

The German mathematician Van der Waerden (1961) opines that the symbol of zero as a small circle came from the first letter “o” of the Greek word *ouden* meaning nothing. This claim can be compared with a parallel claim (apparently convincing but far from the truth) that four in Brahmi Numerals written as 𑀓 comes from the first letter 𑀓 of the word 𑀓𑀲 (our four in English). Similarly in India one may say that the symbol ५(5) in Deonagri script comes from the first letter of the word 𑀧𑀲𑀓𑀲𑀓𑀲 (five), 𑀧𑀲𑀓𑀲𑀓𑀲𑀓𑀲 (6) in Deonagri comes from the first letter of the word 𑀧𑀲𑀓𑀲𑀓𑀲𑀓𑀲𑀓𑀲 (six). But these are not so. Every number symbol has a heritage and a path through which it has come down to its present form. That “o” is the first letter of the word is just a coincidence. Rather the symbol of a small circle (o) was used for the numbers 10, 70, and 100 in Greece.

1	◊
2	𑀓
3	𑀓𑀲
4	𑀓𑀲𑀓
5	𑀓𑀲𑀓𑀲
6	𑀓𑀲𑀓𑀲𑀓
7	𑀓𑀲𑀓𑀲𑀓𑀲
8	𑀓𑀲𑀓𑀲𑀓𑀲𑀓
9	𑀓𑀲𑀓𑀲𑀓𑀲𑀓𑀲
10	◊●

See Also

► [Bakhshālī Manuscript](#)

References

- Bag, A. K. (1970). Symbol for zero in mathematical notation in India. *Boletín de la Academia Nacional de Ciencias*, 48, 251.
- Bloomfield, M. (Ed.). (1899). *Atharvaveda*. Strasbourg, France: K. J. Treubner. Rpt. 1971.
- Bose, D. M. (Ed.). (1971). *A concise history of science in India*. New Delhi, India: Indian National Science Academy.
- Datta, B., & Singh, A. N. (1935). *History of Hindu mathematics* (Vol. 1). Lahore, Pakistan: Motilal Banarsi Das.
- Kaye, G. R. (1927–1933). *Bakhshālī manuscript. A study in mediaeval mathematics*. Calcutta, India: Government of India
- Van der Waerden, B. L. (1961). *Science, awakening*. Oxford, UK: Oxford University Press.

Zeroism

C. K. Raju
Centre for Studies in Civilizations, New Delhi,
India
Al-Bukhari International University, Alor Setar,
Malaysia

Zeroism is an alternative philosophy of mathematics (Raju, 2007), based on *śūnyavāda*, a realistic philosophy often ascribed to the Buddhist teacher Nagarjuna (2nd c. CE). It is now called zeroism to emphasize that the concern is with the practical and contemporary benefits of that *śūnyavāda* philosophy, as distinct from fidelity to an interpretation of the textual sources of *śūnyavāda*, which have often been misunderstood and mangled by scholars unfamiliar with the idiom. Indeed, the whole idea of relying on the authority of textual sources is a practice of scriptural traditions and contrary to *śūnyavāda*, which denies the validity of proof by authority.

Zeroism is a realistic philosophy which accepts universal practical procedures in mathematics and rejects, as erroneous and culturally biased, the formalist (or idealist) attempt to understand mathematics as metaphysics. (Formalism is the philosophy underlying mathematics as taught in schools and colleges today.)

To understand how the West came to the peculiar conclusion that mathematics is metaphysics, we need to go back all the way to Plato. In Plato's story of Socrates and the slave boy, Socrates first elicits the boy's innate knowledge of mathematics and then declares that he has proved the existence of the soul! (His argument is that since the slave boy did not learn mathematics in this life, his innate knowledge of mathematics proves that he learnt it in a previous life.) Indeed, "mathematics" derives from *mathesis*. Though *mathesis* just means "learning," Plato had a special understanding of "learning," and stated that "all learning is recollection" – of the knowledge the soul had acquired in its previous lives but has forgotten since its birth. This belief in the previous lives of the soul was based on the belief in quasi-cyclic time. (See article on "► Time".) With a quasi-recurrent cosmos, rebirth takes place in successive cycles of the cosmos. Not only are humans reborn, but all events repeat approximately, so it is indeed natural to suppose that memories too commence afresh. *Mathesis* then becomes a mysterious way to arouse and bring back those lost memories of previous lives in a previous cycle of the cosmos. Proclus (1970) believed that mathematics (and not geography, for instance contains eternal truths and is best suited to arouse the eternal soul.)

This notion of the soul and its previous lives ran afoul of the church, which cursed it in the sixth century, when it also banned mathematics and philosophy from Christendom (Raju, 2003). The Western understanding of mathematics changed further in the twelfth century, during the Crusades, when the church accepted back mathematics, but reinterpreted it as concerned not with arousing the soul but with rational persuasion or metaphysical proofs. Nonetheless, the belief that mathematics contains eternal truths lingered on. Indeed, Aquinas claimed that God ruled the world with eternal laws of nature, and it came to be believed that those laws were hence written in the language of mathematics (since mathematics was believed to contain eternal truths).

This belief in eternal truths led to the related belief in the "perfection" of mathematics; any imperfection was bound to be exposed during eternity! As Berkeley (1734) put it "It is said,

that the minutest Errors are not to be neglected in Mathematics." The belief in perfection led to the rejection of the empirical in Western mathematics. Indeed, Plato deprecated the empirical world as inferior, and Westerners came to believe that this perfection of mathematics could only be achieved through metaphysics, which gave a higher form of truth than empirical truth. It is still believed, on Tarski-Wittgenstein semantics, that empirical truths are contingent truths (true in some possible worlds), weaker than mathematical truths, which are necessary truths (true in all possible worlds), relative to the axioms. Consequently, the present-day philosophy of formalism still supposes that mathematics (being a higher form of truth) must be 100 % metaphysics. The number 2 is today defined solely with reference to Peano's axioms and *not* ostensibly by pointing to 2 oranges, 2 dogs, etc.

All these beliefs are in sharp contrast to zeroism. To begin with, how do we know that there are any eternal truths? Like science, zeroism admits only two means of knowledge: *pratyakṣa* or the empirically manifest and *anumāna* or inference. Totally contrary to the belief in eternal truths, it is manifest that nothing persists unchanged for even two instants. This is often wrongly called the Buddhist doctrine of flux. It is, however, not a doctrine but a simple observation, repeated thousands of times each day. Those who claim the existence of something (such as the soul) which stays constant and unchanged across time need to prove its existence. This has never been done. Thus, this *śūnyavāda* denial of the soul (*anātmavāda*) is fundamentally different from the church curse on "cyclic" time which sought to dictate the nature of the physical cosmos on doctrinaire and political grounds. All that is denied in *śūnyavāda* is the continuation of an unchanged identity from one instant to the next, and this is done solely on grounds of observation and absence of any proof for the existence of something unchanged.

Denying the continuation of identity may seem counterintuitive since our thinking involves language, and the belief in persistence of identity is part of natural language. Thus, the simple statement "When I was a boy," suggests the