Concept of Time and Reality in Science and Sikh Religion

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Evolution of concept of Time has scientific, philosophical and theological implications. Time has been measured in different cultural and historical eras by using primitive astronomical methods. The rotation of earth, sun and moon was the basis for the measurement of time. The concept of time is rooted in the subjective experience of the 'passing' present, which appears to 'flow' through time and thereby to dynamically separate the past from the future. The mechanistic concept of time avoids any subjective foundation and it was defined in terms of motion. This concept is often attributed to Aristotle. His book of Physics states: "Time is neither identical with movement nor capable of being separated from it". Since motion is defined as a change with time, thus rendering the metaphor of flow of time a tautology.

Space and time have been used as constructs in Physics since the times of Greek philosopher, Aristotle. Aristotelian physics was based on logic but experimental observation was not given due importance. It was adopted by the Christian Church to preach geocentric theory till mid-fifteenth century when Copernicus rejected it in favour of heliocentric theory. Galileo and Newton laid the foundations of modern science, rejecting the Aristotelian ideas about space, time, matter and motion.

Concept of time was central to the laws of motion formulated by Newton. However, he considered Time as absolute in the same way as space and God. In fact, being a devout Christian, Newton assigned the properties of isotropy, homogeneity and infinity to both space and time as these attributes belong to God. Newton's concept of mechanistic time, as far as it is based on his laws of motion, neither specifies a direction in time nor a specific present. The isotropic nature of the Newtonian time is given by its spatial character. As space acts as a container for material bodies, time was considered as a container of events. If time is a space – like container, then its instants are analogous to points of space which do not admit of any differentiation. Newton[1], almost cunningly considered "Absolute true time without relation to anything external." In this way, time had an ontological priority over Reality, the material world conceived by Newtonian physics. Bishop Berkeley was highly critical of Newton and he believed that all objects, space and time are an illusion, in the same way as Indian Vedantins believe.

According to Mach's principle, the concept of absolute time is not only kinematically redundant – it should not play any dynamical role as a preferred parameter in the physical world. Similarly, Leibniz, Huygens, and Berkeley were also critical of Newtonian idea of absolute time. They had notions of relative time contrary to what Newton proposed but the success of Newtonian physics acted as a road roller for new ideas till the dawn of twentieth century.

Before 1905, space and time were thought of as a fixed arena in which events took place, but which was not affected by what happened in it. It was Einstein's theory of special and general relativity which brought a revolutionary change in concepts of space and time. According to the basic postulate of special theory, the velocity of light remains constant irrespective of the motion of source of light or the observer. Using the Lorentz transformation equations, Einstein established the relative character of space and time, leading to length contraction and time dilation predictions of special theory of relativity. Time, in this case, is not something external or independent of events but an intrinsic characteristic of reality (phenomenon). It was genius of Einstein who took a quantum jump to explain results of experiments at very high velocities by assuming that if velocity of light remains constant for all observers, it is the time interval which is affected by relative motion. The Newtonian world of three dimensional space and absolute time was replaced by a four dimensional space – time continuum. The isotropy and homogeneity of Newtonian time is rejected, and so is the causality of classical physics. According to M. Capek[2]: "Einstein himself admits that the asymmetry of time is preserved even in its relativistic fusion with space."

General theory of relativity goes a step further. It predicts that time should appear to run slower near a massive body like the sun. Space and time are not flat but curved by the presence of massive bodies. Space and time are not absolutes: they are affected by everything that happens in the Universe. In a manner of speaking, both space and time are rendered into dynamical variables of the phenomenal world.

Since time is an impalpable quantity it is not possible to draw a picture or construct a model of a four dimensional space-time continuum. It can be represented only mathematically by Lorentz transformations; space and time, separately, have vanished into the merest shadows, and only a sort of combination of the two preserves any reality.

Arrow of Time: Second law of thermodynamics, which stands today as virtually the only pillar of classical physics left intact, proclaims that the fundamental processes of nature are irreversible. Nature just moves one way. According to this law, entropy always tends to increase in this universe. Since entropy is a measure of

disorder, it implies that disorder always tends to increase. Ultimately, it will lead to 'heat death' of the universe when entropy reaches its maximum value. Time itself will come to an end. Hence, entropy prints to the direction of time and we call it thermodynamics arrow of time which distinguishes the past from the future.

Exploring Relationship between Time and Reality: It is evident that notions of time and reality have been inter-linked in philosophy of science. Kantian idealism went to the extent of making time epistemologically prior to reality and, in this way; Kant provided a philosophical justification to Newtonian world-view. Both Kantian idealism and classical materialism denied temporal character of reality, the former on the basis of epistemology and the latter by making it spatialized. Barrow, the teacher of Newton, by holding time to be space-like container arrives at the static conception of reality when he says that time is "the continuance of anything in its own being."

The relational theory of time denies its externality to reality. Berkeley was the chief spokesman of the theory. In modern times, this theory has been expounded by Grunbaum[3] and Reichenbach. Bergson has made an original contribution by de-spatialization of time by treating it neither as atomistic, nor as a Newtonian container, but perceiving it as a flow. Bergsonian time is creative and we say that an object is in time is to mean that it partakes of time, that it is conditioned or created by time. When Einstein integrated time with space, he, in a sense, de-spatialized the Newtonian space and attributed to it the creative functions. This is how space was deprived of its rigidity and its power to take part in physical events was recognised as possible. Einstein added dimension of time to this notion of dynamic space to form a single unified space time framework, which became the real determinant of the qualities of an object in that framework. This brought a revolutionary change in the notion of reality. The attributes or qualities of an object do not belong '*a priori'* to that object but emanate from its space time framework.

Newtonian physics gave birth to the philosophy of determinism (propounded by Descartes) which considered our universe as a gigantic clock-work machine[4]. There was no place for God or freewill in this philosophy. The advent of Relativity theory and Quantum mechanics uprooted and toppled determinism leading us towards a radical new definition of reality. The objective reality of classical physics predicted an existence external to and independent of human observers. Principle of Causality was a corner stone of classical physics; no more so in quantum world! Quantum physics yields only statistical information about reality. Nature has imposed a limit through Heisenberg's uncertainty principle of knowing reality in full details. In a way, the quantum world is unpredictable, probabilistic and subjective whereas classical world was predictable, deterministic and objective.

Concept of Time[5] and Reality[6] in Sikh Religion

The concept of time and its relationship with ultimate reality (God) has been a subject of intense debate in all religious traditions of India. The Vedic seers *(Rishis)* were fully aware of the changing nature of the universe. They knew that to change means to perish. Hence they termed Time as 'Kal', which means death in its literal meaning. However, ultimate reality (God) was defined as infinite and eternal or timeless in almost all Indian traditions. God is not subject to or under the influence of time; hence it is denoted by *Akal* (Timeless Being), a term typically of Indian origin.

Sikh religion originated in India during fifteenth century; hence it is one of the youngest religions of the world. Guru Nanak, the founder of Sikh religion, critically examined the philosophies of oriental and occidental traditions and formulated his unique conception of ultimate reality, calling it *Akal Murt(i)*. Before Guru Nanak, Reality (God) was conceived as manifesting itself in the following four ways: revelation in the word, immanence in nature (space), incarnation in the individual human form, and dwelling in the self *qua* soul conceived as efflux of the Absolute. With Sikh religion, there emerges for the first time in the history of religious thought a new conception of God, which is timeless but descending in time (history) through the medium of Gurushiip of the Sikh prophets starting with Guru Nanak.

In Indian thought, the quality that remains eternal is indicated by the Sanskrit term s*at* (being). Hence the Reality (God) is that which remains eternal, in the self same state of being in infinite duration stretching from beginningless past to endless future. As against the Vedantic concept of 'akal' (Timelessness), the Sikh concept of A*kal Murt(i)* refers to the supra – temporal, time transcendent nature of God[7].

The Sikh cosmology[8] is also unique and most scientific of all religions of the world. In the Sikh holy book, called Guru Granth Sahib (GSS), the attributes of Ultimate Reality (God) are described in the opening verse as follows : One (Being), Truth, Transcendent and Immanent, Creator Person, Beyond Time and Space, Self-Existent (Unborn), Cosmic spirit made manifest by the grace of the Guru.

The opening sloka refers to the relationship of time and ultimate reality in Sikh religion as follows:
"Ultimate Reality (God) existed before time, It existed in Past, exists in the Present and will exist in the future".

It is very clearly mentioned in GGS that Time is created along with the Universe by God, the Creator. Time has a beginning and an end and it cannot be treated as

absolute or eternal like God. There are references to measure of time. The day-night cycle, change of seasons and other climatic variations occur due to rotation of earth round the sun. A reference is also made to passage of Hallet's comet in the sky by Guru Nanak in GGS[9]. The following hymn of Guru Nanak is the epitome of his scientific vision in GGS, where creation hypothesis[10] is described. It is comparable to Big-Bang model of cosmology:

"For billions of years, there was nothing but utter darkness. There was neither day nor night, nor sun, nor moon, but the Lord alone sat in profound trance. Neither there was creation, nor air, nor water. There was neither death nor Time. When he so willed, He created the Universe. He founded the continents, solar system and underworlds, and from the Absolute self, He became manifest. "

In Sikh religion, Time has a predominant role to play in Sikh metaphysics and it is being used as a tool in the hands of God to annihilate everything created by Him. But God himself is beyond the grip of time. Hence A*kal-Murt(i)* is a key-note attribute of God which defines time-transcendent nature of reality. Hence time and reality have a strong correlation in GGS.

Concept of *'Akal'* (Timeless Being) is further elaborated in Dasam Granth[11], dealing with both the sacred and profane issues and authored by Guru Gobind Singh, the tenth Guru of the Sikh religion. Guru has saluted God in the form of *Akal* and sought his protection for promoting Dharma (True religion) and rule of law on this earth. Guru created the "Khalsa" as the sovereign army of *Akal Purkh* (God) to establish peace and rule of law. Eternity of Akal (God) is stressed in the composition of *Akal Ustat* (Dasam Granth). *Kal* (Time) is interpenetrating into Akal, the ultimate Reality in the same way as *Sargun* (Immanence) and *Nirgun* (Transcendence) are two aspects of the same Reality. According to Talib[12], the concept of *Akal* is central and integral to Sikh religion and its philosophy. Hence, an attempt will be made in this project to bring out salient features of Time and Reality in Sikh religion vis-à-vis scientific tradition.

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