise definition of time. It has remained deeply elusive and enigmatic. The concept of time is not only highly ambiguous and speculative but it is also intricately shrouded in mystery. Nevertheless, we can feel it, perceive it, and yet cannot comprehend it in its entirety and endless magnificence.

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Conflict of Interest

The author(s) declared no conflict of interest.

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