

CHAPTER 2

The Absolute and the Relational Theories of Space and Time

1. The Absolute Theory of Space and Time :

The absolute theory of time is intimately connected with the absolute theory of space, which is to be found first, in clear terms, in Newton's¹ conception of space and time. In Newton's theory space and time are real independent entities; each of them constitutes a continuum such that any one part of that continuum is indistinguishable from any such other part. The different parts of space and time are due to the things that occupy place and the events that happen at moments; they are not due to space and time themselves.

Both space and time are absolutely immutable and homogeneous. The basic attributes of space and time follow from their homogeneity : their independence from physical contents, their uniformity, continuity and infinity. As

space is independent of matter, time is also independent in regard to the concrete changes that take place in it. This has been explicitly formulated by Newton in the following sentences :

"Absolute, true and mathematical time of itself and by its own nature flows uniformly, without regard to anything external. It is called duration. Relative, apparent and vulgar time is some sensible and external measure of absolute time (duration), estimated by the motions of bodies . . . , and is commonly used instead of true time, such as an hour, a day, a month a week"².

According to this theory time flows irrespective of the events or changes occurring or not in it. Only in a contingent way it is filled in by changes; but in its own nature, it is empty. The uniformity of time may be more clearly designated as uniform fluidity or duration. As space does not imply matter, time also does not imply motion or changes. According to Russell³, just as matter occupies or fills portions of space, so motion or changes fill portions of time. Just as space is a container of matter, so time is a receptacle of all changes. It is only because of time's independence from change, Russell says, that we can speak of different moments of duration even when no actual changes seem to occur; as for instance, when a body retains its position unchanged through time or when

a psychological state persists through a certain interval of time.

This conception has been exquisitely expressed in the following sentences :

"... whether things run or stand still, whether, we sleep or wake, time flows in its even tenor. Imagine all the stars to have remained fixed from their birth, nothing would have lost to time ..."⁴.

It should be pointed out that this kind of conception with regard to space and time was not natural to the ancient Greek thinkers. The notion of a void appears in Greek thought as a substitute for the idea of space. But it means simply the intervals between the bodies. Aristotle does not offer any theory of space except his discussions on spatial magnitudes that are potentially divisible ad infinitum. In Aristotle's Physics⁵ we find the concept of 'place', by which Aristotle means the inner boundary of the first unmoved body that contains it; the universe is conceived as the sum total of bodies, and there is nothing outside the universe; so, while everything in the universe is in place, the universe is not.

Time, according to Aristotle, is the measure of motion in respect of 'before' and 'after'; temporal intervals are said to be potentially divisible ad infinitum and

potentially extendable ad infinitum.

Aristotle's argument for the limit of the universe is utterly unconvincing to the absolutists. This reminds us of an ancient question put forward by Lucretius⁵ : whether it was not possible to shoot an arrow beyond the boundary of space. This question expresses our irresistible tendency to regard every limit in space as provisional. This very tendency is embodied in the Second Postulate of Euclid, according to which any straight line can be extended beyond its extremities.

The homogeneity of space involves that there cannot be any privileged class of points constituting the boundary of space. Similarly, if time is homogeneous no moment can have a privileged character; this means that there can be no first or last moment — every moment or instant must have its ancestors and successors.

The mathematical continuity of time follows with equal logical force from its homogeneity. No matter how narrow a temporal interval may be, time must flow within it, or otherwise the temporal interval would stand still. In such an interval there would be no possibility of distinguishing successive instants. Such a durationless atom of time would then be non-temporal. The mathematical continuity of time is thus another name of its divisibility, that has no limit as long as we deal with a finite temporal series; the

only true indivisibility belongs to a durationless instant. Space is also infinitely divisible. To say that certain spatial intervals are indivisible is to mean that it is impossible to find within them any juxtaposed parts. Such indivisible spatial intervals are, on this thesis, devoid of spatiality.

According to the absolute theory, the spatial and temporal intervals are relative. Just as we measure spatial magnitudes by the size of our measuring instrument, so we estimate temporal intervals by comparing them with our 'specious present'⁷. The term 'specious present' indicates that what we call 'now' is only a spurious present, since the only true present is a mathematical durationless instant; all the instants prior to this are called past and all that follow it are future.

In the realistic philosophy of Samuel Alexander⁸ an attempt has been made to correlate time with space so as to put both of them in a space-time continuum. This packaged concept of Space-Time is, according to Alexander, the absolute and ultimate stuff which things are made of. Space and time are not separate and independent. They are interdependent, so that there is neither space without time, nor time without space. Space-Time as a single vast entity is the substratum of all that is. Here 'is' means existent.

Bound together by motion, space and time may, however, be quite empty of historical events, beings or objects.

Alexander sought to combine realism with the philosophy of evolution. Space-Time, he says, is the ultimate stuff of reality and the source of evolution.

In Indian philosophy Kālavāda means the doctrine which identifies the Absolute with Time; it is also the opinion of those philosophers who hold time to be a real substance. The first conscious reflection on time as the Supreme Ontological Being and Cosmic Power is to be found in the Atharvaveda⁹. In Indian mythology Time is the symbol of Life and Death. In philosophy this has been reduced to the conception of time as the general cause determining the origination, duration and destruction of all contingent beings. But with the development of the Upaniṣadic thought there was an emphasis on permanence and eternity. As a consequence, time, change and causation were degraded to the status of derivative realities. The Upaniṣadic tendency might have influenced even the realistic thinkers of the different systems of Indian philosophy, who also conceived real time statically rather than dynamically.

In Vaiśeṣika-Sūtra¹⁰ Kaṇāda says that Time is an eternal, unique, all-pervading real substance. It is one of the nine padārthas side by side with ether, space, mind, soul etc. It is the static background against which events

happen. Time has no specific physical quality; it is imperceptible.

But how is time known ? The Vaiśeṣika answers that (i) Time is known by means of inference. The notions of priority, posteriority, simultaneity, succession, quickness and slowness are said to be the grounds for inferring the existence of Time. We cannot have any doubt about the reality of the above-mentioned notions. And these are not found to be associated with other substances, namely earth, water, air etc. So the substance to which these notions are attributed must be Time or Kāla¹¹.

The Vaiśeṣika here infers the existence of time from the notions of priority and posteriority, though these notions themselves are understood with reference to time. So it might appear that the Vaiśeṣika is arguing in a circle. In order to avoid this criticism, they explain these notions with reference to the revolutions of the sun¹². The Vaiśeṣika has thoroughly discussed the necessity for the assumption of a ubiquitous substance, through which solar motions may be related to any individual. If, for example, A is said to be prior to B, that means that A has experienced a larger number of solar motions than B is known to have. But we all know that the motion of the sun inheres in the sun. So neither A nor B can be connected with solar motion through the relation of inherence. A and B are

widely separated from the revolving sun, so there cannot be a relation of conjunction between them. Hence, A and B, or for that matter, any individual or event must be connected with solar motion through something else. That something is Time. This relation is called saṃyukta-saṃyukta-samavāya¹³.

Thus, the Vaiśeṣika says, though we do not have direct intuition of time, we know its existence by means of inference. This was suggested by Vācaspati who was supported later on by Udayana and other Vaiśeṣika thinkers. But Śrīdhara suggested a different way of proving the existence of time. Time can be inferred, he says, as the cause of the notions of priority, posteriority etc. In our daily life we use these words that express time-relations between objects and events. If there were no reality corresponding to these words and expressions, it would not be possible for us to understand these words. So time must be postulated as a necessary correlate of temporal concepts and temporal expressions¹⁴.

This point reminds us of the modern controversy between the tensed theory and the tenseless theory of time, which will be discussed in a later chapter. Śrīdhara's idea seems to suggest the existence of tensed facts that can only validate our tensed utterances. However, according to the Vaiśeṣikas, Time being an all-pervasive objective substance, the temporal concepts are common to all people.

(ii) The existence of the Time-Substance is also inferred from the fact of changeability and impermanence of contingent products. For every change in this world there are some specific as well as general causes. Time is said to be the general cause or nimitta kāraṇa for the origination, extinction and endurance of these contingent things — janyānam janakah kālah¹⁵.

But the question arises : Time is said to be one and indivisible. But we speak of three times — past, present and future. We also make distinctions between moments, hours, days, years etc. How are these empirical divisions of time intelligible ? What is the ontological status of these divisions ?

The Vaiśeṣika replies that these divisions are not integral to Real Time. Time is essentially independent of all events happening in it. The distinctions of Time are due to its association with limiting adjuncts - janyamātram kālopadhih¹⁶. Just as the one, unique space is divided by pots, etc., apparently, Time is also differentiated into smaller and greater parts only apparently. The Vaiśeṣika thus distinguishes between Mahākāla or Pāramārthika Kāla and Kṣanakāla or Vyāvahārika Kāla. It appears that these realist philosophers distinguish between transcendental time and empirical time. But time is something objective and substantial in this system, not merely a subjective form of

intuition as in Kant's philosophy. For Kant time is transcendently ideal. But according to the Vaiśeṣika these empirical divisions of time are unreal with reference to Real Cosmic Time. This conception seems to be inconsistent with their realistic philosophy.

According to Dinakara¹⁷, however, Time is one; the divisions of time into moments, days, years etc. do not signify different times. These different temporal divisions in our ordinary discourse represent different proportions of temporality — kiñciddharmaviśiṣṭasya kṣaṇatvam
kiñciddharmaviśiṣṭasya dinatvam etc.

Dinakara's commentary appears to be more logical from the absolutist stand-point of the Nyāya-Vaiśeṣika philosophy of time. With other Nyāya-Vaiśeṣika thinkers, Dinakara asserts the existence of a unique, indivisible, absolute, real Time of infinite magnitude. As an absolutist he could assert neither the existence of different times, nor any real division or parts in time; nor could he logically maintain any distinction between transcendental time and empirical time of the Kantian type. So he admits that Time is apprehended by us, as finite beings, in different proportions in different contexts. Some proportions of temporality are thus apprehended by us as momentary i.e. kṣaṇatvam. These are called moments. In the same manner, hours, days, years etc. represent different proportions of the infinite magnitude of Time.

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However, all Indian thinkers were not kālavādin. The Sāṃkhya philosophers refuse to admit the reality of time as a separate entity. According to them the idea of an infinite, all-pervasive time is a construction of imagination - buddhinirmāna. That is to say, this idea does not correspond to anything in reality. The Sāṃkhya philosophers admit that the very structure of our language is embedded with time and tenses. It is impossible to give up tenses and temporal predicates. Without the words like 'past', 'present', 'future', 'simultaneous' and 'successive', it is impossible to describe and communicate our ideas. All these signify that temporal distinctions are rooted in our basic modes of thinking.

The question arises : do not these temporal words and expressions implicitly refer to some real distinction in time itself ? And if 'time' does not stand for any real entity, why and how temporal discrimination arise in our thought at all ?

The Sāṃkhya philosophers¹⁸ contend that the ideas of time and temporal characteristics arise from the awareness of finitude and limitation of actions and events. Whatever has a beginning and an end may be said to be finite and limited. Time is the means of conceiving such limited existence and persistence of events. Thus according to the Sāṃkhya philosophers the concept of time as an eternal,

infinite, absolute substance cannot have ultimate validity.

The Sāṃkhya and the Yoga are not two independent philosophies. But the Yoga conception of time is very close to the Buddhist kṣāṇa-bhaṅgavāda. Time, according to the Yoga, is something that flows or passes away. The Yoga rejects not only the idea of an absolute infinite time but also the reality of the concepts of finite durations, such as minutes, hours, days and years etc. Against the idea of an absolute Time, the Yoga posits the conception of a momentary atomic time. A moment is said to be the minutest division of time, the time taken by a moving atom to reach a new position¹⁹.

It might be contended that, if as an infinite magnitude time is unreal and fictitious, how can one speak meaningfully of an infinitesimal part of it? The Yoga would reply that, if the moment is defined or explained in terms of infinite time, it will appear equally unreal. The moment is not the microcosmic part of duration. It is the moment, that is basic and primary, while duration is a construction. The moment is ultimate, irreducible, subtle, and therefore, indefinable. Moments exist one after another; this order is called succession. By succession the Yoga means the relation of priority and posteriority or order of moments. Each moment is real time, but the moment does not possess succession as its constituent. Succession, in the Yoga philosophy, is conceptual. Only one moment exists, which

is the present; past and future moments do not exist. The present moment is known by activity and change. Time, in the Yoga conception, is, therefore, intimately connected with change²⁰.

The Yoga do not explicitly identify time with change, whereas for the Sāṅkhya time is nothing apart from change and activity. For both Sāṅkhya and Yoga time is a modification of the elements of 'sattva-rajas-tamas' of the undifferentiated Prakṛti.

In the Yoga conception, time is essentially atomic, and is accessible to yogic experience. The entire universe, according to the Yoga, undergoes change in the single atomic moment. And only in yogic intuition this entire universe can be known in one moment. Such a view seems to advocate an absolute atomistic conception of time.

2. The Relational Theory of Time :

The relational theory of space and time is very old dating back as far as the ancient Greeks. In Leibniz's²¹ philosophy, however, we find a clearer and fuller version of this view. But long before Leibniz we find Giordano Bruno quoting Lucretius²², "Time is nothing by itself". It is also a very significant fact that Spinoza, a contemporary of

Newton, refused to recognize time as an attribute of the ultimate reality. It is also to add that doubts concerning the ontological status of both space and time were raised mainly by idealistic philosophers and philosophically minded scientists.

According to Leibniz, space is an order of coexistences and time is an order of successions; space and time, outside the world, are imaginary and ideal things. Space and time, Leibniz says, are those wherein the mind conceives the application of relations. Space is what comprehends all places, and similarly for time. Against the Newtonian conception that spatial and temporal distinctions are due to the things that occupy places and the events that happen at moments, Leibniz argues that where no distinction exists, there is no way of making a distinction. This is the application of the Principle of Identity of Indiscernibles. Then with his most favourite, the Principle of Sufficient Reason, Leibniz argues that God would have no sufficient reason for putting things at one place or in one order than another, or for creating things at one time rather than another. In other words, since there is no way of determining one place or moment as distinct from others apart from what occupies these places and times, there is no sense in speaking of one part of space or time rather than another.

Against Descartes, Leibniz argues that the essence of matter is not extension, but vis viva or active force. The

only ultimate realities are individual substances, that is, the metaphysical points endowed with vis viva, and minds. Nothing else has ultimate reality. It is clear then that space and time are not ultimate realities as they are in the Newtonian conception, nor are they infinite substances. Bodies and movements of bodies are not real existences, but ideal existences, created by imagination. Space and time are themselves even further removed from real existence. For, motions of bodies in space and changes in time can only be significant if there is empty space and empty time. But, as it has been held by Leibniz, the notion of empty space and empty time is a vulgar error.

But if space and time are orders of relations, what is it that is related by these relations? On the relational view, spatiality consists in relations between elements. But if these elements themselves are spatial, the same argument must apply to them; the only way to stop this infinite regress is to suppose that the objects related by spatial relations are themselves non-spatial. It is perhaps this problem that led Leibniz to construct a physical world out of non-extended spiritual atoms named "monads". But that in turn led to the suggestion that space and time must be merely ideal.

Thus the suggestion that space and time must consist simply of relations does lead to the problem about what is

so related. It is this kind of conception that inspired Bradley²³ to introduce a piece of Hegelian dialectic, and declare space and time to be mere appearances.

Bradley, however, refuted both the absolute and relational theories of space and time. Against relationists he argued that space and time cannot be mere relations; against absolutists he argued that space and time are mere relations. According to the absolute theory, space and time are infinitely divisible; but at any stage of this division there must be parts that are spatially or temporally related to other parts. As Bradley says,

"The terms are essential to the relation, and the terms do not exist. Searching without end we never find anything more than relations ... space is essentially a relation of what vanishes into relations"²⁴.

Bradley, in his dialectic, intended to show that dilemmas are inherent in the very nature of our thoughts of space and time, and, therefore, they are unreal.

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Kālah supteṣu jagrati kālo hi durātikramah //
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