

A Philological Note on *Koṇa*

Ramkrishna Bhattacharya*

Pavlov Institute, Kolkata, India

*Corresponding Author: Ramkrishna Bhattacharya, Pavlov Institute, Kolkata, India.

ABSTRACT

The word, *koṇa*, does not stand for 'angle' (as it normally does today in many north Indian languages), but simply means 'corner'. Thus *pañcakoṇa* in *Mnava Śulbasūtra*, 10.3.7.6 suggests a five-cornered figure. There was no concept of angles and their measurement by degrees in ancient India.

Geometry was born in India first as a handmaiden of rituals involving piling of bricks. The Śulbasūtras testify to this fact. Neither geometry nor mensuration were involved in other sacrificial rites but only in the case of Soma Yāga. There is however, a mention of a brick-built altar in the *Kaṭha Upaniṣad* (1.1.14) called *Nāciketa*: "Death [Yama] told him [Naciketas] of the Fire that is the source of the world, the class and number of bricks, as also the manner of arranging for the fire" (Trans. Swami Gambhirananda). This *Nāciketa* Agni is also mentioned in *Baudhāyana Śrautasūtra*, 19.6 (qtd. in Kulkarni, 1987, p. 158 n3). The brick-built altars were a must, although, in practice, avoidance of brick-making and - piling was not only in vogue but also. Thus, Śaṅkarācārya's commentary on the *Brahmasūtra*, 3.44-52 speaks of bricks made of mind, that is, no actual bricks are employed. Another way of avoidance was *chanda* or metre-built altars. Only the *mantras* (magic spells) to be uttered during the piling of the bricks were pronounced but no mud-brick was actually employed. Geometry (or rather proto-geometry) was born again, after a long gap, as a handmaiden of astronomy. Although Euclid's *Elements* was known in its Arabic version to the Muslim scholars in India during the Mughal Emperor Akbar's times, there is no evidence that any non-Muslim astronomer or geometer was acquainted with it before 1658. It was in this year that Kamalākara composed his treatises on astronomy *Siddhānta-tattva-viveka* which mentions Euclid's work (Datta and Singh 1983, 125-126).

Samrād Jagannātha was the first to translate Euclid, not from the original Greek but from its Arabic rendering by āl-Tusi (see R.

Bhattacharya 2003). In the Sanskrit translation, 'angle' was named *koṇa*.

Koṇa, it has been suggested, is the degenerated form of *karṇa* in Prakrit, not a word borrowed from Greek (cf. *gonen*) (Datta and Singh 1983, 128). Datta and Singh admit that the classification ofilaterals, such as *sama-tribhuja*, *dvisama-tribhuja*, and *viṣama-tribhuja* is made on the basis of the sides (called *bhuja*, *bāhu*, etc., all meaning 'arm'); not in terms of angles as in Greek geometry (1983, 129). Similarly, quadrilaterals are named *caturbhuja*. In the Śulba tradition *asra* is used in place of *bhuja*. Interestingly enough the isosceles triangle is known by its form as found in the chariot, the forepart of the shafts, is called *Praūga* (<*pra-yuga*). *Jyā*, *koṭi-jyā*, *utkrama-jyā* are functions of an arc of a circle but not of an angle (Datta and Singh 1983, 39). It should be noted that *jyā* means a bow-string, and the arc is called *dhanu* or *cāpa*, bow. *Jīva*, *siñjinī*, *guna*, *maurvī* and all other synonyms of *jyā* stand for the chord of an arc (1983, 40)

Datta and Singh's assertion that *asra* (or *aśra*) ordinarily means 'corner' or 'angle' in compound names for the rectilinear figures, but sometimes found to denote 'side' (1983, 128-129), does not appear to be correct, for there is no second meaning of *koṇa* excepting 'corner' in the Śulba tradition. The word, *koṇa*, does not stand for 'angle' (as it normally does today in many north Indian languages), but simply means 'corner'. The word occurs only once in the *Mānava Śulbasūtra*, 10.3.4.8 and in no other Śulba text. Thus *pañcakoṇa* and *trikoṇa* in *Mānava Śulbasūtra*, 10.3.7.6 suggest a five-cornered and three-cornered figure respectively. Accordingly, van Gelder renders the verse as

A Philological Note on *Koṇa*

follows, 'in the second (layer) there shall be twenty-four bricks more; and on the junctions of the rim and the spokes bricks with *five ad three corners*' (1963, 314. Emphasis added). Sen and Bag, too, opted for 'five-cornered and three-cornered' (1983, 145, section 16.6).

Thus, *there was no concept of angles and their measurement by degrees in ancient India*. Monier-Williams records the meaning of *koṇa* (masculine) 'a corner, angle,' but refers to no geometrical text but to a book of stories, Viṣṇu-śarman's *Pañcatantra*. Besides this too Monier-Williams records several other meanings, such as fiddle-stick, drum-stick, (hence) the number 'four,' etc. but they do not concern us here. All Sanskrit lexicons (Sanskrit-English, -French and -German available in the Cologne/Koeln collection) tell the same story, namely, *koṇa* came to mean 'angle' in much later times when India came to know of Euclidean geometry. Angle-Geometry is essentially Greek (as Solomon Gandz 1929, 473 pointed out long back). On the other hand, the Śulba geometry as also astronomy that emerged later were essentially Side-Geometry.

ACKNOWLEDGEMENT: Sourav Basak, Amitava Bhattacharyya, Soumyadeep Ghosh. The usual disclaimers apply.

REFERENCES

- [1] Bhattacharya, Ramkrishna. 2003. Euclid, al-Tusi, Samrat Jagannatha: How the *Elements* Came to India. *Indo-Iranica* (Kolkata). Vol. 54, Nos. 1-4, 65-72.
- [2] Datta, B. B. and Singh, A. N. 1983. *Hindu Trigonometry* (Revised by K. C. Shukla). *Indian Journal of History of Science*, 18(1), 39-108.
- [3] Gandz, Solomon. 1929. The Origin of Angle-Geometry, *Isis*, 12(3), 452-481.
- [4] *Brahma-sūtra-bhāṣya* by Śrī Śaṅkarācārya. 1996. Trans. Swami Gambhirananda. Calcutta: Advaita Ashrama.
- [5] Gelder, Jeanette M. (trans.). 1963. *The Mānava Śrautasūtra*. New Delhi: International Academy of Indian Culture.
- [6] *Kaṭha Upaniṣad, in Eight Upaniṣads*, with the commentaries of Śaṅkarācārya. 1996. Volume 1. Calcutta: Advaita Ashrama.
- [7] Kulkarni, R.P. *Cār Śulbasūtra* (with Hindi translation). Ujjain: Maharshi Sandipani Veda Vidya Pratishthan, 2003.
- [8] Monier-Williams, Monier. 1899/2002. *A Sanskrit English Dictionary*. Delhi: Motilal Banarsidass.
- [9] Sen, S.N. and A.K. Bag. 1983. *The Śulbasūtras*. New Delhi: Indian National Science Academy.
- [10] Koeln Sanskrit Lexicon - Universität zu Köln
- [11] www.sanskrit-lexicon.uni-koeln.de

Citation: Ramkrishna Bhattacharya. "A Philological Note on *Koṇa*", *International Journal of Research in Humanities and Social Studies*, 7(9), 2020, pp. 31-32.

Copyright: © 2020 Ramkrishna Bhattacharya. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.