# Science and Society in the Sanskrit World

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BRILL

LEIDEN | BOSTON

*To Professor Christopher Minkowski*

यन्नेत्रैस्त्रिभिरीक्षते न गिरिशो नाष्टाभिरप्यब्जभूः
स्कन्दो द्वादशभिस्तथा न मघवा चक्षुःसहस्रेण वा |
सम्भूयापि जगत्त्रयस्य नयनैर्द्रष्टुं न यत्पार्यते
प्रत्याहृत्य दृशौ समाहितधियः पश्यन्ति तत्पण्डिताः ||

That which eludes
even Śiva's three eyes
Brahmā's eight
Skanda's twelve
Indra's thousand,
What all the eyes in the world
put together still cannot see,
Learned persons behold
shutting their two eyes
mind stilled in concentration.

From the *Saduktikarṇāmṛta* (attributed to Śālikanātha),
translated by SUHAS MAHESH.

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CHAPTER 8

# Cyclical Time in Brahmanical India: Origin and Development

*Johannes Bronkhorst*

Classical Brahmanical texts—most notably the *Purāṇas*—present a cyclical vision of time, which Axel Michaels (2004: 300) describes as follows:

> The best-known expression of the cyclical image of the world is the doctrine of the four ages of the world (*yuga*). The calculation of time is complex and has not been handed down uniformly. … According to [a common calculation], the course of the world consists of the change of unfolding (*sarga*, *pratisarga*) or creation (*sṛṣṭi*) and dissolution (*pralaya*), presented as day and night in the hundred-year life of the god Brahmā. Such a Brahmā day lasts from creation to the decline of an eon (*kalpa*). And every Kalpa lasts a thousand great ages of the world (*mahāyuga*), corresponding to twelve thousand god years or 4,320,000 human years, which are divided into four ages of the world (*yuga*), and each of them has a tenth long dawn and dawn and dusk, in which Brahmā (or Viṣṇu) rests. The whole thing is repeated a thousandfold, a hundred Brahmā years or 311 billion and forty million human years. When this epoch (*para*) is over, the world declines. The coarse material will again become subtle primeval material, in which the constituents are in balance, until they are shaken—either by themselves or by a divine impulse—and the cycle of the emergence and passing away of the world (*saṃsāra*) continues.
>
> According to this calculation, the current age, the Kaliyuga, began on February 18, 3102 B.C.

Vedic literature says nothing about cyclical time. Early post-Vedic literature, on the other hand, introduces the claim that the world is eternal. It does so most clearly with respect to Sanskrit, the language which, it claims, is eternal and therefore beginningless. Sanskrit, of course, is the language of the *Veda*, and the notion that the *Veda* is eternal proved attractive to the Brahmins of that period, too.[1] Indeed, this notion became fundamental to ritual Mīmāṃsā,

1 Bronkhorst forthcoming.

the orthodox school of Vedic interpretation, which supported the beginninglessness of the *Veda* with the claim that every teacher of the *Veda* had had a teacher, and this without beginning. This argument remained popular with ritual Mīmāṃsā well into the second millennium, and distinguished this school from other schools of orthodox philosophy, which had meanwhile turned to a different understanding of the history of the world, the vision of cosmos and cyclical time corresponding to the description given above.

The first claim I wish to make in this article is that the cyclical vision of time came from the eastern region of northern India, from the culture of Greater Magadha. The main reasons supporting this claim are:

– This vision of cyclical time is completely absent in Vedic literature (as pointed out above); it appears only gradually in post-Vedic literature.
– It appears to be present in Buddhist and Jaina literature from the beginning.

Uncertainty about the dates at which early Buddhist and Jaina texts reached their present form tends to weaken chronological conclusions based on those texts. However, there is good reason (if further justification were necessary) to think that cyclical time was part of the culture of Greater Magadha when Buddhism and Jainism still shared space with Ajivikism.

The most important passage in the Buddhist canon that informs us about Ajivikism (i.e., about the teaching of Makkhali Gosāla, presumably its founder; see below) occurs in the *Sāmaññaphala Sutta* of the *Dīgha Nikāya*. Basham (1951: 13–14; modified) paraphrases it as follows:[2]

> There is neither cause nor basis for the sins of living beings; they become sinful without cause or basis. Neither is there cause or basis for the purity of living beings; they become pure without cause or basis. There is no deed performed either by [one's own] self (*ātman*) or by [the self of] others, no action belonging to the self (*puruṣa*), no strength, no courage, no endurance connected with the self or prowess connected with the self. All beings, all that have breath, all that are born, all that have life, are without power, strength, or virtue, but are developed by destiny, chance, and nature, and experience joy and sorrow in the six classes (of existence).
>
> There are 1,400,000 chief uterine births, 6,000 and 600; 500 *karma*s, 5 *karma*s, 3 *karma*s, a *karma*, and half a *karma*; 62 paths; 62 lesser *kalpa*s; 6 classes (of human existence); 8 stages of man; 4,900 means of livelihood

2 For philological details and specifications, see Bronkhorst 2003: 160 f. Graeme MacQueen (1988: 195) compares the different versions, including the Chinese versions, of this Sūtra and arrives at the conclusion "that [the Pāli version], of all the versions, preserved the most ancient state of the text". See also Meisig 1987.

> (?); 4,900 ascetics; 4,900 dwellings of *nāga*s; 2,000 faculties; 3,000 purgatories; 36 places covered with dust (?); 7 sentient births; 7 insentient births; 7 births from knots (?); 7 gods; 7 men; 7 *pisāca* (births?); 7 lakes; 7 knots (?), and 700; 7 precipices, and 700; 7 dreams, and 700; and **8,400,000 great *kalpa*s** through which fool and wise alike will take their course, and make an end of sorrow. There is no question of bringing unripe *karma* to fruition, nor of exhausting *karma* already ripened, by virtuous conduct, by vows, by penance, or by chastity. That cannot be done. *Saṃsāra* is measured as with a bushel, with its joy and sorrow and its appointed end. It can neither be lessened nor increased, nor is there any excess or deficiency of it. Just as a ball of thread will, when thrown, unwind to its full length, so fool and wise alike will take their course, and make an end of sorrow.

A passage in the Śvetāmbara Jaina canon, too, informs us about the teaching of Gosāla. It occurs in the *Viyāhapannatti* (= *Bhagavatī Sūtra*) and reads:

> All those who have reached or are reaching or will reach salvation must finish in order **8,400,000 *mahākappa*s**, seven divine births, seven groups, seven sentient births, seven 'abandonments of transmigration' (*paüṭṭa-parihāra*), 500,000 *kamma*s, and 60,000 and 600 and the three parts of *kamma*. Then, being saved, awakened, set free, and reaching *nirvāṇa* they have made or are making or will make an end of all sorrow.

The two passages have enough in common to justify the conclusion that they borrow from a common source which, we may safely assume, belongs to a time well before the composition of the *Mahābhārata*, and therefore well before the cyclical notion of time appears in the Brahmanical tradition. This common source mentioned *kalpa*s that succeed each other.

This common source also uses a multiple of the number 84. This number is omnipresent in cosmological contexts in Buddhist and Jaina sources, but completely absent in Vedic literature. It appears for the first time in the *Mahābhārata*, in connection with Mount Meru, another notion that the Brahmanical tradition appears to have borrowed from Greater Magadha. In the *Bhīṣmaparvan* of the *Mahābhārata* (Mhbh 6.7.10), as well as in the *Purāṇas*, it is stated that *Meru* rises 84,000 yojanas above the earth and descends 16,000 yojanas below it. The height of Mount Meru in the *Mahābhārata* appears to be the first occurrence in Brahmanical literature of a number with cosmological significance from the group of 84 and its multiples.

With respect to early Jaina literature, Ruth Satinsky (2015: Abstract) observes:

> The number 84 and its multiples are an important concept in Jaina cosmology. Ṛṣabha and his son Bharata are held to have had lifespans of 8,400,000 pūrvas respectively; Śreyāṃsa 8,400,000 years; and Ara, 84,000 years. In addition, four out of the five Mount Merus to which the ford-makers (tīrthaṅkara) are linked rise 84,000 yojanas above the earth … In a different context, the number 8,400,000 is for Jainas the sum total of conceivable birth-situations (yoni), in which souls may find themselves, over and over, as they circle through saṃsāra.

Satinsky further points out that "in both the Śvetāmbara and Digambara traditions, the number 84 and its multiples are omnipresent in the category of 'calculable' (*gaṇita*) (*gaṇiya*) time measures".

In Buddhism, the *Aṅguttara Nikāya* states that Mount Sineru (Meru) is 84,000 yojanas high and wide, and that it descends 84,000 yojanas beneath the sea. There are other significant occurrences of the number 84,000 in Buddhist literature. For example, there are the 84,000 *dharmaskandha*s of the Buddha—i.e., portions of the teaching relating to laws (*dharmaskandhavaśena caturaśīti-sahasravidham*)—and 84,000 stūpas containing the relics of Śākyamuni that Aśoka distributed.

All this suggests that the notion of *kalpa*—a key notion of cyclical time—was associated with a multiple of the number 84, itself a "cultural marker" of Greater Magadha.

There is one striking distinction between the cosmic cycles adopted in Brahmanism and those current in the traditions derived from Greater Magadha: the latter do not use the expression *yuga*,[3] which is yet a key term in the Brahmanical vision of time.[4] The Brahmanical tradition, on the other hand, does use the expression *kalpa*,[5] a term very common in the traditions that originated in Greater Magadha. We will consider these terminological issues below.

A small number of early Brahmanical texts present a picture of cyclical time that is rather different from the one presented above. These texts, too, speak

3 The Brahmanical *yuga*s do show up in more recent Buddhist texts; see Eltschinger 2012: 68 ff., 30 ("by the turn of the sixth century, certain Indian Buddhists … modified their apocalyptic schemes by taking up the hitherto purely Brahmanical pattern of four ages (*yuga*)"); Bronkhorst 2016: 17 n. 45.

4 Note further that multiples of 84, though common in connection with Mount Meru etc., were not adopted in the new Brahmanical measurements of cosmic cycles; the numbers here used may have Vedic antecedents, at least in part (González-Reimann 2009: 417).

5 See the next note.

of four *yuga*s that succeed each other, but these *yuga*s do not now have the extraordinary lengths that later tradition came to ascribe to them. The lengths of the four *yuga*s in the *Mānava Dharmaśāstra* (1.68–70), for example, are 4,000, 3,000, 2,000 and 1,000 years respectively. We find exactly the same lengths for the *yuga*s in the prophecy of Mārkaṇḍeya in the *Mahābhārata* (3.186.18–23).[6] These texts contain no indication to suggest that anything but ordinary human years are meant. The emphasis on the evils of the end of the aeon (*yugānta*)—rather than on the *kaliyuga*, the last of the four—suggests that also the *Vāyu Purāṇa* (esp. 32.58–65), the *Brahmāṇḍa Purāṇa* (1.2.31) and the *Yuga Purāṇa*[7] presuppose short lengths.[8]

It appears, then, that the classical Brahmanical notion of long world-periods was derived from an earlier one of short world-periods. The mechanism that allowed this to happen is simple. Ludo Rocher (1986: 124) said the following about the lengths of the classical Purāṇic world-periods:

> One feature that sets the *yugas* apart from similar systems in other civilizations is that, in India, the world ages have been assigned specific durations. The four *yugas* extend over periods of 4000, 3000, 2000, and 1000 years. Each of these is preceded by a dawn (*saṃdhyā*) and followed by a twilight (*saṃdhyāṃśa*) equal to one tenth of the duration of the *yuga* proper. The figures for the *yugas* which appear most often in the purāṇas are, therefore, 4800, 3600, 2400, and 1200, the *caturyuga* being equal to 12,000 years. More often than not these years are said to be divine years. To convert them into human years they have to be multiplied by 360, i.e. 1,728,000 + 1,296,000 + 864,000 + 432,000 = 4,320,000.

Multiplication by 360 turned short world-periods into long world-periods, by moving from human to divine measurements.

It goes without saying that—in spite of major differences—the long Purāṇic world-periods share an important feature with the long world-periods that were current in the culture of Greater Magadha, viz. their great length. This raises another question: Why did Brahmanism initially borrow the notion of

6 Together with transitional periods, the four *yuga*s add up to 12,000 years, which is a *mahāyuga*; one thousand of these great *yuga*s constitute one *kalpa* (González-Reimann 2009: 417.) Note that the term *kalpa* is here used for ultra-long periods of time, even though *yuga* refers to relative short periods. Was this an attempt to maintain the notion that the duration of a *kalpa* is enormous, as it was and remained in its original milieu?

7 The *Yuga Purāṇa* is really part of a longer work called *Gārgīya-jyotiṣa* (and other names; Mitchiner 2002: 1f.). Another part of this work is studied in Zysk 2016.

8 See further below.

cyclical time without borrowing its great lengths of time? A closer look at the *Yuga Purāṇa* may suggest an answer.

There are good reasons to believe that the *Yuga Purāṇa*, or at least important parts of it, date back to a date well before the other Brahmanical texts we have considered. It describes certain historical events in the form of a prophecy. It does so in great detail, and in this respect it is quite unique in early India (Parasher 1991: 239). It mentions the Greeks (*yavana*) and the Śakas and the war and destruction these invaders bring. Most interesting from our present perspective is that it views these disasters as indicators of the approaching end of an era (*yugānta*). The invasions of the Greeks and the Śakas take place at, and signify, the end of the era. The text concludes with an indication that a new *kṛtayuga* will begin soon.

It seems clear from this text that its author really believed that the end of the era was at hand (Mitchiner 2002: 86; González-Reimann 2002: 98–99; 2009: 417). He thought it would take place soon after the invasions of the Śakas, and this is indeed the time when the text must have been composed.[9] At this time, then, at least certain Brahmins, presumably those who suffered most from the repeated invasions that struck northwestern India, thought that the end of the world—or more precisely, the end of the present world-period—was near.

The *Yuga Purāṇa* as we have it mentions the four *yuga*s. However, there are reasons to think that they originally had no place in it. In a recent article, Vincent Eltschinger (2020) questions the simultaneous appearance and parallel, organic growth of all four *yuga*s. He points out that Aśvaghoṣa's extant writings (which cannot be later than 100–150 CE) show no acquaintance with the second and third *yuga* (the *tretāyuga* and the *dvāparayuga* respectively), whereas they do know the first one (the *kṛtayuga*) and perhaps the fourth one (the *kaliyuga*). Moreover, "the early portions of the *Rāmāyaṇa* reflect no awareness of the *tretā-* and *dvāparayuga*s. They only rarely allude to the *kṛta-* and the *kaliyuga*s …, operating almost exclusively with the *yugānta*." Eltschinger concludes: "The evidence from the *Rāmāyaṇa* and the works of Aśvaghoṣa suggests that in first-century CE Ayodhyā/Sāketa (the Rāmaite center from which, according to colophons, Aśvaghoṣa was a native), cosmological and eschatological concep-

9 Second half of the first century BCE, according to Mitchiner (2002: 93). The massive eruption of Alaska's Okmok volcano in 43 BCE—one of the largest volcanic eruptions of the past 2,500 years which probably resulted in crop failures, famine and disease in many parts of the world, and which exacerbated social unrest and contributed to political realignments throughout the Mediterranean region—may also have contributed to the conviction that the end of the world was near (McConnell et al. 2020).

tions revolved around the three motifs of an 'Edenic' *kṛtayuga* …, a cataclysmic *yugānta* … and a still very discrete *kaliyuga*/*tiṣya* with unspecified mutual connections and no organic pattern of gradual degeneration." An analysis of the *Yuga Purāṇa* and the prophecy of Mārkaṇḍeya in the *Mahābhārata* brings to light that these texts contain several distinct layers. According to Eltschinger, there are

> some reasons to believe that the four-*yuga* framework of the *Yugapurāṇa* is a late addition intended to recontextualize an older, possibly end-of-the-first-century BCE account, not of the four *yuga*s, but of the *yugānta*, 'the end of the *yuga*'. The formal, compositional and doctrinal features of the *Yugapurāṇa*, *Mahābhārata* 3.186 and 3.188 point to two distinct layers: older apocalyptic accounts of the *yugānta* (first century BCE to second century CE?), and a later reframing of these prophecies made in order to align them with the new Brahmanical, essentially Vaiṣṇava ideas concerning cosmology and, in one case at least, the historical manifestation of Viṣṇu (second to fourth century CE?).

Eltschinger hypothesizes that the doctrine of the four *yuga*s developed some time between the late first century and the late second century CE, probably on the basis of an analogy with the dice game (*kṛta*, *tretā*, *dvāpara* and *kali* are the names of the four throws in the dice game).

The preceding reflections suggest that the creation of the classical Purāṇic notion of cyclical time went through several phases. There were first the catastrophes that befell Brahmanism during the final centuries preceding the Common Era. After the collapse of the Maurya Empire, around 185 BCE, the north of India suffered a succession of foreign invasions. The Indo-Greeks were among the first to extend their power on the ruins of the Maurya Empire. Indo-Scythian (or Śaka, to use the Indian term) invasions followed soon. The result was a breakdown of society, or at any rate of the Brahmanical order of society. A number of texts give expression to the Brahmanical disarray during this period. One of these is the *Yuga Purāṇa*, whose oldest parts may date back to the end of the first century BCE. The prophecy of Mārkaṇḍeya in the *Mahābhārata* does the same, but adds to the list of oppressive ruling dynasties. One of these (the Ābhīras) appears to justify the conclusion that this prophecy was written, or given its present shape, in 250 CE or later (Mitchiner 2002: 46).

At or before this date, and presumably under the influence of cyclical notions of time that existed in other traditions, Brahmanism adopted the cyclical notion of four *yuga*s. We must assume that the term *yuga* was chosen because

of the pre-existing concerns with the end of the *yuga* and the notion of a *kṛtayuga* that had been around. The new cyclical notion of four *yuga*s was much more precise than *yugānta* and *kṛtayuga* had been so far. However, it was initially still based on the fear that the end of the world was near. When, presumably under the reign of the Guptas, this fear no longer looked justified, a reinterpretation—or rather: a recalculation—of the four *yuga*s put the end of the world at a safe distance. What is more, this recalculation attributed great lengths to the cycles, not just to the *kalpa*s but even to the individual *yuga*s (remember that one *kalpa* is one thousand *mahāyuga*s; see note 6). This brought these cycles closer to what must have been their source of inspiration: the time-cycles of Greater Magadha.

One text remains to be considered. It is older than the *Yuga Purāṇa*, older also than any of the other texts we have so far considered, but yet younger than the collapse of the Maurya Empire. It is Patañjali's *Mahābhāṣya*, which may have been composed (or at any rate completed) in the second century BCE at a date perhaps closer to 100 than to 150 BCE, presumably in Kashmir.[10] The *Mahābhāṣya* does not use the terms *yuga* and *kalpa* to designate time periods, but it does show awareness of long stretches of time. In its introductory chapter it tells the story of Bṛhaspati (the god of learning) who tries to teach the words of the Sanskrit language to the god Indra by enumerating them. He does not succeed in enumerating them all even after a thousand divine years (*divyaṃ varṣasahasram*).[11] Patañjali appears to situate this story in a remote past, for he contrasts it with the present, in which few live longer than a hundred years.[12] All this seems to presuppose a decline over time, not dissimilar to the opposition *kṛtayuga* vs. *kaliyuga* that presumably underlay the account in the original *Yuga Purāṇa*. Note further that this may be the earliest attestation of the notion of "divine year", so common in later Purāṇas.[13]

10 Bronkhorst 2016: 42–46.

11 Mahā-bh I p. 5 l. 25–27.

12 Mahā-bh I p. 5 l. 27–28: *kiṃ punar adyatve/ yaḥ sarvathā ciraṃ jīvati sa varṣaśataṃ jīvati/*.

13 As pointed out by Limaye (1974: 17), the same expression *divyaṃ varṣasahasram* occurs in the *Ārṣeya Brāhmaṇa* (1.1.5; Sharma 1967: 3). This is a "secondary Brāhmaṇa" (*anubrāhmaṇa*), i.e. "a portion of a Brāhmaṇa apportioned to a Kalpa-sūtra" (Gaurinath Sastri 1982: 111; Satya Shrava 1977: 12; further Gonda 1975: 320), or a work similar to a Brāhmaṇa (*brāhmaṇasadṛśo 'yaṃ grantho 'nubrāhmaṇam*; *Kāśikā* on P. 4.2.62); it belongs "to the latest period of the Vedic literature" (Sharma 1967: 10). The expression *divyaṃ varṣasahasram* also occurs in the *Agnyādheya Brāhmaṇa* (§ 6, p. 17), a portion of an otherwise lost Kāṭhaka Brāhmaṇa (Gonda 1975: 351).

Patañjali does not say in so many words that his remarks presuppose time cycles, but it seems plausible to assume that they do. Must we conclude that his text was influenced by the notions of cyclical time that had originated in Greater Magadha?

Elsewhere I have argued at length that Buddhist ideas influenced the *Mahābhāṣya*.[14] To the arguments there presented one could add that the *Mahābhāṣya*'s introductory chapter mentions "the earth with its seven continents" (*saptadvīpā vasumatī*) and the three worlds.[15] This reminds one of Buddhist cosmology as we find it in the *Abhidharmakośa* and the earlier *Lokaprajñapti*. These describe, most in particular, seven concentric mountain ranges (*parvata*) that surround Mount Meru.[16]

In view of the Buddhist influence it is hardly reckless to assume that already Patañjali's *Mahābhāṣya* was acquainted with the cyclical notion of time, and with long periods that succeed each other. If so, its appearance in the *Yuga Purāṇa* is not without precedent in Brahmanical literature.

What happened to the belief that the world is eternal and has no beginning in time? Interestingly, the *Mahābhāṣya* is one of the earliest texts to attribute beginninglessness to the *Veda*.[17] Strictly speaking there is no contradiction between an eternal and a cyclical world. Time cycles can repeat themselves from beginningless time, and this is what most Indian thinkers ended up believing. The eternality of the *Veda* posed more difficulties, and frequently took the shape that God reintroduces the same *Veda* at the beginning of each cycle. Some went to the extent of maintaining that the *Veda*, though authorless, was non-eternal.[18]

### Abbreviations

| | |
|---|---|
| Abhidh-k-bh(P) | Vasubandhu, Abhidharmakośabhāṣya, ed. P. Pradhan, rev. 2nd ed. Aruna Haldar, Patna 1975 (TSWS 8) |
| BORI | Bhandarkar Oriental Research Institute, Poona |
| Kāśikā | Kāśikā by Vāmana & Jayāditya, ed. Aryendra Sharma, Khanderao Deshpande, D.G. Padhye, Osmania University, Hyderabad, 1969–1970, 2 vols |

14 Most recently Bronkhorst 2016: 308–360.

15 Mahā-bh I p. 9 l. 20.

16 Abhidh-k-bh(P) 3.48–49, pp. 158–159. Cf. Sadakata 1997: 25 ff.: La Vallée Poussin 1914–1918: 296–297.

17 Bronkhorst forthcoming.

18 See, e.g., Łucyszyna 2020.

| | |
|---|---|
| Mahā-bh | Patañjali, (Vyākaraṇa-)Mahābhāṣya, ed. F. Kielhorn, Bombay 1880–1885 |
| Mhbh | Mahābhārata, crit. ed. V.S. Sukthankar et al., Poona 1933–1966 (BORI) |
| P. | Pāṇinian sūtra |
| TSWS | Tibetan Sanskrit Works Series, Patna |

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