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Exploring the Concept of Time: A Comparative Study of Traditional Indian Philosophy and Modern Scientific Theory

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Abstract: ***This article investigates into the intricate nature of time, examining its significance in the realms of both Indian philosophical tradition and modern scientific theories. While the concept of time has evolved over millennia in Indian thought, its relation to the origin of the universe remains a compelling inquiry. This exploration particularly focuses on the Nasadiya Sukta, a Vedic hymn that contemplates the genesis of the cosmos. Drawing parallels with modern scientific understandings, the article discusses the emergence of time, the interplay of space and time, and the interrelation between change and time consciousness. By juxtaposing ancient philosophical insights with contemporary scientific findings, the article aims to shed light on the philosophical conceptions and implications of time.***

Keywords: Time, Indian philosophy, Nasadiya Sukta, cosmology, modern science

Time has an inscrutable nature that always makes us astound. It is necessary for us to study and understand what time is in the natural world and the metaphysical character of time because this question is very much associated with the origin of the universe. In Indian philosophical tradition, the notion of time went through several changes over a period of time. In Indian philosophy, the concept of time was never discussed in isolation because it is closely related to each tradition's metaphysical point of view and their concepts of being reality, change, causality and so on (Prasad 1992, 2). In the earliest experience of the Vedic age, time is perceived as the "Fruit of ritual action"(Pannikar 1992, 2). The *rsis* of the Vedas does not view time as an abstract entity. For ancient Indian people, the time has no reality apart from the instants in which sacred rituals are performed (Pannikar 1992, 22). For ancient Indian men, [1] time helped them to make a close alliance with divinity, attain their ultimate goals and thus help overcome their temporal existence. There is a saying, "If the priest did not offer up the sacrifice of fire every morning, the sun would not rise" (Pannikar 1992, 22).

Amongst the four Vedas - *'Rig', ' Sāma', ' Yajur', and 'Atharva', Rig* - Veda is the most ancient and extensive in nature. The *Rigveda* was composed roughly between 1500 to 1000 BC. Rig - Veda is distributed into ten books which are referred to as *Mandala*. There are nearly ten thousand *mantras* present in the Rig Veda. There was no cognisant attempt to describe the quintessence of time in *Rig - Veda*. However, there was a *sukta* named *Nasadiya Sukta* which shaded some light into the creation of the universe. As we have mentioned earlier, the question of time is very much related to the origin of the cosmos. So, studying the *sukta* thoroughly to derive the notion of time in *Rigveda* is important. The tenth volume of *RigVeda*, the 129th Hymn, discusses the beginning of the cosmos and creation. This *sukta* was also translated by Swami Vivekananda. We will start by focusing on a few selected passages from Raimundo Pannikar's translation of *Nasadiya Sukta* (Pannikar 2016, 50)[2]. *Nasadiya Sukta* describes the beginning of the cosmos. The *sukta* starts with the line, "At first was neither Being nor Nonbeing. There was not air nor yet sky beyond" (Pannikar 2016, 50). In other words, there was no sign of existence or nonexistence at the start of creation. There was no world, air, or sky, meaning none of the '*panchabhutas'* was present then. '*sattva'*, '*rajas'*, and '*tamas'* these three *guṇas* were not there. The fourteenth plane from *pātāl* to *Satyaloka* was not there. Neither the gross matter of the universe existed then, nor the subtle entities like *mahaṭ*, *ahaṃkāra* existed. There was no such thing as Space and Time.

In the following lines, it has been said there was no death then. There was no life also. There was neither day nor night. The only supreme being, *Brahman*, with his *Maya*, was there and staying without air. There was nothing other than Him; not even this visible world was there[3]. (Pannikar 2016) After that, It is said that at that time, there was darkness all around. Darkness was covered by darkness. There was no way to tell them apart. That world was covered with its cause, *Maya*. If you notice, you will see that the word 'Tama' has been used twice in the *mantra*. *Tamah* means darkness. It is said that 'there was darkness covered by darkness'. This visible world did not exist at the beginning of creation. It was pitch black. At the beginning of creation, only one Supreme Being, the *Brahman*, was present. He was also in a state of undividedness with his cause Maya. The universe was present in *Brahman* but in a un manifested way. As water mingles with milk – they cannot be separated. Similarly, *Brahman* and the world were un - dividedly mixed with *maya* or ignorance. There was no way of knowing them separately. Here *maya* or ignorance covers everything and is compared to darkness [4](Pannikar 2016, 50).

The first three lines of the *Nasadiya Sukta* describe the primal moment of creation. Where is the mention of time

[1] Here the word 'Men' should be interpreted as an Individual.

[2] We are mentioning some selected section from *Nasadiya Sukta* which we find relevant in order to address the issue of time.

[3] "There was no death then, nor yet deathlessness; of night or day there was not any sign. The One breathed without breath by its own impulse" (Pannikar 2016, 50).

[4]"The moment creation happens there was also no life and death was not yet apparent then. There was no darkness or day. Brahman, the one and only supreme entity, was there and remained without air. There was nothing other than Him, not even this visible material world was there"(Pannikar 2016, 50).

here? Although time is not directly mentioned here, the notion of time is closely associated with what is said. It is stated that there was nothing at the start of existence, Not even space. This is mainly a vital statement to study. If we analyse this mantra from a modern perspective, we can see that they have a valid point to say that. Today scientists are suggesting that Space and Time itself have a beginning. Before Big Bang, there was nothing. This concept is difficult to grasp and counterintuitive for ordinary people because we think every effect has a particular cause. Everything has to come from something. However, modern science has a different saying. Matter, time, and space are interrelated; before the big bang, these things were non - existent (Voit 2009, 675).

Let us take a look at what exactly happened during the time of the Big Bang. Scientists say that around 13.7 billion years ago, an infinitely hot and concentrated single point exploded (Voit 2009, 675). The cosmos was created and began to expand with this explosion. After the explosion, matter, energy, time and space were created. After a few seconds of this enormous explosion, some important events occurred. Scientists Categorised those events into two eras - Radiation Era and Matter Era. The radiation Era is further divided into eight stages, namely - 1. 'Planck epoch', 2. 'Grand unification epoch', 3. 'Inflationary epoch', 4. 'Electroweak epoch', 5. 'Quark epoch', 6. 'Hadron epoch', 7. 'Lepton epoch', 8. 'Nucleosynthesis epoch'. After that Matter Era was started (Voit 2009, 677).

The exact moment the big bang happened is named the 'Planck epoch'. At this time, no matter what was there, only Energy existed. All the natural forces - Gravity, Strong Nuclear, Weak, and Electromagnetic - were integrated. These forces were named Super Forces. This time temperature was 10^{40} Kelvin. This stage ended when Gravity was separated from the other three forces and emerged as a different one (Voit 2009).

The next 10^{43} Seconds after Big Bang, Scientists named this moment the 'Grand unification epoch'. At that instant, the temperature was 10^{36} Kelvin. This time Strong Nuclear, Weak and Electromagnetic Forces were together. At the end of this stage, strong nuclear were detached from the other three forces (Voit 2009).

The following 10^{36} Sec after Big Bang, the moment is named the 'Inflationary epoch'. This time - temperature came down to 10^{33} Kelvin. This is the moment when the universe quickly expanded from a size of an atom to a size of an orange. Electrons, Quarks and Other sub - atomic Particles ran through space, but the temperature was so hot that the particles could not combine (Voit 2009).

The following 10^{32} seconds after Big Bang, this moment is called 'Electroweak epoch'. This time the temperature came down to 1023 Kelvin. This time last two forces, electromagnetic and weak force, were separated (Voit 2009).

The following 1012 seconds after Big Bang is described as 'Quark Epoch'. This time temperature was 10^{16} Kelvin। Though all the sub - atomic particles were present at that time, it was still impossible for them to combine because of the high temperature (Voit 2009).

The following 10^{6} seconds after the Big Bang called as 'Hadron epoch'. The temperature was 10^{10} Kelvin - This moment; the temperature came down enough to bond sub - atomic particles together. Proton And neutrons were created from Quark (Voit 2009).

The following 1 Sec after the Big Bang is called the 'Lepton epoch'. This time, the temperature decreased from 10^{10} Kelvin to 10^{9} within 10 seconds. This time Proton and Neutron combined and formed the first Nuclei. As a result, the first chemical element was made up called Helium (Voit 2009).

After that matter era started, different atomic and sub - atomic particles started mixing up to form some of the essential elements of the universe. The matter era is further divided into - Atomic, Galactic and Stellar Eras (Voit 2009).

The following 5000 years after the Big Bang, the universe's temperature dropped to 3000 Kelvin. As a result, electrons attached to the Nuclei and made up the world's second primary material Hydrogen (Voit 2009).

After Big Bang, throughout the following 200 million years, 75% universe was covered by the atoms of Hydrogen and Helium, which later made up the atomic cloud. For an extended time, the universe was covered by atomic clouds. There were no celestial bodies in the universe then, so the universe was pitch black. Scientists named this time a 'Dark Age' of the cosmos. *Nasadiya Sukta* mentioned a similar notion: "Darkness was there, all wrapped around by darkness; there was darkness covered by darkness"(Pannikar 2016). After this dark age, the temperature of the universe decreased to 60 Kelvin. Different stars, Galaxies, and Nebula formed from this time.

In short, this is the story of creation according to modern science. We can find striking similarities between the ideas of *Nasadiya Sukta* and Modern Scientific theories. Here is an essential notion in both versions: there was a time when there was no existence of space and time. The moment space was created; time was also created. Now, it is hard for ordinary people to visualise the scenario that, at some point, there was no space and time. However, scientists are optimistic about *the Big bang theory* today, and *Nasadiya Sukta* indicated the same notion.

Now one can ask why we are conjoining these two theories and what we are trying to imply here. Do we try to validate the ideas of ancient texts with the help of modern science? When we mention these two theories together, we do not want to conclude that our ancient men have already discovered whatever modern science is discovering today. This is certainly not the situation. We want to mention these theories together to display our reverence towards the human mind which can think alike though they are decades apart. While ancient man lacked technology, he did possess a strong imagination that allowed him to solve the universe's riddle. Here another issue can arise: The Eastern world always finds its validation from the Western world. We want

to validate our theories with the help of Western theories. Why is that? Are we suffering from this post - colonial hangover, or are there other causes? We cannot deny it entirely. However, we can also say that our ancient texts are full of knowledge and influential theories describing the mystery of the universe. However, there was a lack of scientific evidence which could support the theories. That is why when modern science preaches the same theories with proper scientific evidence, we seek validation from them.

The most important information we get about time in this *Nasadiya Sukta* is that time and space itself has a beginning on their own. Time starts from the moment any changes or movements or motions take place. If we dig deep into our consciousness, we can find this is kind of true. We understand time in relation to change. My surroundings are constantly changing. Thus, time is elapsing for me. There will be no change and no time if there is no sign of movement or motion. Life is associated with change and time. With this speculation, here comes another controversy. Can time exist without change? Let's do some thorough experiments.

Thought Experiment 1 - Let us say person 'A' is in a room without any time - measuring devices in that room. However, the sunlight and sound from the outside world enter the room. In such a situation, can the person tell the exact time without the help of a clock? The answer is – yes; he can easily because he is witnessing the change in the outer world from his room. By observing repetitive phenomena in the outer world, it will be possible for him to estimate the time easily. In ancient times, people kept track of time in this manner.

Thought Experiment 2 - Now, let us say that the same person, 'A', is in a room where no natural light or sound enters. Only one artificial light shines in the room. There are no time - measuring devices in the room. Now, will it be feasible for a person to tell the time without seeing any changes or receiving any external cues from the outside world? The answer is yes; even in such a situation, his time consciousness will be pretty accurate because he will notice the changes inside his body even if he does not see the changes in the outer world. Just as the sun rises, sets, months pass, years turn, and season changes according to an infallible rule of the outside world; similarly, there is a rule inside our body according to which we get hungry and sleepy. Our various bodily functions take place at certain times. It is called Circadian Rhythm in scientific terms. If a person pays attention to his circadian cycle, he can estimate the time. Although in this isolated state, his time consciousness will differ significantly from his ordinary time consciousness. Because the change in the outer world influences our bodily system, the moment there is sunlight, our body clock gets its signal that it is time to wake up and be active. This type of experiment was done by Michel Siffre (Siffre 2008). He was a French Geologist by profession. In 1972, Siffre spent six uninterrupted months in total isolation in Midnight Cave in Del Rio, Texas (Siffre 2008). He entered the cave on 13th February and came out on 5th September. He was cut off from the outside world throughout these six months. He recorded these six months of journey in his diary. When he lived in the cave, a group of researchers lived above the cave. Siffre called the researchers every day to inform his waking and going - to - bed times. When he came out of the cave after six months, it turned out that Siffre thought he had spent more time in the cave than he actually had. Siffre thought he had completed five months in the cave, but six months had elapsed. Typically, our sleep - wake cycle is 24 hours, but Siffre's sleep - wake cycle in the cave was 26 hours. (Siffre 2008)This means that even if people do not observe any change in the outside world, they still have a certain sense of time, although it slightly differs from ordinary time consciousness. Siffre thought that this experiment would help to understand the physiological condition of future astronauts who will spend long days in isolation in space. Siffre concluded that even if his natural biological rhythm was inconsistent due to the lack of any external indication from the outside world, he could still adjust to it (Siffre 2008). Siffre believed that future astronauts would be able to control their biological rhythm without external inputs, although they would need companionship. Siffre said in his conclusion, "Time is not something humans could work with and understand without any external environmental cues" (Siffre 2008).

Based on the words of Siffre, let us say if nothing changes in the world, will time exist? Let us assume that nothing is altering in the cosmos. Nothing at all. Will there ever be a passage of time without change of any kind? Here it can be said that we cannot know that time exists independently of change. Because the moment I say that a conscious mind is witnessing that nothing is changing anywhere in the world, everything is fixed, even though one thing is changing, then that is the thought in that conscious mind. It is not conceivable for any conscious mind to observe that there is no alteration in the world. Therefore, it is not feasible to prove the absolute objective existence of time from our subjective point of view because time begins when changes happen.

In analysing the intricate interplay between time, change, and consciousness, this exploration highlights the profound convergence of Ancient Indian philosophical thought and Modern Scientific understanding. The notion that time originates with change resonates across both traditions, suggesting a fundamental connection between the physical and metaphysical realms. While ancient thinkers grappled with these concepts through contemplation and mythos, modern science advances our comprehension through empirical evidence. The parallelisms and divergences between these perspectives illuminate the boundless capacity of the human mind to grapple with the enigma of time, simultaneously honouring the wisdom of the past and the progress of the present.

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