



# Object-numerals as listed in Nijagaṇa Śivayogī's *Viveka-Cintāmaṇi*

Dipak Jadhav<sup>1</sup>

Received: 22 December 2021 / Accepted: 16 January 2023 / Published online: 6 February 2023  
© Indian National Science Academy 2023

## Abstract

Nijagaṇa Śivayogī was a Liṅgāyata Indian philosopher who flourished sometime between 1250 and 1655 CE. He composed the *Viveka-Cintāmaṇi* in Kannada. The fifty-nine object-numerals listed in this work by him under the heading *gaṇita-saṅjñe* (mathematical notations) are studied in this paper. Every object-numeral is a bearer of deeply rooted thought in ancient Indian society, be it from the Vedic, *paurāṇika*, epic, Jaina or *Āyurvedic* culture. Some of those object-numerals such as *vararatna* (3), *haravaktra* (5), *artha* (6), *rājyāṅga* (7), *sabhāṅga* (7), *anusvāra* (0), *nāsti* (0), etc. are unusual as their use in ancient and medieval Indian mathematics and astronomy has not yet been reported. The paper also reports the use of object-numerals by the Indian business community in the past.

**Keywords** *Gaṇita-saṅjñe* · Nijagaṇa Śivayogī · Object-numeral · *Viveka-Cintāmaṇi* · Word-numeral

## Abbreviation and notation

Skt. Sanskrit

[...] A pair of square brackets, wherever used, contains a paraphrase inserted by the present author to achieve comprehensiveness together with clarity

## 1 Introduction

A system of expressing numbers using significant words was developed and practiced in India. The words that are employed in this system are called word-numerals, or, more precisely, object-numerals (Sarma, 2003, p. 37; Sarma, 2012, p. 38). Object-numeral (*bhūta-saṅkhyā*) is the number (*saṅkhyā*) expressed through the word that had perfect and relevant significance for some particular object (*bhūta*) or entity (*bhūta*) in the past (*bhūta*) or that has been of perfect and relevant significance for some particular object or entity. That object or entity could be concrete or conceptual. Sometimes the synonyms of the word used for that particular object and its associated terms were also

used as object-numerals. For example, arrow, i.e., arrow of Kāmadeva, is an object. It is termed *bāṇa* in Sanskrit. Kāmadeva is the god of sexual desire. He is a young handsome god. The tips of his five arrows are fragrant flowers. Those five flowers are *aravinda* (day-lotus), *aśoka* ([the flower of] Aśoka tree), *cūta* ([the flower of] Mango tree), *navamālikā* (jasmine), and *nīlotpala* (blue lotus) (Mani, 1975, pp. 378–379; Apte, 1893, pp. 224 and 248; Cappellet, 1891, pp. 40 and 174). *Śara* is synonymous with *bāṇa*. *Kāmabāṇa* (the arrow of Kāma) and *kāmāstra* (the weapon of Kāma) are the associated terms of *bāṇa*. For this reason, each of *bāṇa*, *śara*, *kāmabāṇa* and *kāmāstra* denotes five (Jadhav, 2019, p. 11).

The use of object-numerals is found in India long before the commencement of the Common Era. The earliest instance of the use of a word to denote a number is found in the *Śatapatha Brāhmaṇa*. The word used to denote 4 in it is *kṛta*. In the *Taittirīya Brāhmaṇa* also *kṛta* has been used to denote 4. *Kṛta*, which is the past passive participle of the Sanskrit root *kṛ* (to do), means 'done.' It by extension indicates something 'well done' or 'good.' *Kṛta*, *tretā* ([marked with] three), *dvāpara* (two-side), and *kali* (quarrel or misfortune) were the four throws of the Vedic dice game. They represented 4, 3, 2, and 1 respectively. Since *kali* represented 1, it was the losing throw. Since *kṛta* denoted 4, it was the 'winning' or 'well done' throw. The use of the word *gāyatrī* (metre of 24 syllables) denoting 24 is found in the *Kātyāyana*

✉ Dipak Jadhav  
dipak\_jadhav17@yahoo.com

<sup>1</sup> Government Boys Higher Secondary School, Distt. Barwani, Anjad, Madhya Pradesh 451556, India

*Śrauta Sūtra*. The word *jagatī* (metre of 48 syllables) is used in the *Lāṭyāyana Śrauta Sūtra* to represent 48 (Datta & Singh, 1935, pp. 57–58; González-Reimann, 1989, p. 196).

The Sanskrit words used as object-numerals have been compiled by K. S. Shukla in the *Devanāgarī* script without highlighting their significances, as an Appendix to his edited version of the *Vaṭeśvara-Siddhānta*. His compilation, culled from the *Vaṭeśvara-Siddhānta* of Vaṭeśvara (904 CE), seems to be the longest one as it contains 945 words (Shukla, 1986, pp. 369–384). The same compilation is made available by K. V. Sarma in Roman script (Sarma, 2003, pp. 59–69). Long before Shukla, H. R. Kapadia collected object-numerals from various sources, the names of all of which were not noted by him, and appended his collection in the *Devanāgarī* script to his edited version of the *Gaṇitatilaka* of Śrīpati (c. 1039 CE). His collection includes 449 object-numerals (Kapadia, 1937, pp. 107–113).

Nijaguṇa Śivayog ī was a Liṅgāyata philosopher. He was a poet, musicologist, mystic of great spiritual originality and prolific writer. A follower of the Vīraśaiva faith, he is one of three *Nijaguṇas* in the Kannada literature. The scholars are unanimous that in his early life, he was the ruler of the country around the Śambhuliṅga hill, also called Cilakavāḍi Beṭṭa, near Yelandūr, in Kollegal Taluk of Mysore district of the present Karnataka. Later on, he became an ascetic and retired to that hill and lived there as a Śiva-yog ī. He flourished sometime between 1250 and 1655 CE, more particularly in the fifteenth century. He authored eight philosophical works in Kannada (Rice, 1921, p. 71; Datta, 1988, p. 1165; Siddhashrama, 1990, pp. 1–17).

Out of his eight philosophical works, the *Viveka-Cintāmaṇi* is an encyclopaedia rich in Sanskrit terms though written in Kannada. It provides a handy summary of the main streams of religious thought. It was translated into Marāṭhī in 1604 CE and Sanskrit in 1652 CE. It was also translated into Tamil. It is written in ten chapters and each is divided into topics. Each topic is further divided into sub-topics and each sub-topic into headings. About fifteen hundred headings of information are treated in ten chapters. The first chapter begins by explaining the names and qualities of the Lord. It then describes various types of texts and philosophies including the *Vedas*, *upaniṣadas*, *purāṇas*, six systems of philosophy, *Vaiṣṇavism*, *Buddhism*, *Jainism*, and materialism (Datta, 1988, p. 1165; Siddhashrama, 1990, p. 32; Dalal, 2014, p. 464). Nijaguṇa Śivayog ī gives a list of fifty-nine object-numerals in it to denote numerals from ‘one’ to ‘nine’ plus ‘zero.’

This paper aims at bringing his list of fifty-nine object-numerals to the attention of today’s scholarship, highlighting their significance. The list will be compared with each of Kapadia’s collection and Shukla’s compilation and other related issues will also be commented on.

## 2 Object-Numerals from the *Viveka-Cintāmaṇi*

Under the heading *gaṇita sañjñe* (mathematical notations) of the sub-topic *vaiśyakarmagaḷu* (Skt. *vaiśyakarmas*, business-activities) of his *Viveka-Cintāmaṇi*, Nijaguṇa Śivayog ī gives two lists relating to numbers. In the first list, he refers to the list of decimal place-names to thirty-sixth order. In the second list, he refers to the following fifty-nine object-numerals (Shivalingaiah, 1989, p. 6).

Object-numerals	Number denoted
<i>rūpa, bhūmi, candra</i>	1
<i>bāhu, pāda, pakṣa, nayana,</i> <i>yugma, yugala, yuga</i>	2
<i>haranayana, agni, pura,</i> <i>vararatna</i>	3
<i>kaṣāya, veda, varṇa, āśrama,</i> <i>samudra</i>	4
<i>haravaktra, vrata, indriya, bāṇa,</i> <i>viśaya, pāṇḍava, bhūta</i>	5
<i>dravya, rtu, rasa, skandamukha,</i> <i>vedāṅga, karma, varṇa, darśana,</i> <i>artha</i>	6
<i>muni, giri, rājyāṅga, turaga,</i> <i>dhātu, sabhāṅga, svara, sāgara</i>	7
<i>vasu, diggaja, mada, karma</i>	8
<i>randhra, nidhi, rasa, graha,</i> <i>ratha, bhakti</i>	9
<i>bindu, śūnya, nāsti, anusvāra,</i> <i>gagana, pūrṇa</i>	0

Ferdinand Kittel (1832–1903 CE) a priest of the Basel Mission in South India worked in Mangalore, Madikeri and Dharwad in Karnataka. He edited and translated the Kannada *Chandassu* (Canarese Prosody) of Nāgavarma of the late tenth century in 1875 CE, which he titled as *Nāgavarma’s Canarese Prosody*. In this work he refers to the above list in Roman script except for *dravya* (Kittel, 1875, p. 14).

Thomas Foulkes writes in the synopsis translated from the Tamil, culled from the *Viveka-Cintāmaṇi*, that:



It is the duty of the *veisya* (i.e., *vaiśya*, business community) to be acquainted with the science of numbers from an unit up to the thirty-sixth place of figures; and to be familiar with the symbolical language of numbers in use amongst merchants, in which unities, such as ‘the earth,’ ... used in place of the word ‘one;’ ... (Foulkes, 1860, p. 14).

### 3 Results and discussion

In this section, we will discuss the above object-numerals to highlight their significance and to compare their list with each of Kapadia’s collection and Shukla’s compilation.

#### 3.1 Object-numerals denoting one

The right form is beauty (Cappeller, 1891, p. 453). It is an exemplar. Therefore, *rūpa* (form) denotes 1. Since there is only one earth in the solar system, *bhūmi* (earth) represents 1. As there is only one moon, which is the satellite of the earth, *candra* (moon) refers to 1.

Each of these three object-numerals is in both Kapadia’s collection and Shukla’s compilation.

#### 3.2 Object-numerals denoting two

Those objects or body parts that are always in pairs represent 2. This is why each of *bāhu* ([two] hand[s]), *pāda* ([two] leg[s]), *pakṣa* ([two] fortnight[s]), *nayana* ([two] eye[s]), *yugma* (paired), *yugala* (pair or couple), and *yuga* (pair or couple) denotes 2.

Out of these seven object-numerals, *pāda* is not in both of Kapadia’s collection and Shukla’s compilation. Instead, Kapadia’s collection contains that *pāda* which denotes ¼.

#### 3.3 Object-numerals denoting three

(i) There are three sacrificial fires (*agnis*) known as *gārhapatyāgni* (the house holder’s fire or the fire that we use at homes), *āhavanīyāgni* (the fire situated in the east and used as the main offering fire), and *dakṣiṇāgni* (the fire situated in the south and used for certain rituals) (Rangacharya, 1912, p. 287). (ii) In Vedic thought, *agni* (fire) is considered to be the mouth of the gods and the goddesses. The sun in space, lightning in the environment, and fire on land show its presence at three levels (Lochtefeld, 2002, pp. 14–15). (iii) Fire has three properties—to heat, burn, and illuminate. This view seems to be held by Javanese in modern times (Wijayatno, 2003). For one of these three reasons, certainly, for the first one, *agni* (fire) represents 3. According to the *paurāṇika* thought, Lord Śiva had three eyes. *Hara* is an epithet of Śiva. Hence *haranayana* (Śiva’s [three] eye[s] or

Śiva’s [third] eye) means 3. Also *Tripura* or simply *pura* is the three moving cities made of gold, silver, and iron, which were built by three demon brothers, Tārākṣa, Kamalākṣa, and Vidyunnālī. They and their cities were destroyed by Lord Śiva with one arrow when they became a terror to the gods (Harshananda, 2008, Vol. 3, p. 394). For this reason, *pura* denotes 3. *Vara* means to be excellent or fairest or best (Cappeller, 1891, p. 474). According to the Jainism, *samyakadarśana* (right perception), *samyakajñāna* (right knowledge), and *samyakacaritra* (right conduct) together help to attain liberation (Sastri, 1944, p. 60). These are three *ratnas* (jewels). This is why *vararatna* (excellent [three] jewel[s]) denotes 3.

Out of these four object-numerals, *vararatna* is not found in both of Kapadia’s collection and Shukla’s compilation. *Haranayana* is also not included in Kapadia’s collection. Instead, it includes *haranetra*, which is synonymous with *haranayana*.

#### 3.4 Object-numerals denoting four

Since the life of the individual, according to the value-system propounded in Hinduism, is divided into four *āśramas* (stages of life), namely, *brahmacarya* (studentship), *gārhasthya* (married state), *vānaprastha* (state of a forest recluse), and *saṃnyāsa* (monkhood) (Harshananda, 2008, Vol. 1, p. 178), *āśrama* refers to 4. *Krodha* (anger), *māna* (pride), *māyā* (deceit), and *lobha* (greedy), according to the Jainas, are four *kaṣāyās* (passions) (Jaini, 1927a, v. 34, pp. 27 and 33; Jadhav & Jain, 2016, p. 196). This is why *kaṣāya* represents 4. Since *Arvāvat*, *Parāvāt*, *Sarasvat*, and *Śaryānāvāt* are the four seas mentioned in the *Ṛgveda* (Bhargava, 1964, pp. 1–23), *samudra* (sea) represents 4. Society in ancient India was classified into four *varṇas* (groups), namely, *brāhmaṇa*, *kṣatriya*, *vaiśya*, and *śūdra* (Harshananda, 2008, Vol. 3, p. 502). Therefore, *varṇa* means 4. *Veda* (knowledge) denotes 4 because *Ṛg* (praise), *Yajur* (sacrifice), *Sāma* (chant) and *Atharva* (priest) are four *Vedas*.

All these five object-numerals are found in both of Kapadia’s collection and Shukla’s compilation.

#### 3.5 Object-numerals denoting five

The present author is not sure why *haravaktra* represents 5. *Vaktra* means face (Cappeller, 1891, p. 467). And we have already seen that *hara* is an epithet of Lord Śiva. In this way, *haravaktra* means ‘[five] face[s] of Lord Śiva’ as they represent Śiva’s five aspects, namely, (i) *tatpuruṣa*, associated with eastern direction, (ii) *sadyojāta*, western direction, (iii) *vāmadeva*, northern direction, (iv) *aghora*, southern direction, and (v) *īśāna*, facing skyward (Daniélou, 1995, pp. 41–43). According to the Jainism, *ahimsā* (non-injury to any living being), *satya* (truth), *asteya* (not taking



what is not given), *brahmacharya* (celibacy), and *aparigraha* (non-possession) are five *vratas* (vows or codes of conduct) (Sangave, 2001, pp. 124 and 162). Therefore, *vrata* denotes 5. The chief instrument through which human being is equipped to receive and respond to knowledge from the outside world is called *indriya* (sense-organ). They are five in numbers—*rasanā* (gustatory perception system), *ghrāṇa* (olfactory system), *cakṣu* (ocular system), *śrotra* (auditory system), and *tvag* (somatosensory system) (Harshananda, 2008, Vol. 2, pp. 68–69). Therefore, *indriya* gives us an idea about 5. It has already been explained in the first section of this paper why *bāṇa* denotes 5. The pleasure acquired through the above five sense-organs is *viśaya* (Cappeller, 1891, p. 511). Those five pleasures are *rasa* (taste), *gandha* (smell), *rūpa* (form), *śabda* (sound), and *sparśa* (touch) (Rangacharya, 1912, p. 293). This is why *viśaya* denotes 5. The *Mahābhārata*, one of the two major epics of ancient India, describes *Pāṇḍavas* as the five sons of Pāṇḍu. They are Yudhiṣṭhira, Bhīma, Arjuna, Nakula, and Sahadeva. The word *pāṇḍava* is derived from their father's name (Mani, 1975, p. 562). This is why *pāṇḍava* demonstrates 5. The whole visible world is composed of one or more of five elements (*pañcabhūtas*). They are *tejas* (fire), *vāyu* (air), *pṛthvī* (earth), *ākāśa* (space), and *ap* (water) (Cappeller, 1891, p. 382; Mani, 1975, p. 547). This is why *bhūta* implies 5.

Each of these object-numerals except *haravaktra* is in both of Kapadia's collection and Shukla's compilation.

### 3.6 Object-numerals denoting six

According to the Jainism, *dhamma* (Skt. *dharma*, aether), *adhamma* (Skt. *adharmā*, anti-aether), *āgāsa* (Skt. *ākāśa*, space), *jīva* (soul), *poggala* (Skt. *pudgala*, matter), and *kāla* (time) are six *dravyas* (fundamentals or realities) (Jaini, 1927b, p. 3). For this reason, *dravya* denotes 6. Why Kittel did not include it in his list is not known. Unlike many other countries, the Indian subcontinent has six *ṛtus* (seasons)—*vasanta* (spring), *grīṣma* (summer), *varṣā* (rainy-season/monsoon), *śarad* (autumn), *hemanta* (fall winter), and *śiśira* (winter). Therefore, *ṛtu* denotes 6. *Madhur* (sweet), *amla* (sour), *lavaṇa* (salty), *kaṭu* (bitter), *tikta* (pungent), and *kasāya* (astringent) are the six tastes recognized in *Ayurveda*. They are called *ṣaḍrasa* or simply *rasa*. Hence *rasa* means 6. Lord Kārttikeya is recognized as the god of war. He is the son of Pārvati and Śiva and Gaṇeśa's brother. He is shown with either one or six faces and known by many names. One of them, in fact, his epithet, is *Arumugam* (Skt. *Ṣaṇmukha*, six-faced) (Gopal, 1990, p. 80). Since he is also known as *Skanda*, *skandamukha* represents 6. Why Kittel wrote it separately in his list as *skandha* and *mukha* is not known. Since *śikṣā* (phonetics), *kalpa* (rituals), *vyākaraṇa* (grammar), *nirukta* (etymology), *chandaḥ* (prosody), and

*jyotiṣa* (astronomy) are the six *vedāṅgas* (ancillaries of the *Vedas*) (Mani, 1975, p. 842), *vedāṅga* corresponds to 6. Since *pujā* (worship), *gūṛusevā* (serving the venerable), *dāna* (giving alms), *svādhyāya* (self-study), *saṃyama* (moderation), and *tapa* (austerity) are, according to the Jainas, six *karmas* (routine duties) for a householder (Padmavathamma et al., 2013, p. 22), *karma* represents 6. According to the Jainas, the *leśyās* (thought-paints) are the soul's vibrations effected by mild and strong passions. *Kṛṣṇa* (black), *nīla* (blue), *kāpota* (dove-grey), *teja* (yellow), *padma* (pink or red), and *shukla* (white) are the six types of *leśyās* (Jaini, 1927a, pp. 55 and 249). Since one of the various connotations of *varṇa* is colour, it is synonymous with *leśyā*. For this reason, *varṇa* refers to 6. *Darśanas* ([Indian] philosophical systems) are classified into *āstika* and *nāstika*. The *āstika darśanas* accept the authority of the *vedas*. They are six in number—*vaiśeṣika* (analytical) of Kaṇāda, *nyāya* (logic) of Gautama, *yoga* (yoking) of Pātañjali, *sāṅkhya* (reckoning) of Kapila, *vedānta* (culmination of the *vedas*) of Bādarāyaṇa, and *mīmāṃsā* (inquiry) of Jaimini (Harshananda, 2008, Vol. 1, p. 459). Therefore, *darśana* represents 6.

Apart from 'meaning', the word *artha* has many other connotations such as object, purpose, referent, property, wealth, etc. Referent means the thing in the world that a word denotes. *Artha* seems to have come here for *padārtha*. The latter stands for entity or category and literally means 'referent (*artha*) of word (*pada*)'. *Dravya* (substance), *guṇa* (quality), *karma* (activity), *sāmānya* (generality or similarity), *viśeṣa* (dissimilarity or specific individuality), and *samavāya* (inherence) are six *padārthas*. Out of them, *dravya* (substance) is the central pivot in which *guṇa* (quality) and *karma* (activity) reside with *samavāya* (inherence) and which acts by the law of *sāmānya* (generality) and *viśeṣa* (specific individuality). All the things in the world are made up of them. In fact, according to the *Nyāyavaiśeṣika* philosophy, *padārthas* or all objects of experience can be primarily divided into *bhāva* (position) and *abhāva* (negation or non-existence). The *Vaiśeṣika Sūtras* mentions *abhāva* (negation) as dependent on *bhāva* (position), while the later *Nyāya* authors such as Udayana include *abhāva* (negation) as a separate category, but Śrīdhara, a contemporary of Udayana, remarks that *abhāva* (negation) was not counted as it was dependent on *bhāva* (position) (Dasgupta, 1922, pp. 312–313; Sharma, 1993, p. 10). This must have been the reason why Nijaguṇa Śivayogī included *artha* in his list to denote 6.

Both Kapadia's collection and Shukla's compilation include *ṣaṇmukha*, not *skandamukha*. Out of these nine object-numerals, *artha*, *karma*, and *vedāṅga* are not in both of Shukla's compilation and Kapadia's collection. But Kapadia's collection includes that *artha* which denotes both 3 and 5.





### 3.7 Object-numerals denoting seven

*Āṅgīrasarṣis* are seven in number. By way of the *paurāṇika* tradition they have reached us as *saptarṣi* (seven sages [or seven stars of the Great Bear]) (Jadhav, 1998, p. 3). Since *muni* (ascetics) is the synonym of *ṛṣī*, it denotes 7. According to the *paurāṇika* thought, there are seven mountains in the region of Bhāratavarṣa. They are *Mahendra*, *Śukti*, *Malaya*, *Rkṣaka*, *Pāriyātra*, *Sahya*, and *Vindhya* (Caturvedī, 1998, p. 351). Therefore, *giri* (mountain) represents 7. Since *Svāmī* (lord), *amātya* (minister), *suhṛt* (ally or friend), *kośa* (treasure), *rāṣṭra* (territory), *durga* (fort), and *bala* (force) are *rājyāṅgas* (the constituents of a regal administration) (Śāstrī, 1998, p. 269), *rājyāṅga* denotes 7. Since the seven rays of the sun are its seven bright horses, *turaga* (horse) denotes 7 (Jadhav, 1998, p. 3). The *dhātu* (tissue) forms the basis of knowing physiology. Seven *dhātus* are described in *Āyurveda*. They support the basic structure and functioning of the body. They are *rasa* (fluid), *rakta* (blood), *māṃsa* (flesh/muscles), *meda* (fat), *asthi* (bones), *majjā* (marrow), and *śukra* (semen) (Sharma & Chaudhary, 2014, p. 232). This is the reason why *dhātu* is a symbol of 7. *Sabhāṅga* (the [seven] constituent[s] of a regal assembly) seems to be associated with *rājyāṅga*, although it cannot be said for certain. *Ṣaḍja*, *ṛṣabha*, *gāndhāra*, *madhyama*, *pañcama*, *dhaivata*, and *niṣāda* are seven *svaras* (notes) in the scale of Indian classical music (Ghosh, 1961, p. 5). They are shortened to *sa*, *ri* (Carnatic music) or *re* (Hindustani Music), *ga*, *ma*, *pa*, *dha*, and *ni* respectively (Randel, 2003, pp. 814–815). Therefore, *svara* represents 7. According to the *paurāṇika* cosmography, the earth is divided into seven continents separated by the seven concentric encircling seas. Those intermediate seas are of *lavaṇa* (salt water), *ikṣu* (sugar-cane juice), *surā* (wine), *sarpi* (i.e., *ghī* or clarified butter), *dadhi* (curd), *dugdha* (milk), *jala* (water) (Wilson, 1912, p. 116). For this reason, *sāgara* (sea) represents 7.

*Rājyāṅga* and *sabhāṅga* are two such object-numerals that are not found in both of Kapadia's collection and Shukla's compilation. Apart from them, *sāgara* is not in Shukla's compilation.

### 3.8 Object-numerals denoting eight

The *Harivaṃśa Purāṇa* mentions *aṣṭavasus* (eight *vasus*) as Akha, Dhara, Dhruva, Soma, Anila, Anala, Pratyūṣa, and Prabhāsa while the *Mahābhārata* as Dhara, Dhruva, Soma, Ahar, Anila, Anala, Pratyūṣa, and Prabhāsa. According to the *Bhāgavata Purāṇa*, they are Droṇa, Prāṇa, Dhruva, Arka, Agni, Doṣa, Vasu, and Vibhāvasu. And in the *Viṣṇu Purāṇa*, they are listed as Āpa, Dhruva, Soma, Dhārma, Anila, Anala, Pratyūṣa, and Prabhāsa. This variation in their names only suggests that some of them have two or more names (Mani, 1975, pp. 65–66). Vasu was the daughter

of Dakṣa. Dharmadeva was her husband. *Aṣṭavasus* were born to them. Therefore, *vasu* denotes 8. According to the *paurāṇika* thought, Airāvāt in *pūrva* (east), Puṇḍarīka in *āgneya* (south-east), Vāmana in *dakṣiṇa* (south), Kumuda in *nair̥ta* (south-west), Añjana in *paścima* (west), Puṣpadanta in *vāyavya* (north-west), Sārvabhauma in *uttara* (north), and Supratīka in *iśāna* (north-east) are the eight elephants who hold the earth in the respective eight directions (Śāstrī, 1998, p. 25). This is the reason why each of *diggaja* (i.e., *dikkarin*, elephant of a region) and its associated term *mada* ([elephant's] rut) denotes 8. According to the Jainas, *karma* is of innumerable types. In one source it is described as 148 and in another as 97 types. All of them can however be broadly classified into 8 categories. They are *jñānāvaraṇa* (knowledge-obscuring), *darśanāvaraṇa* (conation-obscuring), *vedanīya* (feeling), *mohanīya* (deluding), *āyu* (age or 'one that determines life span'), *nāma* (one that determines body), *gotra* (one that determines family or status), and *antarāya* (obstructive) (Jaini, 1927b, pp. 18–25). Therefore, *karma* denotes 8. It was also used by Mahāvīra (850 CE) long before Nijaguṇa Śivayog ī (Datta & Singh, 1935, p. 56).

Each of these four object-numerals is found in Shukla's compilation. *Karma* seems to be synonymous with *karman* which is in Kapadia's collection.

### 3.9 Object-numerals denoting nine

A human being is said to have nine exit points called *navadvāras* (nine gates) or *navarandhras* (nine outlets), through one of which the soul finally leaves the body. They are two ears, two eyes, two nostrils, one mouth, the genitals, and the anus (Prabhupāda, 1986, v. 5.13, pp. 255–256). For this reason, *randhra* represents 9. According to the *paurāṇika* thought, *mahāpadma*, *padma*, *śaṅkha*, *makara*, *kacchapa*, *mukunda*, *kunda*, *nīla*, and *kharva* are *navanidhi* (nine treasures) and they belong to Kubera, the god of wealth (Mani, 1975, p. 544; Rangacharya, 1912, p. 291). Therefore, *nidhi* denotes 9. *Rasa* refers to a concept that evokes an emotion or feeling in the audience, spectator or reader due to aesthetic flavour crafted by the artist in some musical, visual or literary work. *Rasas* are nine in number. They are *śṛīṅgāra* (romance), *hāsya* (humour), *raudra* (fury), *kārunya* (compassion), *bībhatsa* (loathsomeness), *bhayānaka* (terror), *vīra* (valour), *adbhuta* (amazement), and *śānta* (tranquillity). The inclusion of the ninth *rasa* had to undergo a good deal of struggle between the sixth and tenth centuries before the expression *navarasa* came into vogue.<sup>1</sup> Hence *rasa* denotes 9. As per the *paurāṇika* texts, *Sūrya*

<sup>1</sup> Available at [https://en.wikipedia.org/wiki/Rasa-\(aesthetics\)#cite-ref-26](https://en.wikipedia.org/wiki/Rasa-(aesthetics)#cite-ref-26). Accessed on November 09, 2018.



(Sun), *Candra* (Moon), *Śukra* (Venus), *Budha* (Mercury), *Kaja* or *Maṅgala* (Mars), *Bṛhaspati* (Jupiter), *Śani* (Saturn), *Rāhu*, and *Ketu* are the *navagrahas* (nine planets) (Mani, 1975, pp. 295–297). Therefore, *graha* denotes 9. According to the *Bhāgavata Purāṇa*, there are nine forms of *bhakti* (devotional practice). They are *śravaṇa* (listening), *kīrtana* (praising), *smaraṇa* (remembering), *pāda-sevana* (rendering service to the feet), *arcana* (worshiping), *vandana* (paying homage), *dāśya* (servitude), *sākhyā* (friendship), and *ātma-nivedana* (self-surrender) (Haberman, 2001, pp. 133–134). Hence, *bhakti* signifies 9.

The present author is not sure why *ratha* represents 9. He is also not sure whether it is really *ratha* or it is *ratna* although Kittel clearly spells it *ratha*. *Ratha* in Sanskrit means chariot or cart. In Hindu temple architecture, *ratha* is a vertical offset projection or facet on the plan of sanctum and the rising tower above. It is usually extended to the superstructure of the temple from its bottom. There are temples with *triratha* (three *rathas*), *pañcaratha* (five *rathas*), *saptaratha* (seven *rathas*), and *navaratha* (nine *rathas*). The corners of each *ratha* touch notional circles on the temple plan, which are concentric on the presiding deity.<sup>2</sup> No larger *ratha* than *navaratha* (nine *rathas*) seems to have prevailed in Hindu temple architecture. This may be a reason for *ratha* to denote nine. If it is *ratna*, it represents nine because of one of the following two reasons. There are two legends regarding *ratna* (jewel) in the *paurāṇika* tradition. Legend one is that there are nine precious stones such as *muktā* (pearl), *māṇikya* (ruby), *vaiḍūrya* (chrysoprasus), *gomeda* (beryl), *vajra* (diamond), *vidrūma* (coral), *padmarāga* (jacinth), *marakata* (emerald), and *nīla* (sapphire). According to second legend there were nine scholars, who handled philosophy and arts, in the court of the king Vikramāditya. There were Dhanvantari, Kṣapaṇaka, Amarasimha, Śaṅku, Vetālabhaṭṭa, Ghaṭakarpara, Kālidāsa, Varāhamihira, and Vararuci (Mani, 1975, p. 536).

Out of these six object-numerals, *bhakti*, *rasa*, and *ratha* are not in both Kapadia's collection and Shukla's compilation.

### 3.10 Object-numerals denoting zero

Today zero is denoted by 0. It was also once denoted by dot (·) in India (Datta & Singh, 1935, p. 78; Pingree, 2003, p. 140). Since *anusvāra*, i.e., which is transliterated as *ṃ*, is a diacritic dot employed in a number of Indic scripts to mark a type of nasal sound and *bindu* is a term meaning 'point' or 'dot', each of *anusvāra* and *bindu* denotes 0. Since sky is empty, *gagana* (sky) represents 0. Since *nāsti* means

non-existence, it refers to 0. *Pūrṇa* means 'the full [moon]', i.e., a dot in the sky (Pingree, 2003, p. 139). Hence it is a symbol of 0. Since *śūnya* means empty, it denotes 0.

Each of *anusvāra* and *nāsti* is not in both of Kapadia's collection and Shukla's compilation. *Bindu* has come in Shukla's compilation as *vindu*.

## 4 Concluding remarks

Kannāḍa literature has evolved over three broad periods: classical (ninth century to 1250 CE), medieval (1250–1500 CE), and modern (1500 CE onwards). Kannāḍa of the medieval period is reflected in the poetry of Śaiva and Liṅgāyata authors (Kittel, 1894, pp. 3–4; Mugali, 2006, p. 179). Nijaguṇa Śivayogī too appears to have belonged to the medieval period. During the classical period, Kannāḍa has borrowed many words from Sanskrit, either in their true form or in the form in which Sanskrit terms changed to suit the tongue of the Kannāḍa people (Kittel, 1894, p. 14). Since all the fifty-nine object-numerals referred to by Nijaguṇa Śivayogī are in Sanskrit, he seems to have flourished during the early medieval period. But on this basis alone, it cannot be said with certainty in which early part of the medieval period he flourished.

We have seen that he refers to both the list of decimal place-names and the list of object-numerals under the heading *ganīta-saṅjñe* in the *Viveka-Cintāmaṇi*. It cannot be said with certainty that he himself coined the term *ganīta-saṅjñe* or it was in vogue in Kannāḍa prior to him. *Ganīta-saṅjñe* can be interpreted freely as 'numeric-indicatives' whereas it means 'reckoning-terminology' or 'mathematical notations' if formally translated.

The sub-topic 'Business-activities' under which he refers to the list of fifty-nine object-numerals in the *Viveka-Cintāmaṇi* deserves great attention here, especially with the support of the information, culled by Foulkes, that it was the duty of the business community to get acquainted with the object-numerals in use among the merchants. All this clearly communicates that object-numerals were used in the Indian business community. It is important in the sense that no report other than this, so far as the present author knows, reads that object-numerals were used in the Indian business community.

Each of the fifty-nine object-numerals he refers to is a bearer of profound thought that developed in ancient Indian society from the vedic, *paurāṇika*, epic, Jaina or *Āyurvedika* culture. Some of them such as *vararatna* (3), *haravaktra* (5), *artha* (6), *rājyāṅga* (7), *sabhāṅga* (7), *anusvāra* (0), *nāsti* (0), etc. are unusual as their use in ancient and

<sup>2</sup> Available at [https://en.wikipedia.org/wiki/Ratha\\_\(architecture\)](https://en.wikipedia.org/wiki/Ratha_(architecture)). Accessed on June 10, 2019.



medieval Indian mathematics and astronomy has not yet been reported.

**Acknowledgements** For valuable suggestions, the present author is grateful to the referee of this paper and the editor of this journal.

## References

- Apte, V. S. (1893). *The student's English-Sanskrit dictionary*. Mrs. Radhabai Atmaram Sagoon.
- Bhargava, M. L. (1964). *The geography of Rgvedic India*. The Upper India Publishing House Ltd.
- Cappeller, C. (1891). *Sanskrit-English dictionary*. Strassburg.
- Caturvedī, M. (Ed.). (1998). *Siddhānta-śiromaṇi of Bhāskara II (with his autocommentary Vāsanābhāṣya & Vārttika of Nṛsiṃha Daivajña)*. Sampurnanand Sanskrit University.
- Dalal, R. (2014). *Hinduism: An alphabetical guide*. Penguin Books.
- Daniélou, A. (1995). *The Phallus: Sacred symbol of male creative power*. Inner Tradition/Bear & Co.
- Dasgupta, S. (1922). *A history of Indian philosophy (Vol I)*. Motilal Banarsidass.
- Datta, A. (Ed.). (1988). *Encyclopaedia of Indian literature: Devraj to Jyoti (Vol. 2)*. Sahitya Akademi.
- Datta, B. B., & Singh, A. N. (1935). *History of Hindu mathematics (Part I)*. Motilal Banarsidass.
- Foulkes, T. (1860). *A synopsis of Hindu systems and sects*. (Translated from the Tamil). Williams and Norgate.
- Ghosh, M. (Ed. and Tr.). (1961). *Nātyaśāstra of Bharatamuni (Vol. II, Chapter XXVIII–XXXVI)*. The Asiatic Society.
- González-Reimann, L. (1989). The ancient Vedic dice game and the names of the four world ages in Hinduism. In A. F. Aveni (Ed.), *World Archaeoastronomy* (pp. 195–202). Cambridge University Press.
- Gopal, M. (1990). *India through the ages*. Ministry of Information and Broadcasting, Government of India.
- Haberman, D. L. (2001). *Acting as a way of salvation*. Motilal Banarsidass.
- Harshananda, S. (2008). *A concise encyclopaedia of Hinduism: 3 Vols.* Ramakrishna Math.
- Jadhav, D. (1998). Saṅkhyā sāta kā vaidika mahatva. *Rasaraṅga* (Sunday supplement of daily Indian Hindi newspaper *Dainika Bhāskara*), 3.
- Jadhav, D. (2019). On word-numerals in Nāgavarma's Canarese Prosody. *International Journal of Jaina Studies*, 15(3), 1–21.
- Jadhav, D., & Jain, A. (2016). Combinatorics as found in the *Gommaṭasāra* of Nemicandra. *Indian Journal of History of Science*, 51.2(1), 190–205.
- Jaini, J. L. (Ed. and Tr.). (1927a). *Gommaṭasāra (Jīvakāṇḍa) of Nemicandra*. The Central Jaina Publishing House.
- Jaini, J. L. (Ed. and Tr.). (1927b). *Gommaṭasāra (Karmakāṇḍa) of Nemicandra (Part I)*. The Central Jaina Publishing House.
- Kapadia, H. R. (Ed.). (1937). *Gaṇitātīlaka of Śrīpati*. Oriental Institute.
- Kittel, F. (Ed. and Tr.). (1875). *Nāgavarma's Canarese Prosody*. Basel Mission Book and Tract Depository.
- Kittel, F. (1894). *A Kannada-English dictionary*. Basel Mission Book and Tract Depository.
- Lochtefeld, J. G. (2002). *The illustrated encyclopedia of Hinduism*. The Rosen Publishing Group.
- Mani, V. (1975). *Purāṇic encyclopaedia*. Motilal Banarsidass.
- Mugali, R. S. (2006). *The heritage of Karnataka*. Lightning Source Inc.
- Padmavathamma, K., & Prakash, K. G. (Eds. and Trs.). (2013). *Śrī Rājāditya's Vyavahāraṅgaṇita and Līlāvati*. Padmavathamma.
- Pingree, D. (2003). Zero and the symbol for zero in early sexagesimal and decimal place-value systems. In A. K. Bag & S. R. Sarma (Eds.), *The Concept of Śūnya* (pp. 137–141). Indira Gandhi National Centre for the Arts, Indian National Science Academy and Aryan Books International.
- Prabhupāda, A. C. B. S. (Tr.). (1986). *Bhagavad-gītā as it is*. Bhaktivedanta Book Trust.
- Randel, D. M. (2003). *The Harvard dictionary of music* (4th ed.). Harvard University Press.
- Rangacharya, M. (Ed. and Tr.). (1912). *Gaṇita-sāra-saṅgraha of Mahāvīrācārya*. The Government of Madras.
- Rice, E. P. (1921). *A history of Kanarese literature*. Association Press.
- Sangave, V. A. (2001). *Facets of Jainology: Selected research papers on Jain society, religion, and culture*. Popular Prakashan.
- Sarma, K. V. (2003). Word and alphabetic numerical systems in India. In A. K. Bag & S. R. Sarma (Eds.), *The concept of śūnya* (pp. 37–71). Indira Gandhi National Centre for the Arts, Indian National Science Academy and Aryan Books International.
- Sarma, S. R. (2012). The *Kaṭapayādi* system of numerical notation and its spread outside Kerala. *Revue D'histoire Des Mathématiques*, 18, 37–66.
- Sastri, Pt. A. S. (Ed.). (1944). *Tattvārthasūtram of Umāsvāmi*. Government Oriental Library.
- Śāstrī, Pt. H. (Ed.). (1998). *Amarakoṣa of Amarasīṅha*. Chowkhamba Sanskrit Series Office.
- Sharma, P. V. (1993). *Essentials of Āyurveda (Text and translation of Śoḍaśāṅgaḥṛdayam)*. Motilal Banarsidass.
- Sharma, V., & Chaudhary, A. K. (2014). Concepts of Dhātu Siddhānta (theory of tissues formation and differentiation) and Rasāyana; probable predecessor of stem cell therapy. *AYU*, 35(3), 231–235.
- Shivalingaiah, G. A. (Ed.). (1989). *Śrīmannijaguṇa Śivayogi viracita Viveka-cintāmaṇi*. Śivakavi Prakāśana.
- Shukla, K. S. (Ed.). (1986). *Vaṭeśvara-siddhānta and Gola of Vaṭeśvara (Part I)*. Indian National Science Academy.
- Siddhashrama, B. P. (1990). *The metaphysics and the mysticism of Sri Nijaguṇa Śivayogi* (Doctoral thesis submitted in 1990). Bangalore University.
- Wijayatno, W. (2003). Sengkalan: Mystery of words and forms. *The Jakarta Post* (Daily English Indonesian Newspaper). <https://jawawa.id/newsitem/sengkalan-mystery-of-words-and-forms-1447893297>
- Wilson, H. H. (1912). *Vishnupuranam*. The society for the resuscitation of Indian literature.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

