

Concepts of Space, Time, and Consciousness in Ancient India

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Abstract

This paper describes Indian ideas of the early-Purāṇa/Mahābhārata times (centuries BC) on the nature of space, time and consciousness that would be of interest to the physicist. In order to simplify references, we quote mainly from Yoga-Vāsiṣṭha (YV), which is representative of that period of Indian thought. YV professes to be a book of instruction on the nature of consciousness but it has many fascinating passages on time, space, matter and cognition. This paper presents a random selection that has parallels with recent speculations in physics. It also presents a brief account of the context in which ideas of YV developed.

1 Introduction

Ancient Indian ideas of physics, available to us through a variety of sources, are generally not known in the physics world. Indian astronomer/physicists, starting with a position that sought to unify space, time, matter, and consciousness, argued for relativity of space and time, cyclic and recursively defined universes, and a non-anthropocentric view. The two most astonishing numerical claims from the ancient Indians are: a cyclic system of creation

of the universe with a period of 8.64 billion years, although there exist longer cycles as well; and, speed of light to be 4,404 yojanas per nimeṣa, which is almost exactly 186,000 miles per second (Kak, 1998)!

A critic would see the numbers as no more than idle coincidences. But within the Indian tradition it is believed that reality, as a kind of a *universal state function*, transcends the separate categories of space, time, matter, and observation. In this function, called *Brahman* in the literature, inhere all categories including knowledge. The conditioned mind can, by “tuning” in to *Brahman*, obtain knowledge, although it can only be expressed in terms of the associations already experienced by the mind. Within the Indian tradition, scientific knowledge describes as much aspects of outer reality as the topography of the mindscape. Furthermore, there are connections between the outer and the inner: we can comprehend reality only because we are already equipped to do so! My own papers listed in the bibliography can serve as an introduction to these ideas and point to further references for the reader to examine.

Two philosophical systems at the basis of Indian physics—and metaphysics—are Sāṃkhya and Vaiśeṣika. Sāṃkhya, which is an ancient system that goes back to the 3rd millennium BC, posits 25 basic categories together with 3 constituent qualities, which evolve in different ways to create the universe at the microcosmic as well as the macrocosmic levels. It also presupposes a “potential” (*tanmātra*) to be more basic than the material entity. Vaiśeṣika is a later system which is an atomic theory with the non-atomic ground of ether, space, and time upon which rest four different classes of indestructible atoms which combine in a variety of ways to constitute all matter; it also considers mind to be atomic (Kak, 1999). These systems presuppose genesis and evolution both at the cosmic and psychological levels. They also accept cyclic and multiple universes, and centrality of observers.

Unfortunately, historians of science are generally oblivious of Indian physics, astronomy or cosmology. Amongst popular books, Paul Halpern’s *The Cyclical Serpent* (1995) is an unusual book in that it places modern speculations regarding an oscillating universe within the context of the cyclic cosmology of the Purāṇas, but even this book doesn’t define a context for the Indian ideas.

In this paper we present, in a capsule form, the basic Indian ideas on space, time, and observation from the age of the epics and the early Purāṇas. The ideas of these period seem to belong to last centuries BC and they are

described in the Mahābhārata, Purāṇas, and the early Siddhāntas. To keep our sources to a minimum, we mainly use Yoga-Vāsiṣṭha (YV) is an ancient Indian text, over 29,000 verses long, traditionally attributed to Vālmīki, author of the epic Rāmāyaṇa, which is over two thousand years old.

2 Vedic and Purāṇic Cosmology

We first look at Vedic cosmology. The Vedas are texts that represent the ancient knowledge tradition of India. While their compilations go back to at least the third millennium, some of their contents might be even older (Feuerstein et al, 1995).

There are several statements in the Vedic texts about the universe being infinite, while at the same time the finite distance to the sun is explicitly mentioned (Kak, 1998a-d). Aditi, the great mother of the gods, is a personification of the concept of infinity. A famous mantra speaks of how taking infinity out of infinity leaves it unchanged. This indicates that paradoxical properties of the notion of infinity were known.

In a reference to mapping the outer world into an altar made of bricks, the Yajurveda (hymn 17) names numbers in multiples of ten that go upto ten hundred thousand million. This also suggests a belief in a very large universe.

The Śatapatha Brāhmaṇa, a commentatorial prose text on the Veda, that most likely goes back to the early centuries of the second millennium BC, provides an overview of some broad aspects of Vedic cosmology. The sixth chapter of the book, entitled “Creation of the Universe”, speaks of the creation of the earth later than that of other stars. Creation is seen to proceed under the aegis of the Prajāpati (reference either to a star or to abstract time) with the emergence of Aśva, Rāsabha, Aja and Kūrma before the emergence of the earth. Viśvanātha Vidyālaṅkāra suggests that these are the sun (Aśva), Gemini (Rāsabha), Aja (Capricorn) and Kūrma (Cassiopeia). This identification is supported by etymological considerations. The Ṛgveda 1.164.2 and Nirukta 4.4.27 define Aśva as the sun. Rāsabha which literally means the twin asses are defined in Nighaṇṭu 1.15 as Aśvinau which later usage suggests are Castor and Pollux in Gemini. In Western astronomy the twin asses are to be found in the next constellation of Cancer as Asellus Borealis and Asellus Australis. Aja (goat) is defined by Nighaṇṭu 1.15 as a

sun and owing to the continuity that we see in the Vedic and later European names for constellations (as in the case of the Great Bear) it is reasonable to identify it as the constellation Capricorn (*caper* goat + *cornu* horn). Kūrma is a synonym of Kaśyapa (tortoise) which is like Cassiopeia (from Greek Kassiopeia), and it is appropriate because it is near the pole.

The Purāṇas view the universe to have a diameter of about 500 million yojanas, but beyond the universe lies the limitless *Pradhāna*, that has within it countless other universes (Kak, 1998a).

3 The Yoga-Vāsiṣṭha

The internal evidence of the Yoga-Vāsiṣṭha (YV) indicates that it was authored or compiled later than the Rāmāyaṇa. Chapple (1984) summarizes the views of various scholars who date it variously as early as the sixth century AD or as late as the 13th or the 14th century. Dasgupta (1975, 1932) dated it about the sixth century AD on the basis that one of its verses appears to be copied from one of Kālidāsa's plays considering Kālidāsa to have lived around the fifth century. The traditional date of Kālidāsa is 50 BC and new arguments (Kak 1990) support this earlier date so that the estimates regarding the age of YV are further muddled and it is possible that this text could be 2000 years old.

YV may be viewed as a book of philosophy or as a philosophical novel. It describes the instruction given by Vasiṣṭha to Rāma, the hero of the epic Rāmāyaṇa. Its premise may be termed radical idealism and it is couched in a fashion that has many parallels with the notion of a participatory universe argued by Wheeler and others. Its most interesting passages from the scientific point of view relate to the description of the nature of space, time, matter, and consciousness. It should be emphasized that the YV ideas do not stand in isolation. Similar ideas are to be found in the Vedic books in a tradition that is at least 5000 years old. At its deepest level the Vedic conception is to view reality in a monist manner; at the next level one may speak of the dichotomy of mind and matter. Ideas similar to those found in YV are also encountered in Purāṇas and Tantric literature.

YV is a text that belongs to the mainstream of the ancient Vedic tradition that professes to deal with knowledge. Astronomical references in the Vedic texts take us back to the 4th or 5th millennium BC or even earlier (e.g. Kak

1994-6).

Roughly speaking, the Vedic system speaks of an interconnectedness between the observer and the observed. A similar conception appears to have informed many ancient peoples including the Greeks.

The Vedic system of knowledge is based on a tripartite approach to the universe. Beyond the three categories lies the transcendental “fourth”. Three kinds of motion are alluded to in the Vedic books: these are the translational motion, sound, and light which are taken to be “equivalent” to earth, air, and sky. The fourth motion is assigned to consciousness; and this is considered to be infinite in speed.

At least one of the founders of quantum theory was directly inspired by the Vedic system of knowledge. Schrödinger (1961) claims that the Vedic slogan “All in One and One in All” was an idea that led him to the creation of quantum mechanics (see also Moore, 1989). Even before Schrödinger, the idealist philosophical tradition in Europe had long been moulded by Vedic ideas. It should also be noted that many parts of the Vedic literature are still not properly understood although considerable progress has recently taken place in the study of Vedic science.

It is most interesting that the books in this Indian tradition speak about the relativity of time and space in a variety of ways. The medieval books call the Purāṇas speak of countless universes, time flowing at different rates for different observers and so on.

Universes defined recursively are described in the famous episode of Indra and the ants in Brahṃavaivarta Purāṇa 4.47.100-160, the Mahābhārata 12.187, and elsewhere. These flights of imagination are to be traced to more than a straightforward generalization of the motions of the planets into a cyclic universe. They must be viewed in the background of an amazingly sophisticated tradition of cognitive and analytical thought (see e.g. Staal 1988; Rao and Kak 1998).

Selected Passages

The page numbers given at the end of each passage are from the Venkatesananda (1993) translation. YV consists of 6 books where the sixth book itself has two parts. The numbers in the square brackets refer to the book, (part), section, verse. The reference to the Sanskrit original is also listed in the bibliography.

Time

- Time cannot be analyzed; for however much it is divided it survives indestructible. [1.23]
- There is another aspect of this time, the end of action (*kṛtānta*), according to the law of nature (*niyati*). [1.25.6-7]
- The world is like a potter's wheel: the wheel looks as if it stands still, though it revolves at a terrific speed. [1.27]
- Just as space does not have a fixed span, time does not have a fixed span either. Just as the world and its creation are mere appearances, a moment and an epoch are also imaginary. [3.20]
- Infinite consciousness held in itself the notion of a unit of time equal to one-millionth of the twinkling of an eye: and from this evolved the time-scale right upto an epoch consisting of several revolutions of the four ages, which is the life-span of one cosmic creation. Infinite consciousness itself is uninvolved in these, for it is devoid of rising and setting (which are essential to all time-scales), and it devoid of a beginning, middle and end. [3.61]

Space

- There are three types of space—the psychological space, the physical space and the infinite space of consciousness. [3.17]

The infinite space of individed consciousness is that which exists in all, inside and outside... The finite space of divided consciousness is that which created divisions of time, which pervades all beings... The physical space is that in which the elements exist. The latter two are not independent of the first. [3.97]

- *Other universes/wormholes.* I saw within [the] rock [at the edge of the universe] the creation, sustenance and the dissolution of the universe... I saw innumerable creations in the very many rocks that I found on the hill. In some of these creation was just beginning, others were populated by humans, still others were far ahead in the passage of their times. [6.2.86]

- I perceived within each molecule of air a whole universe. [6.2.92]

Matter

- In every atom there are worlds within worlds. [3.20]
- I saw reflected in that consciousness the image of countless universes. I saw countless creations though they did not know of one another's existence. Some were coming into being, others were perishing, all of them had different shielding atmospheres (from five to thirty-six atmospheres). There were different elements in each, they were inhabited by different types of beings in different stages of evolution.. [In] some there was apparent natural order in others there was utter disorder, in some there was no light and hence no time-sense. [6.2.59]

Experience

- Direct experience alone is the basis for all proofs... That substratum is the experiencing intelligence which itself becomes the experiencer, the act of experiencing, and the experience. [2.19-20]
- Everyone has two bodies, the one physical and the other mental. The physical body is insentient and seeks its own destruction; the mind is finite but orderly. [4.10]
- I have carefully investigated, I have observed everything from the tips of my toes to the top of my head, and I have not found anything of which I could say, 'This I am.' Who is 'I'? I am the all-pervading consciousness which is itself not an object of knowledge or knowing and is free from self-hood. I am that which is indivisible, which has no name, which does not undergo change, which is beyond all concepts of unity and diversity, which is beyond measure. [5.52]
- I remember that once upon a time there was nothing on this earth, neither trees and plants, nor even mountains. For a period of eleven thousand years the earth was covered by lava. In those days there was neither day nor night below the polar region: for in the rest of the earth

neither the sun nor the moon shone. Only one half of the polar region was illumined.

Then demons ruled the earth. They were deluded, powerful and prosperous, and the earth was their playground.

Apart from the polar region the rest of the earth was covered with water. And then for a very long time the whole earth was covered with forests, except the polar region. Then there arose great mountains, but without any human inhabitants. For a period of ten thousand years the earth was covered with the corpses of the demons. [6.1]

Mind

- The same infinite self conceives within itself the duality of oneself and the other. [3.1]
- Thought is mind, there is no distinction between the two. [3.4]
- The body can neither enjoy nor suffer. It is the mind alone that experiences. [3.115]
- The mind has no body, no support and no form; yet by this mind is everything consumed in this world. This is indeed a great mystery. He who says that he is destroyed by the mind which has no substantiality at all, says in effect that his head was smashed by the lotus petal... The hero who is able to destroy a real enemy standing in front of him is himself destroyed by this mind which is [non-material].
- The intelligence which is other than self-knowledge is what constitutes the mind. [5.14]

Complementarity

- The absolute alone exists now and for ever. When one thinks of it as a void, it is because of the feeling one has that it is not void; when one thinks of it as not-void, it is because there is a feeling that it is void. [3.10]

- All fundamental elements continued to act on one another—as experiencer and experience—and the entire creation came into being like ripples on the surface of the ocean. And, they are interwoven and mixed up so effectively that they cannot be extricated from one another till the cosmic dissolution. [3.12]

Consciousness

- The entire universe is forever the same as the consciousness that dwells in every atom, even as an ornament is non-different from gold. [3.4]
- The five elements are the seed for which the world is the tree; and the eternal consciousness is the seed of the elements. [3.13]
- Cosmic consciousness alone exists now and ever; in it are no worlds, no created beings. That consciousness reflected in itself appears to be creation. [3.13]
- This consciousness is not knowable: when it wishes to become the knowable, it is known as the universe. Mind, intellect, egotism, the five great elements, and the world—all these innumerable names and forms are all consciousness alone. [3.14]
- The world exists because consciousness is, and the world is the body of consciousness. There is no division, no difference, no distinction. *Hence the universe can be said to be both real and unreal: real because of the reality of consciousness which is its own reality, and unreal because the universe does not exist as universe, independent of consciousness.* [3.14]
- Consciousness is pure, eternal and infinite: it does not arise nor cease to be. It is ever there in the moving and unmoving creatures, in the sky, on the mountain and in fire and air. [3.55]
- Millions of universes appear in the infinite consciousness like specks of dust in a beam of light. In one small atom all the three worlds appear to be, with all their components like space, time, action, substance, day and night. [4.2]

- The universe exists in infinite consciousness. Infinite consciousness is unmanifest, though omnipresent, even as space, though existing everywhere, is manifest. [4.36]
- The manifestation of the omnipotence of infinite consciousness enters into an alliance with time, space and causation. Thence arise infinite names and forms. [4.42]
- Rudra is the pure, spontaneous self-experience which is the one consciousness that dwells in all substances. It is the seed of all seeds, it is the essence of this world-appearance, it is the greatest of actions. It is the cause of all causes and it is the essence of all beings, though in fact it does not cause anything nor is it the concept of being, and therefore cannot be conceived. It is the awareness in all that is sentient, it knows itself as its own object, it is its own supreme object and it is aware of infinite diversity within itself...

The infinite consciousness can be compared to the ultimate atom which yet hides within its heart the greatest of mountains. It encompasses the span of countless epochs, but it does not let go of a moment of time. It is subtler than the tip of single strand of hair, yet it pervades the entire universe...

It does nothing, yet it has fashioned the universe. ..All substances are non-different from it, yet it is not a substance; though it is non-substantial it pervades all substances. The cosmos is its body, yet it has no body. [6.1.36]

The YV model of knowledge

YV is not written as a systematic text. Its narrative jumps between various levels: psychological, biological, and physical. But since the Indian tradition of knowledge is based on analogies that are recursive and connect various domains, one can be certain that our literal reading of the passages is valid.

YV appears to accept the idea that laws are intrinsic to the universe. In other words, the laws of nature in an unfolding universe will also evolve. According to YV, new information does not emerge out the inanimate world but it is a result of the exchange between mind and matter.

It accepts consciousness as a kind of fundamental field that pervades the whole universe. One might speculate that the parallels between YV and some recent ideas of physics are a result of the inherent structure of the mind.

4 Other Texts

Our readings of the YV are confirmed by other texts such as the Mahābhārata and the Purāṇas as they are by the philosophical systems of Sāṃkhya and Vaiśeṣika, or the various astronomical texts.

Here is a reference to the size of the universe from the Mahābhārata 12.182:

The sky you see above is infinite. Its limits cannot be ascertained. The sun and the moon cannot see, above or below, beyond the range of their own rays. There where the rays of the sun and the moon cannot reach are luminaries which are self-effulgent and which possess splendor like that of the sun or the fire. Even these last do not behold the limits of the firmament in consequence of the inaccessibility and infinity of those limits. This space which the very gods cannot measure is full of many blazing and self-luminous worlds each above the other.
(Ganguly translation, vol. 9, page 23)

The Mahābhārata has a very interesting passage (12.233), virtually identical with the corresponding material in YV, which describes the dissolution of the world. Briefly, it is stated how a dozen suns burn up the earth, and how elements get transmuted until space itself collapses into Wind (one of the elements). Ultimately, everything enters into primeval consciousness.

If one leaves out the often incongruous commentary on these ideas which were strange to him, we find al-Bīrūnī in his encyclopaedic book on India written in 1030 speaking of essentially the same ideas. Here are two little extracts:

The Hindus have divided duration into two periods, a period of *motion*, which has been determined as *time*, and a period of *rest*, which can only be determined in an imaginary way according to the analogy of that which has first been determined, the

period of motion. The Hindus hold the eternity of the Creator to be *determinable*, not *measurable*, since it is infinite.

They do not, by the word *creation*, understand a *formation of something out of nothing*. They mean by creation only the working with a piece of clay, working out various combinations and figures in it, and making such arrangements with it as will lead to certain ends and aims which are potentially in it.

(Sachau, 1910, vol 1, pages 321-322)

The mystery of consciousness is a recurring theme in Indian texts (Kak, 1997). Unfortunately, the misrepresentation that Indian philosophy is idealistic, where the physical universe is considered an illusion, has become very common. For an authoritative modern exposition of Indian ideas of consciousness one must turn to Aurobindo (e.g. 1939, 1956).

5 Concluding Remarks

It appears that Indian understanding of physics was informed not only by astronomy and terrestrial experiments but also by speculative thought and by meditations on the nature of consciousness. Unfettered by either geocentric or anthropocentric views, this understanding unified the physics of the small with that of the large within a framework that included metaphysics.

This was a framework consisting of innumerable worlds (solar systems), where time and space were continuous, matter was atomic, and consciousness was atomic, yet derived from an all-pervasive unity. The material atoms were defined first by their subtle form, called *tanmātra*, which was visualized as a potential, from which emerged the gross atoms. A central notion in this system was that all descriptions of reality are circumscribed by paradox (Kak, 1986).

The universe was seen as dynamic, going through ceaseless change.

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