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In India science and religion are not opposed fundamentally, as they often seem to be in the West, but are seen as parts of the same great search for truth and enlightenment that inspired the sages of Hinduism, Buddhism, and Jainism. Thus, in the Hindu scientific approach, understanding of external reality depends on also understanding the godhead. In all Hindu traditions the Universe is said to precede not only humanity but also the gods. Fundamental to Hindu concepts of time and space is the notion that the external world is a product of the creative play of *maya* (*illusion*). Accordingly the world as we know it is not solid and real but illusionary. The universe is in constant flux with many levels of reality; the task of the saint is find release (*moksha*) from the bonds of time and space.

"After a cycle of universal dissolution, the Supreme Being decides to recreate the cosmos so that we souls can experience worlds of shape and solidity. Very subtle atoms begin to combine, eventually generating a cosmic wind that blows heavier and heavier atoms together. Souls depending on their karma earned in previous world systems, spontaneously draw to themselves atoms that coalesce into an appropriate body." - The Prashasta Pada.

As in modern physics, Hindu cosmology envisaged the universe as having a cyclical nature. The end of each kalpa brought about by Shiva's dance is also the beginning of the next. Rebirth follows destruction.

Unlike the West, which lives in a historical world, India is rooted in a timeless universe of eternal return: everything which happens has already done so many times before, though in different guises. Hinduism arose from the discoveries of people who felt that they had gained an insight into the nature of reality through deep meditation and ascetic practices. Science uses a heuristic method that requires objective proof of mathematical theories. Yet both have proposed similar scenarios for the creation of the universe. Here is a look at Creation, Maya, Churning of Milky Ocean, Shiva's Cosmic Dance, Serpent of Infinity and a few articles on Hindu Cosmology.



Introduction



[Professor Arthur Holmes](#) (1895-1965) geologist, professor at the University of Durham. [He](#) writes regarding the age of the earth in his great book, [The Age of Earth](#) (1913) as follows:

"Long before it became a scientific aspiration to estimate the age of the earth, many elaborate systems of the world chronology had been devised by the sages of antiquity. The most remarkable of these occult time-scales is that of the ancient Hindus, whose astonishing concept of the Earth's duration has been traced back to Manusmriti, a sacred book."

When the Hindu calculation of the present age of the earth and the expanding universe could make Professor Holmes so astonished, the precision with which the Hindu calculation regarding the age of the entire Universe was made would make any man spellbound.

(source: [Hinduism and Scientific Quest - By T. R. R. Iyengar](#) p. 20-21).

[Alan Watts](#), a professor, graduate school dean and research fellow of Harvard



University, drew heavily on the insights of Vedanta. Watts became well known in the 1960s as a pioneer in bringing Eastern philosophy to the West. He wrote:

"To the philosophers of India, however, Relativity is no new discovery, just as the concept of light years is no matter for astonishment to people used to thinking of time in millions of kalpas, (A kalpa is about 4,320,000 years). The fact that the wise men of India have not been concerned with technological applications of this knowledge arises from the circumstance that technology is but one of innumerable ways of applying it."

It is, indeed, a remarkable circumstance that when Western civilization discovers Relativity it applies it to the manufacture of atom-bombs, whereas Oriental civilization applies it to the development of new states of consciousness."

(source: [Spiritual Practices of India - By Frederic Spiegelberg](#) Introduction by [Alan Watts](#) p. 8-9).



[Dick Teresi](#) author and coauthor of several books about science and technology, including [The God Particle](#). He is cofounder of [Omni](#) magazine and has written for Discover, The New York Times Magazine, and The Atlantic Monthly. He says

"Indian cosmologists, the first to estimate the age of the earth at more than 4 billion years. They came closest to modern ideas of atomism, quantum physics, and other current theories. India developed very early, enduring atomist theories of matter. Possibly Greek atomistic thought was influenced by India, via the Persian civilization."

The cycle of creation and destruction continues forever, manifested in the **Hindu deity Shiva, Lord of the Dance**, who holds the drum that sounds the universe's creation in his right hand and the flame that, billions of years later, will destroy the universe in his left. Meanwhile Brahma is but one of untold numbers of other gods dreaming their own universes.

The 8.64 billion years that mark a full day-and-night cycle in Brahma's life is about half the modern estimate for the age of the universe. The ancient Hindus believed that each Brahma day and each Brahma night lasted a kalpa, 4.32 billion years, with 72,000 kalpas equaling a Brahma century, 311,040 billion years in all. That the Hindus could conceive of the universe in terms of billions.

The similarities between Indian and modern cosmology do not seem accidental. Perhaps ideas of creation from nothing, or alternating cycles of creation and destruction are hardwired in the human psyche. Certainly **Shiva's percussive drumbeat** suggests the sudden energetic impulse that could have propelled the big bang. And if, as some theorists have proposed, the big bang is merely the prelude to the big crunch and the universe is caught in an infinite cycle of expansion and contraction, then ancient Indian cosmology is clearly cutting edge compared to the one-directional vision of the big bang. **The infinite number of Hindu universes is currently called the many world hypothesis, which is no less undocumentable nor unthinkable.**

(source: [Lost Discoveries: The Ancient Roots of Modern Science - By Dick Teresi](#) p. 159 and 174 -212). For more refer to chapter [Advanced Concepts](#)).



[Count Maurice Maeterlinck](#) (1862-1949) was a Belgian writer of poetry, a wide variety of essays. He won the 1911 Nobel Prize for literature. In his book [Mountain Paths](#), says:

"he falls back upon the earliest and greatest of Revelations, those of the Sacred Books of India with a Cosmogony which no European conception has ever surpassed."

(source: [Mountain Paths - By Maurice Maeterlinck](#)). Refer to [A Map of](#)

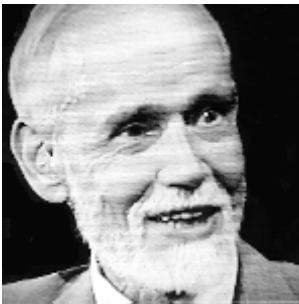


[Sacred Stories of the Ancient World](#) - Contributed to this site by [Dom Sturiale of Sydney, Australia](#).

Swami Kriyananada (J. Donald Walters) World renowned as a singer, composer, and lecturer, founder of the Ananda Village is perhaps the most successful intentional community in the world writes:

"Hindu cosmography, for example born in hoary antiquity, strikes one in certain ways as surprisingly modern. India has never limited its conception of time to a few crowded millennia. Thousands of years ago India's sages computed the earth's age at a little over two billion years, our present era being what is called the seventh Manuvantra. This is a staggering claim. Consider how much scientific evidence has been needed in the West before men could even imagine so enormous a time scale."

(source: [Crises in Modern Thought: The Crises of Reason](#) - By [Swami Kriyananda \(J. Donald Walters\)](#) vol. 1 p - 94).



[Huston Smith](#) (?) born in China to Methodist missionaries, a philosopher, most eloquent writer, world-famous religion scholar who practices Hatha Yoga. He has said in Hinduism:

"The invisible excludes nothing, the invisible that excludes nothing is the infinite – the soul of India is the infinite."

"Philosophers tell us that the Indians were the first ones to conceive of a true infinite from which nothing is excluded. **The West shied away from this notion.** The West likes form, boundaries that distinguish and demarcate. The trouble is that boundaries also imprison – they restrict and confine."

"India saw this clearly and turned her face to that which has no boundary or whatever." "India anchored her soul in the infinite seeing the things of the world as masks of the infinite assumes – there can be no end to these masks, of course. If they express a true infinity." And It is here that India's mind bogging variety links up to her infinite soul."

"India includes so much because her soul being infinite excludes nothing." It goes without saying that the universe that India saw emerging from the infinite was **stupendous**."

While the West was still thinking, perhaps, of 6,000 years old universe – India was already envisioning ages and eons and galaxies as numerous as the sands of the Ganges. The Universe so vast that modern astronomy slips into its folds without a ripple."

(source: [The Mystic's Journey - India and the Infinite: The Soul of a People](#) – By [Huston Smith](#)).



According to [Guy Sorman](#), visiting scholar at Hoover Institution at Stanford and the leader of new liberalism in France:

" Temporal notions in Europe were overturned by an India rooted in eternity. The Bible had been the yardstick for measuring time, but the infinitely vast time cycles of India suggested that the world was much older than anything the Bible spoke of. **It seem as if the Indian mind was better prepared for the chronological mutations of Darwinian evolution and astrophysics."**

(source: [The Genius of India](#) - By [Guy Sorman](#) ('Le Genie de l'Inde') MacMillan January 2001 ISBN 0333936000 p.195).

Refer to [Visions of the End of the World](#) - By [Dr. Subhash Kak](#) - [sulekha.com](#) and also Refer to [A Map of Sacred Stories of the Ancient World](#) - Contributed to this site by [Dom Sturiale of Sydney, Australia](#). Refer to [The World of Myth](#) - By [Ramesh N Rao](#) - [sulekha.com](#)).

Creation

Hinduism is the only religion that propounds the idea of life-cycles of the universe. It suggests that the universe undergoes an infinite number of deaths and rebirths. As in modern physics, Hindu cosmology envisaged the universe as having a cyclical nature. The end of each kalpa brought about by Shiva's dance is also the beginning of the next. Rebirth follows destruction.



Hinduism, according to [Carl Sagan](#), in his book, [Cosmos](#) wrote:

"... is the only religion in which the time scales correspond... to those of modern scientific cosmology. Its cycles run from our ordinary day and night to a day and night of the Brahma, 8.64 billion years long, longer than the age of the Earth or the Sun and about half the time since the Big Bang"

Long before [Aryabhata](#) (6th century) came up with this awesome achievement, apparently there was a mythological angle to this as well -- it becomes clear when one looks at the following translation of [Bhagavad Gita](#) (part VIII, lines 16 and 17),

"All the planets of the universe, from the most evolved to the most base, are places of suffering, where birth and death takes place. But for the soul that reaches my Kingdom, O son of Kunti, there is no more reincarnation. One day

of Brahma is worth a thousand of the ages [yuga] known to humankind; as is each night."

Thus each *kalpa* is worth one day in the life of Brahma, the God of creation. In other words, the four ages of the *mahayuga* must be repeated a thousand times to make a "day of Brahma", a unit of time that is the equivalent of 4.32 billion human years, doubling which one gets 8.64 billion years for a Brahma day and night. This was later theorized (possibly independently) by Aryabhata in the 6th century. The cyclic nature of this analysis suggests a universe that is expanding to be followed by contraction... a cosmos without end. This, according to modern physicists is not an impossibility.

(source: [Astronomy and Mathematics in Ancient India](#)).

[Dr. Sagan](#) in his book [Broca's Brain: Reflections on the Romance of Science](#), remarks:

[Immanuel Velikovsky](#) (the author of [Earth in Upheaval](#)) in his book [Worlds in Collision](#), notes that the idea of four ancient ages terminated by catastrophe is common to Indian as well as to Western sacred writing.

However, in the [Bhagavad Gita](#) and in the [Vedas](#), widely divergent numbers of such ages, including an infinity of them, are given; but, more interesting, the duration of the ages between major catastrophes is specified as billions of years. .. "

"The idea that scientists or theologians, with our present still puny understanding of this vast and awesome cosmos, can comprehend the origins of the universe is only a little less silly than the idea that Mesopotamian astronomers of 3,000 years ago – from whom the ancient Hebrews borrowed, during the Babylonian captivity, the cosmological accounts in the first chapter of Genesis – could have understood the origins of the universe. We simply do not know.

The Hindu holy book, the [Rig Veda](#) (X:129), has a much more realistic view of the matter:

"Who knows for certain? Who shall here declare it?
Whence was it born, whence came creation?
The gods are later than this world's formation;
Who then can know the origins of the world?
None knows whence creation arose;
And whether he has or has not made it;
He who surveys it from the lofty skies,
Only he knows- or perhaps he knows not."

(source: [Broca's Brain: Reflections on the Romance of Science - By Carl Sagan](#) p. 106 - 137).



Hinduism is not a single religion, rather it is a multifaceted matrix of beliefs, philosophies, practices, myths and epics. Within this matrix there are many myths of cosmogenesis. **The Sanskrit word for creation is srishti, which means projecting a gross thing from a subtle substance.** Srishti does not mean bringing out existence from non-existence or creating something from nothing. Creation implies something arising from nothing, or non-existence becoming existence. Hindus declare that non-existence can never be the source of creation. Thus, the universe is more accurately said to be the projection of the Supreme Being rather than a creation.

To the Vedic sages, creation indicated that point before which there was no Creator, the line between indefinable nothingness and something delineated by attributes and function, at least. Like the moment before the Big Bang Theory. These concepts preoccupy high wisdom, the Truth far removed from mere religion. The Bible begins with the Creation. Before the Creation, however, there was the Creator, but does even He know what was there before He existed ?

Long before such philosophical questions occurred to other historical peoples, **Vedism** posited the existence of something more ultimate than the one God. Whatever must have created Him. That is presuming the absolute and basic reality. Or is it?

Hymn 129 of the **Rig Veda** speaks:

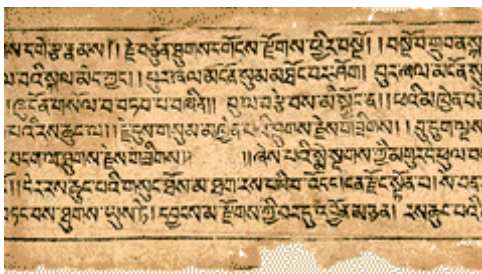
नासदासीन्नो सदासीत्तदानीं नासीद्रजो नो व्योमा परो यत्
किमावरीवः ? क्व कः शर्मन्नं बह ? किमासीद् गहनं गभीरम्...

Hymn 109 says: " Then neither Being nor not-Being existed, neither atmosphere, nor the firmament, nor what is above it . . . The One breathed windless by its own power. Nought else but this existed then.

In the beginning was darkness swathed in darkness: all this was but unmanifested water. Whatever was, that One coming into being, hidden by the void, was generated by the power of heat.

In the beginning desire which was the first seed of mind overcovered it. Wise seers, searching in their hearts, found the bond of Being in Not-Being . . ." (**Rig Veda** - translated by Ralph Griffith 575 - 6).

In this hymn the One, may refer to the creator god Brahma, his breathing and desire bring the world into existence. Before this was a void which can be described only by a paradox, Being nor Not-Being.



Creation accounts in the Vedas speak of a cosmic egg or embryo from which " the lord of creation" was born as the great oceans heated up. But later hymns were increasingly skeptical of such symbolism; the tenth book of the **Rig Veda** includes a verse asking,

"Who truly knows, who could here declare when was born, whence comes this creation?"

Cyclic Creation

In one of the story of **The Upanishads**, referred to by **Joseph Campbell** in his series of interviews with Bill Moyers, Brahma is the creative force behind a series of universes:



Brahma sits on a lotus, the symbol of divine energy and divine grace. The lotus grows from the navel of Vishnu. who is the sleeping god,



whose dream is the universe. . . . Brahma opens his eyes and a world come into being . . . Brahma closes his eyes, and a world goes out of being. (Campbell 63)

This story is similar to some modern ideas on the creation of the universe in continuous cycle, like the one proposed by [John Wheeler](#), all constants and laws of previous cycles are lost at the end of the contracting phase, and new universes can be created in an infinite number of cycles.

(Artwork courtesy of The Bhaktivedanta Book Trust International, Inc.

www.krishna.com).

Princeton University's [Paul Steinhardt](#) and Cambridge University's [Neil Turok](#), have recently developed The Cyclical Model.

They have just fired their latest volley at that belief, **saying there could be a timeless cycle of expansion and contraction. It's an idea as old as Hinduism, updated for the 21st century. The theorists acknowledge that their cyclic concept draws upon religious and scientific ideas going back for millennia — echoing the "oscillating universe" model that was in vogue in the 1930s, as well as the Hindu belief that the universe has no beginning or end, but follows a cosmic cycle of creation and dissolution.**

(source: [Questioning the Big Bang - msnbcnews.com](#)).

A 9th century Hindu scripture, The [Mahapurana by Jinasena](#) claims the something as modern as the following: (translation from [5])

"Some foolish men declare that a Creator made the world. The doctrine that the world was created is ill-advised, and should be rejected. If God created the world, where was he before creation?... How could God have made the world without any raw material? If you say He made this first, and then the world, you are faced with an endless regression... Know that the world is uncreated, as time itself is, without beginning and end. And it is based on principles."

(source: [Astronomy and Mathematics in Ancient India](#)).

(Refer to [Visions of the End of the World - By Dr. Subhash Kak - sulekha.com](#)).

For more refer to [The Infinitesimal Calculus: How and Why it Was Imported into Europe - By C. K. Raju](#) and [Computers, mathematics education, and the alternative epistemology of the calculus in the Yuktibhâsâ - By C. K. Raju](#)

Continuous Creation



Another view of creation expressed in Hindu literature is the idea that being is eternal. **The universe was not created, it will not be destroyed. It simply is.** This selection from the second teaching of the [Bhagavad-Gita](#), speaks of this type of creation:

"Indestructible is the presence that pervades all this; no one can destroy this unchanging reality. It is not born, it does not die; having been, it will never not be; unborn, enduring, constant, and primordial, it is not killed when the body is killed."

The beauty as well as the horror of this ground of being is revealed to Arjuna later in the Gita when Krishna reveals his true form as the god Vishnu. Vishnu is usually referred to as the preserver, the background behind all being. [Stephen Hawking](#) in describing his mathematical model of the universe has used a similar description.

Whereas in Western religions a creator god precedes man and the universe, the Hindu gods are preceded by creation; the origin of the world is envisaged not so much as an act of creation but as one of organization, the making of order out of chaos. The universe is often said to be born from the sacred syllable **Om**, or from an inert void in which "there was neither being nor non-being ... death nor non-death", a single principle from which emerged the diversity of life. From this void desire was born, and from desire came humans, gods and creation."

(Note: For more on yugas, refer to [One Cosmic Day of Creator Brahma](#). Refer to [A Map of Sacred Stories of the Ancient World - Contributed to this site by Dom Sturiale of Sydney, Australia](#). Refer to [The World of Myth - By Ramesh N Rao - sulekha.com](#)).

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Maya or Illusion

For many thousands of years, it is argued, the mystics have had a cosmological and epistemological view of things that the Western world is just beginning to understand. **Cosmologically, Western science has understood only recently that the universe is extremely old.** In 1965 the temperature of the universe was measured for the first time, resulting in our present estimate of the age of the universe as 15 billion years old. In the ancient literature of the India one does not, of course, find such precise figures. Instead there are analogies such as the following. Imagine an immortal eagle flying over the Himalayas only once every 1,000 years; it carries a feather in its beak and each time it passes, it lightly brushes the tops of the gigantic mountain peaks. The amount of time it would take the eagle to completely erode the mighty Himalayas is said to be the age of the present manifestation of the universe. **Such a conception of time, which predates modern science by thousands of years, is thought to be remarkable, especially when it is compared to the slow realization of Western science and religion to the possibility of a less humanlike time scale.**



Eastern mysticism is also consistent with the results of quantum physics. The mystics have always rejected the idea of a hidden clocklike mechanism, sitting out there, independent of human observation. The number one truth is that reality does not consist of separate things, but is an indescribable, interconnected oneness. Each object of our normal experience is seen to be but a brief disturbance of a universal ocean of existence. **Maya** is the illusion that the phenomenal world of separate objects and people is the only reality. For the mystics this manifestation is real, but it is a fleeting reality; it is a mistake, although a natural one, to believe that maya

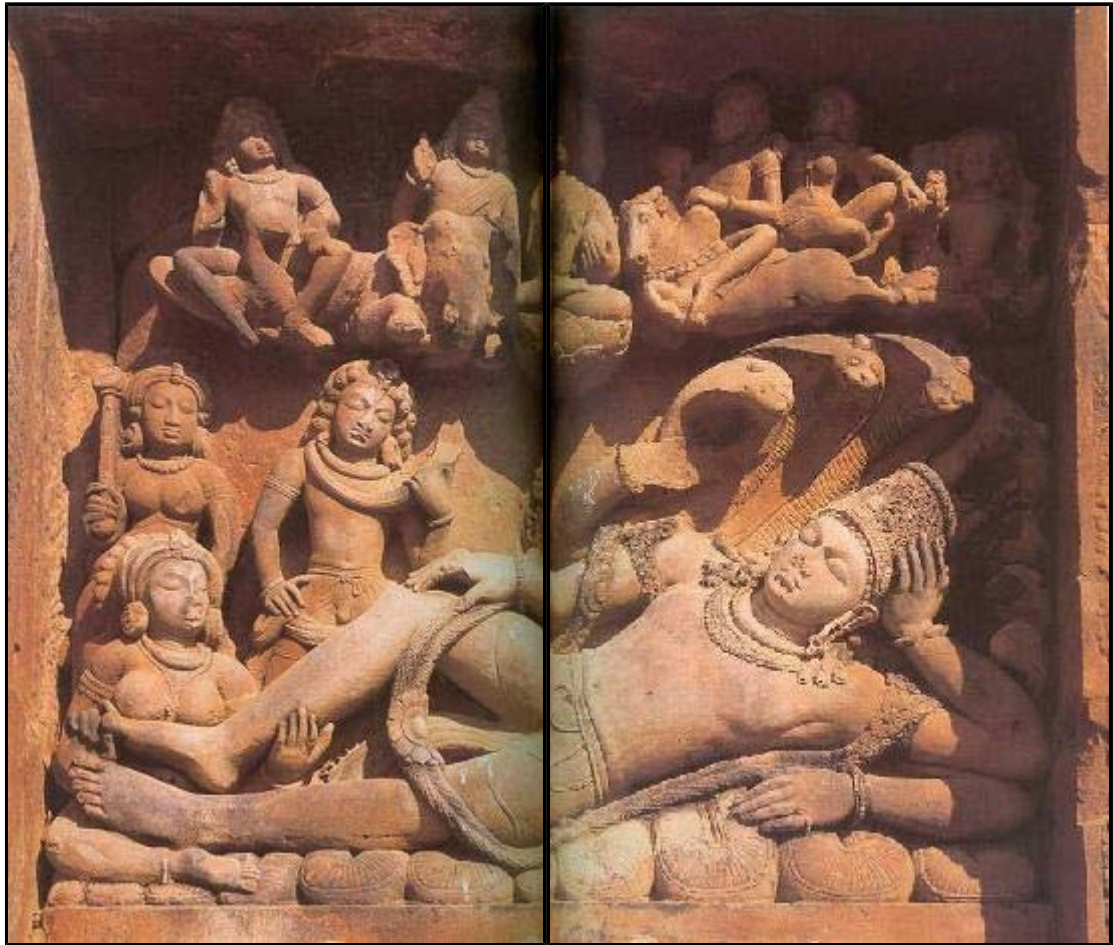
represents a fundamental reality. Each person, each physical object, from the perspective of eternity is like a brief, disturbed drop of water from an unbounded ocean. The goal of enlightenment is to understand this--more precisely, to experience this: to see intuitively that the distinction between me and the universe is a false dichotomy. The distinction between consciousness and physical matter, between mind and body, is the result of an unenlightened perspective.

Maya (Sanskrit: "illusion") is a fundamental concept in Hindu philosophy, notably, in the Advaita (Non-dualist) school of the orthodox system of Vedanta. **Maya denotes the power of wizardry with which a God can make human beings believe in what turns out to be an illusion;** by extension it later came to mean the powerful force that creates the cosmic illusion that the phenomenal world is real.

Maya, as per Hindu thought, is illusion, and what mankind understands to be reality is in fact the dream of Brahma. Brahma is the creator and great magician who dreams the universe into being. The dream itself is maintained by Vishnu, the Preserver, who uses maya to spin the complex web that we know as reality. It is not that the world itself is an illusion, only our perception of it. Whereas we suppose the universe to be made up of a multitude of objects, structures and events, the theory of maya asserts that all things are one. Rational categories are mere fabrications of the human mind and have no ultimate reality.

In much of Hindu thought maya is illusion, and what humankind understands to be reality is in fact the dream of Brahma. He is the creator god and great magician who dreams the universe into being. The dream itself is maintained by Lord Vishnu, the Preserver, who uses maya to spin the complex web that

we know as reality. It is not that the world itself is an illusion, only our perception of it. Whereas we suppose the universe to be made up of a multitude of objects, structures and events, the theory of maya asserts that all things are one. Rational categories are mere fabrications of the human mind and have no ultimate reality.



The symbol is that of Ananta, the great Adishesha of infinity and eternity, which is always represented, coiled up in a horizontal figure of 8 just like the lemniscate.

Lord Vishnu is said to rest in the coils of Ananta, the great serpent of Infinity, while he waits for the universe to recreate itself.

Modern Indian spiritual teachers assert that if the West had followed the Greek philosopher Heraclitus rather than Plato, the history of ideas would be very different and the concept of maya would be central to Western as well as to Eastern thought. Although Plato's teaching resembles maya when he writes that "the visible world is a pale shadow of a true reality beyond", he believed that each aspect of the world had a separate, distinct identity. Heraclitus posited instead a theory which was based on the assumption of the inseparable interconnectedness of the universe. His theory of Becoming asserts that all things are in a state of constant flux; always in the process of becoming something else. This hypothesis is echoed today, some 2,500 years later, by **Chaos Theory**, which the American science writer James Gleick defined as "the science of process rather than state, of becoming rather than being".



Maya is thus that cosmic force that presents the infinite Brahman (the supreme being) as the finite phenomenal world. Maya is reflected on the individual level by human ignorance (ajñāna) of the real nature of the self, which man has mistaken for the empirical ego but which is in reality identical with Brahman.



So why does all this worldly illusion exist? **Ramakrishna** called the world, "The Great Play of the Mother of the World." This is the "play" of Matter--the material world. It is somewhat like a stage play. We are all creatures of spirit with various coatings of matter hiding the spirit from the light. As we act out our Karmic roles in this great play, we remove the coatings of matter and release the light within us. The more light we accumulate within us, the more we can see the light hidden in other people and things. In reality, the whole world play exists for us to seek God Consciousness. All people are either striving toward the light or hiding from it. Those who are hiding are caught up in the Maya.

So, everything which has existence, everything in the phenomenal world is Maya. It is safe to say that "Everything is Maya." How does that affect us in our daily life? It affects the choices we make and therefore the Karma we make for ourselves as a result of those choices. So how should we deal with the Maya of existence? We should try to look for the Reality behind the veils of Maya. Primal Energy is the Infinite Transcendental Essence which permeates all existence. It is like Infinity in manifestation, if such a thing were possible. But to carry this analogy further where it is more understandable, we can best see everything in the universe as a differentiation or gradation of Primal Energy.

Thus, at the root of all existence--all Maya--is Primal Energy. Primal Energy is also the **Great Aum**, "The Word," or even God, if you will. Thus, when Hindus clasp their hands together and bow towards each other, they are saying, in effect, "The God within me greets the God within you."

Water of Illusion



The Greek philosopher Heraclitus used a river as an analogy for his Theory of Becoming, teaching that one cannot step into the same river twice. Maya, too, is often associated with water, the medium that forever changes as it flows from place to place. Water is often a symbol and an agent of illusion. **When Lord Vishnu is compelled to lift the veils of maya for the benefit of his followers, water is never far away.**

A well-known Hindu parable tells of a sage (**Narada**) who underwent such rigorous penance that he felt entitled to demand from **Lord Vishnu** the secret of maya. The god responded by ordering the mortal to dive into a nearby river. When the sage emerged, he did so as a woman, oblivious of her former existence. After a lifetime of success and failure, happiness and tragedy, she finally threw herself in despair onto the funeral pyre of her husband who had been murdered. The fire was instantly quenched by water. The sage regained his former body, and in that moment Lord Vishnu appeared. "This is Maya," he said, and the sage came to understand the nature of illusion and the workings of the universe.

(Refer to [Visions of the End of the World - By Dr. Subhash Kak - sulekha.com](#)). Refer to [A Map of Sacred Stories of the Ancient World - Contributed to this site by Dom Sturiale of Sydney, Australia](#). Refer to [The World of Myth - By Ramesh N Rao - sulekha.com](#)).

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Churning of the Milky Ocean or Samudra-Manthana



In this great story of **Samudra-Manthana**, the Devas and the Asuras, the bright and the dark powers, both combined to churn the milky ocean to obtain the elixir of immortality. We do not have the absolute dichotomy of good and evil that is there in the Semitic traditions; the bright and dark powers, the Devas and the Asuras, are, in fact, related within the whole theory of duality. Promising them a share, they invited the demons (Asuras) to take the tail of the serpent Vasuki, wrapped about the giant churning pole like a rope. The pole was fixed to the bottom of the ocean and the waves it made in twisting one way and the



other way threatened to destroy the three worlds. Lord Vishnu incarnated himself as a tortoise Kurma, taking the pole on his back to prevent the commotion. Glorious treasures emerged from the churned milk: Kamadhenu, the all-giving cow; Kalpavrksha, the wish-fulfilling tree; Accaisrava, the divine horse; Airavata, the divine elephant; Mahalaxshmi, the goddess of wealth and prosperity. These and other great gifts appeared and were happily divided between Asuras and Devas. The ultimate objective was the pot of ambrosia, the elixir of immortality, the amrta kalasa.

Suddenly, a terrible poison came forth. **Lord Shiva**, the great primal divinity, aloof from avarice and materialism of the Devas and Asuras, appeared. He collected the poison in a cup, and as he drank it his throat turned blue, hence one of the names of Shiva is nilakantha, the blue-throated one.

ॐ शान्तिः शान्तिः शान्तिः ॐ शान्तिः शान्तिः शान्तिः

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Shiva Nataraja (Cosmic Dance)

Throughout southern India, Lord Shiva is worshipped as Shiva Nataraja, Lord of the Dance. In the words of **Ananda Coomaraswamy**, a pioneering Hindu philosopher and historian of Indian art, Shiva's dance is the "**clearest image of the activity of God which any art or religion can boast.**" The image of Shiva as Nataraj is indelibly stitched into the Indian imagination.



The dance of Shiva is the dancing universe, the ceaseless flow of energy going through an infinite variety of patterns that melt into one another'.



According to [Sir Jacob Epstein](#) (1880-1959), leading English Sculptor. After studying with Rodin in Paris, he revolted against the ornate and pretty in art, producing bold, often harsh and massive forms in stone and bronze. has written about **Shiva Nataraja**:

"Shiva dances, creating the world and destroying it, his large rhythms conjure up vast aeons of time, and his movements have a relentless magical power of incantation. Our European allegories are banal and pointless by comparison with these profound works, devoid of the trappings of symbolism, concentrating on the essential, the essentially plastic."

(source: [Let There Be Sculpture - By Sir Jacob Epstein](#) 1942 p. 193).

The late scientist, [Carl Sagan](#), in his book, [Cosmos](#) asserts that the **Dance of Nataraja (Tandava)** signifies the cycle of evolution and destruction of the cosmic universe (Big Bang Theory).

"It is the clearest image of the activity of God which any art or religion can boast of." Modern

physics has shown that the rhythm of creation and destruction is not only manifest in the turn of the seasons and in the birth and death of all living creatures, but also the very essence of inorganic matter. "

For modern physicists, then, Shiva's dance is the dance of subatomic matter. Hundreds of years ago, Indian artist created visual images of dancing Shiva's in a beautiful series of bronzes. Today, physicist have used the most advanced technology to portray the pattern of the cosmic dance. Thus, the metaphor of the cosmic dance unifies, ancient religious art and modern physics.

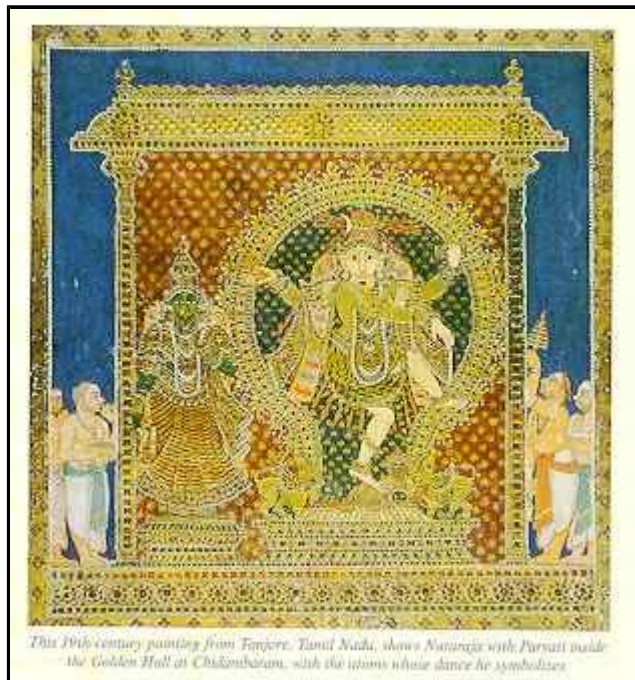


Shiva's dance is a symbol of the unity and rhythm of existence. The unending, dynamic process of creation and destruction is expressed in the energetic posture of Shiva. He dances in a ring of fire that refers to the life-death process of the universe. Everything is subject to continual change, as energy constantly assumes new forms in the "play" (lila) of creation, except the god himself whose dance is immutable and absolute. The pictorial allegory of Nataraja indicates the so-called "five acts" of the deity: the creation of the universe, its sustenance in space, its final dissolution at the end of the cycle of four world ages (yugas), the concealment of the nature of the godhead, and the bestowal of true knowledge.

[Jawaharlal Nehru](#) (1889-1964) first prime minister of free India, was more than a deeply moral human being. He yearned for spiritual light. He was particularly drawn to Swami Vivekananda and the Sri Ramakrishna Ashram. In his book - [A Discovery of India](#) he wrote:

"The statue of Nataraja (dance pose of Lord Shiva) is a well known example for the artistic, scientific and philosophical significance of Hinduism."

(source: [A Discovery of India - By Jawaharlal Nehru](#) p. 214).



This 19th-century painting from Tanjore, Tamil Nadu, shows Nataraja with Parvati inside the Golden Hall at Chidambaram, with the flames whose dance he symbolizes

Shiva's dance is a symbol of the unity and rhythm of existence. The unending, dynamic process of creation and destruction is expressed in the energetic posture of Shiva. He dances in a ring of fire that refers to the life-death process of the universe.



[Fritiof Capra](#) (1939 -) Austrian-born famous theoretical high-energy physicist and ecologist wrote:



"Modern physics has thus revealed that every subatomic particle not only performs an energy dance, but also is an energy dance; a pulsating process of creation and destruction. **The dance of Shiva is the dancing universe, the ceaseless flow of energy going through an infinite variety of patterns that melt into one another**".

For the modern physicists, then Shiva's dance is the dance of subatomic matter. As in Hindu mythology, it is a continual dance of creation and destruction involving the whole cosmos; the basis of all existence and of all natural phenomenon. Hundreds of years ago, Indian artists created visual images of dancing Shivas in a beautiful series of bronzes. In our times, physicists have used the most advanced technology to portray the patterns of the cosmic dance."

(source: [The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism](#) - By Fritjof Capra p. 241-245).

The posture and balance of Nataraja's dancing form show Lord Shiva in the aspect of tamas, the expansive centrifugal force that creates and destroys the universe. This is the first of the three "tendencies" (gunas) that permeate the universe in Samkhya philosophy. Tamas (darkness), symbolized by Shiva, is responsible for the constant birth, change and death of all living things; the force sattva (tranquility) represented by Vishnu the Preserver, holds the atoms of every object together. These two "tendencies" - one holding the atoms of the universe together and the other ripping them apart - create a "friction" (rajas) that "vibrates" the world's atoms and creates the gravity to hold them to the earth. This is the third tendency, symbolized by the deity Brahma. It is the building stuff both of matter and of subtle energies such as perception and thought.

Consciousness inhabits all living things and has permeated the universe since it was created from its original bindu (energy center). The first stave of the universe was filled by "space" : the potential area in which the world will "expand" with the energy of Shiva's aspect as tamas. At the end of Kali Yuga (the current age of ignorance), the expansion accelerates, everything merges and Shiva performs the terrible tandava dance of destruction.



The most important Shiva image during the **Chola dynasty** was that of **Shiva as Lord of the Dance, or Shiva Nataraja**. In this form, Shiva is a summation of Indian religion, philosophy and culture. Shiva's dance is of cosmic significance and represents five principle manifestations of eternal energy: Creation, Destruction, Preservation, Salvation, and Illusion. He holds in his upper right hand a small drum, the symbol of the sound of creation. In his upper left hand is a flame representing the final destruction of the universe. His lower right hand makes the gesture "fear not." With his lower left hand he points to his raised left foot, the place of refuge and salvation for the devotee. His right foot is planted on the back of the demon Apasmara Purusha, the personifying illusion of ignorance over whom Shiva triumphs. In Shiva's hairdo sits the river goddess Ganga, the personification of the Ganges river which is said to spring forth from Shiva's head.

The dancing lord Shiva represents the constant process of creation, preservation and destruction of the universe. He trods on the dwarf, symbolic of Ignorance, which must be eliminated if a believer is to attain release from the eternal cycle of birth and death. In Shiva's upper hands are a drum, symbol of creation, and fire, symbol of destruction. This

magnificently modeled bronze image is a superb example of Chola workmanship.

The entire Universe is then engaged in movement and endless activity, in an uninterrupted cosmic dance of energy. In Hindu iconography the images that represent this dance are shown with Nataraja dancing with four arms and waving hair and should be read as pictorial allegories.

The upper right hand holds a small drum shaped as a clepsydra, which according to Zimmer keeps the rhythms of sound, the vehicle of the word transmitting revelation tradition and enchantment. The opposite hand, on the top left, with fingers postured as half moon, (ardhachandra mudra), carries a Flame, the element of destruction of the world on the palm of the hand. In the balance of the hands creation and destruction are shown as counterweights in the game of the cosmic dance made evident even by the quietness and serenity of Shiva's face at the centre between the two hands. The second right hand is making the gesture of 'motto fear ' that gives peace and protection, while the last left hand, suspended at the height of the breast, points toward the left foot symbolising liberation from the enchantment of Maya.



Universally regarded as the quintessential image of Hindu art and culture, representations of the god Shiva dancing in joyous abandonment within a circle of flames graphically depict his five cosmic acts of creation, preservation, destruction, unveiling of illusion, and liberation of the soul. His creative aspect is symbolized by the hourglass-shaped drum, in his proper upper right hand, which reproduces the primordial sound of creation. Shiva's preservation of the universe is suggested by his lower right hand held in the gesture of reassurance and safety. The flame in his upper left hand and that encircling the aureole represent the fire by which he destroys the universe in order to recreate it. He lifts the veil of illusion through his engendering act of dancing. His liberation of the soul is shown by his upraised left leg, which tramples on a prostrate infant signifying forgetfulness and is thus a source of grace.

While Shiva is believed to dance in various forms and locales for differing purposes, in this pose as Lord of the Dance (Nataraja), he is praised by the renowned eighteenth-century South Indian poet **Thayumanavar** as performing the **"Dance of Bliss in the Hall of Consciousness."** The dance of bliss is specifically associated with **Chidambaram, the sacred center of Nataraja worship**, where Shiva is said to have first performed it in order to convert a group of holy men who were engaged in heretical practices. Chidambaram is also the site of the great twelfth-century temple specifically dedicated to Shiva's aspect as Lord of the Dance. The temple has a silver image of the dancing god as its main icon, and the gateway around the complex is adorned with sculpted depictions of the 108 basic postures of classical Indian dance, Bharata Natyam, which has been performed since at least the second century B.C.

South Indian copper alloy images such as this were originally carried in processions during religious festivals; ropes were inserted through the square holes in the base to tie it to support poles. The distinctive elliptical shape of the aureole and slender figural style indicate that it is one of the earliest surviving images of this type.



As Shiva Nataraja, Lord of the Dance, Shiva enacts the end of the world. He is the symbol of death but only of death as the generator of life and as a source of that creative power ever renewed by **Vishnu and Brahma**.

He evokes the most intense adoration from devotees for he fascinates even as he terrifies. He dances for cosmic re-creation. Shiva's dance of bliss is the catalyst for the destruction of one period of time and the creation of a new cosmos.

He has a third eye in the center of his forehead, the skull and crescent moon in his headdress.

He has long, matted hair and there is a small female figure of the river goddess Ganga in the loose locks of hair twirling around head. The Indian genius for expressing movement in sculpture derives in large part from the high aesthetic value that dancing holds in Indian tradition. It is the posturings and movements of the dance that inspire the imagination of the sculptor. The four arms display the powers of Shiva. The upper right holds the drum or vibrant rattle of creation. The upper left holds the flame of destruction. The lower right hand is raised in the gesture of protection. The lower left hand points to the upraised foot that symbolizes escape from illusion, represented by the dwarf whom he crushes beneath his right foot. The drum is a symbol of rhythm and sound. The matted hair symbolizes his power (like Samson). Crescent moon is the symbol of growth and birth

[Richard Waterstone](#) has written in his book:

Einstein and Shiva's cosmic dance

'There is a striking resemblance between the equivalence of mass and energy, symbolized by Shiva's cosmic dance and the Western theory, first expounded by Einstein, which calculates the amount of energy contained in a subatomic particle by multiplying its mass by the square of the speed of light: $E = mc^2$. "

(source: [India: Living Wisdom - By Richard Waterstone](#) p.135).

(Refer to [Visions of the End of the World - By Dr. Subhash Kak](#) - sulekha.com). Refer to [A Map of Sacred Stories of the Ancient World - Contributed to this site by Dom Sturiale of Sydney, Australia](#). Refer to [The World of Myth - By Ramesh N Rao](#) - sulekha.com).

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The Serpent of Infinity

The late scientist, [Carl Sagan](#), in his book, [Cosmos](#) asserts that the **Dance of Nataraja (Tandava)** signifies the cycle of evolution and destruction of the cosmic universe (Big Bang Theory).

"It is the clearest image of the activity of God which any art or religion can boast of." Modern physics has shown that the rhythm of creation and destruction is not only manifest in the turn of the seasons and in the birth and death of all living creatures, but also the very essence of inorganic matter.



For modern physicists, then, Shiva's dance is the dance of subatomic matter. Hundreds of years ago, Indian artist created visual images of dancing Shiva's in a beautiful series of bronzes. Today, physicist have used the most advanced technology to portray the pattern of the cosmic dance. Thus, the metaphor of the cosmic dance unifies, ancient religious art and modern physics. The Hindus, according to Monier-Williams, were Spinozists more than 2,000 years before the advent of Spinoza, and Darwinians many centuries before Darwin and Evolutionists many centuries before the doctrine of Evolution was accepted by scientists of the present age.

"The Hindu religion is the only one of the world's great faiths dedicated to the idea that the Cosmos itself undergoes an immense, indeed an infinite, number of deaths and rebirths. **It is the only religion in which the time scales correspond, to those of modern scientific cosmology.** Its cycles run from our ordinary day and night to a day and

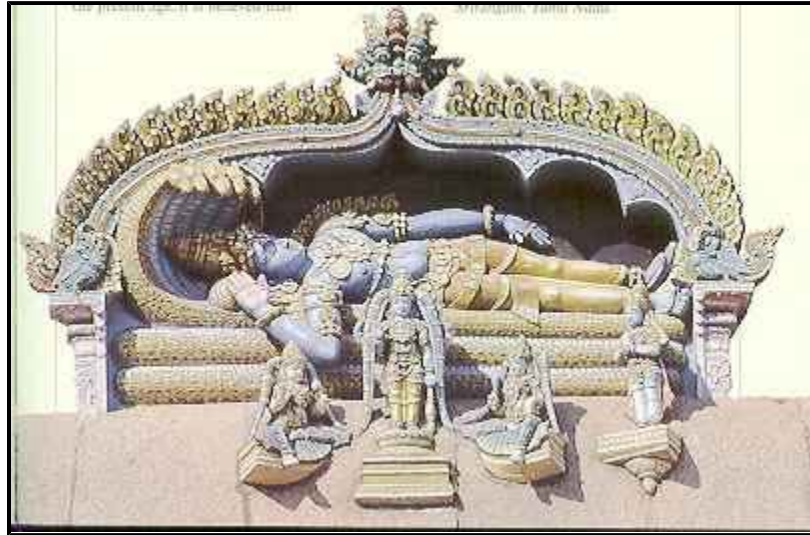
night of Brahma, 8.64 billion years long. Longer than the age of the Earth or the Sun and about half the time since the Big Bang. And there are much longer time scales still."

"The most elegant and sublime of these is a representation of the creation of the universe at the beginning of each cosmic cycle, a motif known as the cosmic dance of Lord Shiva. The god, called in this manifestation **Nataraja, the Dance King**. In the upper right hand is a drum whose sound is the sound of creation. In the upper left hand is a tongue of flame, a reminder that the universe, now newly created,

with billions of years from now will be utterly destroyed."

(source: [Cosmos - By Carl Sagan](#) Random House ISBN 0375508325 p. 213-214).

According to Hindu belief, the universe is destroyed at the end of each **kalpa** (life of the creator god, Brahma). Between the destruction of the world and its re-creation, at the end of each cycle, Lord Vishnu is said to rest in the coils of Ananta, the great serpent of Infinity, while he waits for the universe to recreate itself. At the end of Kali Yuga, the present age, it is believed that Lord Vishnu will descend in the form of the tenth and final avatar - as Kalki, the warrior, riding upon a white horse. He will destroy ignorance, drive invaders from India, and save the good from whom the people of the golden age, the Satya Yuga will descend.



Lord Vishnu is said to rest in the coils of Ananta, the great serpent of Infinity, while he waits for the universe to recreate itself.

For more than a century European and American scholars have held to the conclusion that Indian astronomy must somehow have been borrowed from the Greeks following the invasion of Alexander the Great, even though the Indians have no tradition of this, and Indian astronomy has a form quite unlike Greek astronomy. This conclusion is supported by the following facts:

- there was extensive trade between India and the West during the Hellenistic period
- Indian astronomical science is united with a form of astrology very similar to that cultivated by the Greeks during the Hellenistic period
- there are no historical records or accurate chronology to substantiate the Indian's own traditions of the origin of their astronomical science
- These scholars concede that Hindu cosmological time cycles, the form around which Indian astronomy is built, are indigenous to Indian culture, but they believe them to be crude number speculations.

For many thousands of years, it is argued, the mystics have had a cosmological and epistemological view of things that the Western world is just beginning to understand. Cosmologically, Western science has understood only recently that the universe is extremely old. In 1965 the temperature of the universe was measured for the first time, resulting in our present estimate of the age of the universe as 15 billion years old. In the ancient literature of the East one does not, of course, find such precise figures. Instead there are analogies such as the following. Imagine an immortal eagle flying over the Himalayas only once every 1,000 years; it carries a feather in its beak and each time it passes, it lightly brushes the tops of the gigantic mountain peaks. The amount of time it would take the eagle to completely erode the mighty

Himalayas is said to be the age of the present manifestation of the universe. Such a conception of time, which predates modern science by thousands of years, is thought to be remarkable, especially when it is compared to the slow realization of Western science and religion to the possibility of a less humanlike time scale.

Eastern mysticism is also consistent with the results of quantum physics. The mystics have always rejected the idea of a hidden clocklike mechanism, sitting out there, independent of human observation. The number one truth is that reality does not consist of separate things, but is an indescribable, interconnected oneness. Each object of our normal experience is seen to be but a brief disturbance of a universal ocean of existence. **Maya** is the illusion that the phenomenal world of separate objects and people is the only reality. For the mystics this manifestation is real, but it is a fleeting reality; it is a mistake, although a natural one, to believe that maya represents a fundamental reality. Each person, each physical object, from the perspective of eternity is like a brief, disturbed drop of water from an unbounded ocean. The goal of enlightenment is to understand this--more precisely, to experience this: to see intuitively that the distinction between me and the universe is a false dichotomy. The distinction between consciousness and physical matter, between mind and body, is the result of an unenlightened perspective.



Ancient Indians already operated with a time span of astronomical proportions long before the earliest signs of natural science in ancient Greece. **It is undeniable that ancient Indian texts present astonishingly exact scientific calculations even by today's latest scientific standards, such as the speed of light, exact size of the smallest particles and the age of the universe.**

The **Surya Siddhanta**, a textbook on astronomy of ancient India - last compiled in 1000 BC, believed by Hindus to be handed down from 3000 BC by aid of complex mnemonic recital methods still known today - **computed the earth's diameter to be 7,840 miles, the distance earth - moon as 253,000 miles. These compare to modern measurements resp. as 7,926.7 miles and 252,710 miles for max. dist. moon-earth.**

Manu's texts in Sanskrit propounded evolution thousands of years before Lamarck & Darwin. "The first germ of life was developed by water and heat. Man will traverse the universe, gradually ascending and passing through the rocks, the plants, the worms, insects, fish, serpents, tortoises, wild animals, cattle, and higher animals. These are the transformations declared, from the plant to Brahma, which have to take place in the world."

Brihath Sathaka operates with divisions of the time of one day into:- 60 kalas or ghatika - 24 mins each. Subdivided into 60 vikala (24 secs.each) 60 para then into tatpara, then into vitatpara then into ima then into kasha.... the smallest unit, equal to approx. 0.0000003 of a second (one 300 millionth). This smallest unit (3×10^{-8} second) is surprisingly close to the life-spans of certain mesons and hyperons, according to some Western physicist who was interviewed on the BBC World Service in the early 1990s.

The 14th century 'Rigveda of the Sun' (dated by manuscript age only), says that the sun covers 2,202 yoganas in half a mimesa - which calculates as 300,000 metres a second, fairly exactly the speed of light.

(source: [Science, the Critical mind and Dissent - By Robert C Priddy](#)).

Speed of Light:

One such book is the celebrated commentary on the **Rig Veda** by **Sayana** (c. 1315-1387), a minister in the court of **King Bukka I of the Vijayanagar Empire in South India**. In his commentary on the 4th verse of the hymn 1.50 of the Rig Veda on the sun, he says:

Tatha cha smaryate yojananam sahasre dve dve shate dve cha yogane ekena nimishardhena kramamana namo 'stu ta iti

Thus it is remembered: O Sun, bow to you, you who travers 2,202 yojanas in half a minute.

The Puranas define 1 nimesha to be equal to 16/75 seconds. 1 yojana is about 9 miles. Substituting in Sayana's statement we get 186,000 per second.

Sayana's statement was printed in 1890 in the famous edition of Rig Veda edited by Max Muller, the German Sanskritist . He claimed to have used several three or four hundred year old manuscripts of Sayana's commentary, written much before the time of Romer. Further support for the genuineness of the figure in the ancient book comes from one of the earliest Puranas, the Vayu, conservatively dated to at least 1,500 years old. The **Puranas** speak of the creation and destruction of the universe in cycles of 8.64 billion years, that is quite close to currently accepted value regarding the time of the big bang.

(source: [The Wishing Tree - By Subhash Kak](#) p. 75 - 77).

Shri 108 & Other Mysteries



The number 108 is very auspicious for Hindus. It is the number of beads of a rosary and of many other things in Indian cosmology. But why is this number considered to be holy?

The answer to this mystery may lie in the fact that the ancient Indians took this to be the distance between the earth and the sun in sun-diameter units and the distance between the earth and the moon in moon-diameter units.

Two facts that any book on astronomy will verify :

Distance between earth and moon = 108 times moon-diameter

Indian thought takes the outer cosmology to be mirrored in the inner cosmology of the human. Therefore, the number 108 is also taken to represent the 'distance' from the body of the devotee to the God within. The chain of 108 'links' is held together by 107 joints, which is the number of marmas, or weak spots, of the body in **Ayurveda**.

We can understand that the 108 beads of the rosary must map the steps between the body and the inner sun. The devotee, while saying beads, is making a symbolic journey from the physical body to the heavens.

108 is a number which resonates throughout the universe, as this shows. There are also several other numbers which are repeated throughout creation.

The reason why we do our mantra jap 108 times is because its a symbol of our journey towards our higher/spiritual self (sun) from our material self (earth).

(source: [Shri 108 & Other Mysteries - By Subhash Kak - sulekha.com](#) and [The Cycle of Time](#)).

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'Hindu cosmology's time-scale for the universe is in consonance with modern science'
The Rediff Special / Carl Sagan
<http://www.rediff.com/news/jan/29sagan.htm>



Carl Sagan, the distinguished **Cornell University** astronomer and Pulitzer Prize-winning author, who succumbed to his battle against cancer on December 15, in fact lived for millions of years in the relative time scale of experience.

This legend in his own lifetime was a first grade philosopher, poet, scientist and a splendid example of human greatness all rolled into one.

His true genius lay in the many esoteric philosophical and scientific endeavours which only specialists can really appreciate. But he became an instant pop science icon when he co-authored COSMOS, a television series devoted to astronomy and space exploration.

A part of that awesome series was shot in India. In the early eighties, Sagan met then Indian diplomat Placido P D'Souza and in a conversation explained the India connection and the relevance of Gandhi.

You have been host of the television programme *COSMOS* which deals with astronomy and science exploration. And yet India figured in this programme. Could you tell us how India fits into this series?

Let me first say something about the series in general, and something about the Indian part of the series. The television series *COSMOS* is designed to breach the barrier that many people feel about science. They cannot understand it, and it is foreign to them in approach and content. Our experience is that children grow up with an absolute zest and passion for science, and something happens to discourage some of them - sometimes many of them - from pursuing this interest.

We thought it was our job to excite the children, and reawaken the interest in science of adults. So we will use any approach to gain people's attention, and show them that science is something not just that they can understand, but that they can become excited about and can use as part of the way they view the world.



The series has been extraordinarily successful. It has been shown in a year or two in the Soviet Union and the People's Republic of China. I hope some day it will be shown in India. The tenth episode of *COSMOS* is largely about cosmology - the study of the universe in a perspective in which the Earth is like a grain to stand in vast beach or desert - and the way we approach the subject is through Hindu cosmology.

We have done that for several reasons. We went to Tamil Nadu for the festival called Pongal. Like festivals all over the world, it celebrates the changing of the seasons, and remind us that our ancestors were astronomers, who kept calendars and watched the skies. It was essential for extremely practical matters: when to sow seeds and to harvest grain. It was a matter of life and death to be an astronomer.

But the main reason that we oriented this episode of *COSMOS* towards India is **because of that wonderful aspect of Hindu cosmology which first of all gives a time-scale for the Earth and the universe -- a time-scale which is consonant with that of modern scientific cosmology. We know that the Earth is about 4.6 billion years old, and the cosmos, or at least its present incarnation, is something like 10 or 20 billion years old. The Hindu tradition has a day and night of Brahma in this range, somewhere in the region of 8.4 billion years.**

As far as I know. It is the only ancient religious tradition on the Earth which talks about the right time-scale. We want to get across the concept of the right time-scale, and to show that it is not unnatural. In the West, people have the sense that what is natural is for the universe to be a few thousand years old, and that billions is indwelling, and no one can understand it. The Hindu concept is very clear. Here is a great world culture which has always talked about billions of years.

Finally, the many billion year time-scale of Hindu cosmology is not the entire history of the universe, but just the day and night of Brahma, and there is the idea of an infinite cycle of births and deaths and an infinite number of universes, each with its own gods.

And this is a very grand idea. Whether it is true or not, is not yet clear. But it makes the pulse quicken, and we thought it was a good way to approach the subject.



And then the Chola bronzes in Tamil Nadu were very lovely to film, and gave us a visual approach to go along with the intellectual approach. It was also a way of de-provincialising our presentation. After all, we claim that science is an endeavor of the human species. To shoot the whole film in the United States or Western Europe would have been extremely provincial. We shot in Japan and 12 or 14 other countries, besides India. Let me also say that the subsidiary benefit for my wife and me is that we had a chance to visit India for the first time, and especially Tamil Nadu which we enjoyed enormously.

You mentioned the Chola bronzes and I see also that in your book *COSMOS* one of the chapters called 'The edge of forever' begins with a picture of Nataraja. Could you say something to explain its relevance in that chapter?

The traditional explanation of the Nataraja is that it symbolises the creation of the universe in one hand and the death of the universe in the other - the drum and the flame - and after all, that is what cosmology is all about. So in addition to being artistically exquisite, the Nataraja provides exactly the kind of symbolism that we wanted. The Nataraja that is photographed in the book *COSMOS* is in a museum in Pasadena, California, but it will be returned to India at some specified time within the next decade.

What were your general impressions about India?

I was absolutely delighted with Tamil Nadu. First of all, there was the sense of an intact cultural framework. I did not have the sense of people greatly alienated from their society - you certainly see a great deal of that in the West. I had a sense of people caring for each other, an intact social fabric, and technology coming along quite fast. Not just large industrial parks.

In a way what impressed me most was the widespread use of the bicycle, not only for carrying agricultural products and manufactures from one place to another, but also as a means for young people to visit neighbouring villages, and a sense of exuberant communication, because now people are not closed in a small village. They have a much wider range of places that they have access to.

We spent some time in Madras and in Bombay. But these were slow stages to get us to Tamil Nadu. We saw mainly tourist things which were certainly pleasant, but we did not have the sense of getting to know the people. We could have, but it did not work out that way, whereas in Tamil Nadu we got to know the people.

I will give you an example. Here we are at 6:30 or 7 in the morning - a group of us consisting of cameramen, soundmen, writers, directors, producers and me, who go marching single file by a pond in which there are lovely lily and lotus blossoms. Going to two small temples of the bull god (Nandi). A boy, less than 10 years old, saw us coming, looked at us, dove into the pond and came up near a lotus flower.

He then swam back with it, climbed out of the pond, went up to my wife, gave her the lotus blossom and introduced himself, saying "Hello, my name is..." I forget what his name was. It was done with such elegance and charm and with no thought of reward, but just a sensibility which I found very impressive. Anyway we loved it. How colorful it was...



I must also say the sari is a kind of work of art, especially seeing hundreds of them all together. Also, women washing the saris gives a kind of swatch of color to the landscape... I thought it was wonderful... I had a sense of a healthy society. I didn't know to what extent this is characteristic or not, but I was very impressed and would love to have a chance to go back...

Well, you know you have a standing invitation to visit India...Was that your first visit?

Yes. I had been invited before by a number of people, including J B S Haldane, a British biologist in Bhubaneswar. I knew him well in the last few years of his life. He even made me promise to visit him in Orissa, but he died before I had a chance to do so.

Did you know any other Indian scientists?

Oh, yes. I knew Vikram Sarabhai who spent a year at Cambridge, Massachusetts, when I was on the Harvard faculty. I was a student of the world-renowned astrophysicist Subramanian Chandrasekhar at the University of Chicago. An old friend from the graduate school days in Kameshwar Wali, now a Professor of Physics at Syracuse University. For 17 years a close colleague who has been working with me in laboratory experiments on the origins of life is Bishun Khare. So I had a succession of fairly close friendships with Indians. I have always felt some natural affinity, I suppose.

Have you seen the Gandhi film?

Yes. It well deserved the Academy awards. I though it was splendid on many different levels. One is the idea that there are ways for the people to move governments by unconventional approaches including civil disobedience - but not only civil disobedience - at a time when, in my view, the people of at least some countries have much more sensible views about the nuclear arms are than their governments. They can affect the policies of governments that seem to be slow-moving, intractable and riddled with a bureaucracy that is decades behind the times.

Also, the American civil rights, movement, of course, was powerfully influenced by the degree to which Martin Luther King, Jr admired Mohandas Gandhi, and I think that it is important for us, Americans, to remember that connection... of the time when events in India were relevant to events in the United States. That kind of thing seems to me to be extremely important.



It has been argued that this kind of movement is all right in a colonial situation and in very special circumstances, but when you have functioning democracies, is it valid to adopt what could be considered extra constitutional measures?

Right... or the opposite question: in a country like Nazi Germany, would civil disobedience have in any way been effective? Would the leaders of civil disobedience not have been executed and nothing would have changed? They are both good questions, and my answer is that the approach of Gandhiji is not precisely applicable in every political situation. However, the reminder that there are conventional ways of affecting the perceptions of masses of people on issues of

the greatest importance is very important reminder.

In democracies - you talk about functioning democracies - there are traditions. For example, the approaches to the nuclear arms race are institutionalised, and progress is made very slowly. Armaments are increased easily, decreased with great difficulty, and people think about historical analogies of Munich in 1938 and so on without fully having come to grips with the fact that the invention of nuclear weapons has changed everything. And for that reason I think that something other than politics is necessary when all nations and the human species are faced with the extremely grave possibilities of a nuclear war.

I am not saying that civil disobedience is necessarily the answer. But one thing which was so impressive about Gandhiji was the way he was able to communicate to large numbers of people and to excite people's passion and courage. There was a great deal of courage needed to have followed him, especially in the early days of his movement.

I think something along those lines is needed worldwide if we are to break out of this impasse in the nuclear arms race.



Also, I thought the movie was beautifully filmed, and in many places, extremely moving. Maybe the most moving for me was the scene toward the end, in which Gandhiji says to the despairing man who has killed children in a riot: "I know a way out of hell". I found that an enormously moving approach to the problem, that the way for a Hindu, to make recompense for participating in the riots, is to raise a Muslim child as a Muslim and vice versa.

I thought it was a superb movie and well deserving of the acclaim it has gotten here and elsewhere.

It has certainly made an impact, and moved people to think about Gandhi and India. To the extent that it has made people think a little, it has served its purpose.

I agree, it demonstrates that extremely unconventional approaches are practical politics. Surely Gandhi has made major achievements in practical politics by methods that the British discounted immediately, and were proved wrong. It is good to remember that...

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Chidambaram



Chidambaram, the site of Shiva's cosmic dance, has been the center of Shaivite art and thought for over a millennium. Its great temple, built by successive southern Indian dynasties between the 8th and 12th centuries A.D. is dedicated to Shiva Nataraja, and is said to be the site of his legendary dance in the presence of his consort Parvati. Shiva's dancing icon resides in the Golden Hall, a symbol of the nucleus of the atom and of the center (bindu) of the universe. The Upanishads, Vedas, Puranas and other sacred Hindu texts are represented by parts of the temple complex, the temple as a whole standing for the totality of Hindu knowledge. Shiva's dance to Parvati is celebrated in a great festival in December.

Significance: Chidambaram is one of the most ancient and most celebrated of shrines in India. It is of great religious as well as historic and cultural significance. Chidambaram is associated with Nataraja, or Shiva in his Ananda Tandava pose (the Cosmic Dance of bliss) in the cosmic golden hall and the hall of consciousness (Chit Sabha). Shiva is also worshipped in the "formless form" of the Chidambara Rahasyam, while the temple is known for its Akasa Lingam, an embodiment of Shiva as the formless Space. The word "Koyil" or temple in the Tamil Saivite tradition refers to none other than the Chidambaram Nataraja temple.



Antiquity: The origins of this vast temple are buried in antiquity. Literature talks of a tradition of Shiva (Nataraja) worship in existence even as early as the Sangam period (very early on in the Christian era), and the Tamil Saints have sung its fame when an established worship tradition was in place. The later Chola Kings (Aditya I and Parantaka I) adorned the roof of the shrine with gold, and the other Chola Kings treated Nataraja as their guardian deity and made several endowments to the temple as temple inscriptions testify. The Pandya Kings who followed them, and the later Vijayanagar rulers made several endowments to the temple. There is a stone image of Krishnadevaraya in the North Gopura which he is said to have erected. In the wars of the 18th century, this temple was used as a fort, especially when the British General Sir Eyre Coote unsuccessfully tried to capture it from the Mysore Kings. During this period, the images of Nataraja and Sivakamasundari were housed in the Tiruvarur Tyagaraja temple for safety.



Muthuswamy Deekshitar, one of the foremost composers in the Karnatic Music tradition sings the glory of this temple in his kriti 'Ananda Natana Prakasam'. The Alvar Poems of the Naalayira Divya Prabandam sing the glory of Vishnu, whose image is also housed in this temple, and his shrine is referred to as 'Tiruchitrakootam'. Adi Sankara is said to have presented a Spatika Lingam which is still under worship in this temple. Sekkizhaar's Periya Puranam, describing poetically the life of the Saivite Saints (63 in number) was composed in the 1000 pillared hall, and was expounded by the author himself in the presence of the Chola emperor Kulottunga II, who had commissioned the work, amidst great festivity and fanfare.

Each of the four most revered Saivite Saints (Appar, Sundarar, Sambandar and Manikkavacakar) has worshipped at Chidambaram, and the bulk of Manikkavacakar's work is in praise of Shiva at Chidambaram. Accordingly, their images are placed in the temple entrances corresponding to their points of entry into the temple. (Sambandar - South, Appar - West, Sundarar - North and Manikkavacakar - East).

Legends associated with this temple:

Aadi Sessa, the serpent (couch) of Vishnu, heard from Vishnu the grandeur of Shiva's cosmic dance. Filled with irrepressible desire to witness this dance in person at Chidambaram, Seshan descended to the earth as Patanjali (the one who descended). Vyagrapadar, another devotee of Shiva prayed to obtain the tiger's claws so that he could obtain with ease the sacred Vilva leaves meant for Shiva's

worship at Chidambaram. At the appointed hour, Shiva (with Sivakami) granted to Patanjali and Vyagradaadar, a visual treat in the form of his Cosmic Dance of Bliss, to the accompaniments of music played by several divine personalities in the Hindu pantheon. This Dance of Bliss is said to have been witnessed by Vishnu, and there is a Govindaraja shrine in the Natarajar temple commemorating this. The dance of bliss of Shiva, is also said to have been enacted upon Shiva's (Bhikshatana) victory over the married ascetics of Daruka Vanam.



Yet another legend, commemorating the dance duel between the doyens of dance Shiva and Kali is associated with Chidambaram. Shiva is said to have lifted his left foot towards the sky in the Urdhuva Tandava posture, a definite male gesture, which out of adherence to protocol, Kaali could not reciprocate, thereby causing Shiva to emerge victorious, delegating Kaali to the status of a primary deity in another temple in the outskirts of Chidambaram. This legend is portrayed in the Nritta Sabha, one of the halls within the Chidambaram temple.

There is another recent legend associated with this temple. The sacred Tamil works of the Nayanmaars had been missing for several years, and it was during the period of Raja Raja Chola (the builder of the Grand temple at Tanjavur) that formal research was initiated to trace these fine works of devotional literature. These works of the Saivite Saints - rich in musical content were recovered in a dilapidated state in one of the chambers in this vast temple, after the monarch brought images of the Saint trinity in procession to the temple.



In Hindu cosmology we are all manifestations of the divine, playing at life, forgetting, as children forget themselves in the middle of a game, that we are aspects of divinity at play. In the game, as in the delusions from which the Buddha of legend hoped to free the world, we experience ourselves as distinct personalities; to be liberated is to understand that the game, the personality, our individual suffering, are not the big picture. That we die and are reborn with each moment that passes. That death and birth are aspects of one another, just as creation and destruction are both embodied in Shiva, a single Hindu deity. That we are not separate from the great cosmic dance.

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Did You Know

A Celtic Deity



Like their Indo-European Hindu counterparts, many of the Celt's Deities are depicted in full lotus posture, as on this enamel piece. The stylized swastika pattern on the chest is identical to Hindu versions. Even the vocabulary is amazingly similar. The following are just a few examples:

Sanskrit	Old Irish
arya (freeman)	aire (noble)
naib(good)	noeib (holy)
badhira (deaf)	bodhar (deaf)



names (respect) nemed (respect)
raja (king) righ (king)

The ancient Irish law system, The Laws of the Fenechus, is closely parallel to the Laws of Manu.

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