Indic thought and contemporary science

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Abstract:

The Nyaya sutra lists four means of proof: प्रत्यक्ष (empirically manifest), अनुमान (inference), उपमान (analogy) and शब्द (testimony, authority). All Indian thought accepted प्रत्यक्ष, and the world's first recorded use of the experimental method was by Payasi, to try to refute the belief in life after death. अनुमान, or reasoning, was used e.g. to *infer* from local observations that the earth is round, and to calculate its radius. गणित, too, accepted empirical proofs (in addition to reasoning), but analogy was restricted to pedagogy, and authority was used only by the less knowledgeable. Buddhists and other nastik-s rejected analogy and authority as unreliable. Thus, Indian thought accepted the empirical, but regarded analogy and authority as weak means of proof.

That *seems* similar to contemporary science which too is notionally based on observation and experiment, and supposedly rejects authority. In practice, however, current methods of validating science make heavy (and secretive) use of authority and social acceptance. More fundamentally, science today uses **formal** mathematics; it is little understood that **formal mathematics prohibits the empirical**, hence **forces systematic** reliance on authority (=Western शब्द प्रमाण). That enables superstitions to creep into science in a way which **is fatal to the core of Indic thought.**

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Extended Abstract

Science begins with observation and experiment. The notion of proof in the Nyaya Sutra 2[1] too starts with pratyakhsa (प्रत्यक्ष, or the empirically manifest) as the first means of pramana (प्रमाण, proof).. While there were disagreements over the notion of pramana, pratyaksha was the one means of pramana accepted by ALL Indian philosophical schools of thought. The first recorded account of the use of experiments is by Payasi[2] who used the experimental method to try and refute the belief in life after death.[3] This fact is in sharp contrast to the usual excessively chauvinistic Western claim that Francis Bacon "discovered" the experimental method,[4] 2000 years later. In fact, the corrupt Bacon was so superstitious he laughably stated,[5] "the word of God [Bible] ...[is] the surest medicine against superstition"!

The 2nd means of pramana in Nyaya-Sutra 2, is anumana (अनुमान, inference). This refutes the other wild Western misrepresentation of Indian thought that the use of empirical excluded the use of reasoning. It did not, any more than it does in science. A concrete example is the deduction (Gola 6)[6] that the earth is round (गोल) inferred from the **observation** that far off trees cannot be seen, no matter how tall (Lalla, 20-36).[7] This was used to calculate the radius of the earth a figure found in many Indian mathematical texts.[8] (Aryabhata went further and inferred that the earth rotates, not the celestial sphere, Gola 9-10.) In contrast, the Bible (Vulgate, almost contemporary with Aryabhata) authoritatively asserts[9] that a tall tree CAN indeed be seen from the "end of all earth". Ptolemy (12th c. text) says the earth does not move, after beginning by paraphrasing Indian debate on earth rotation.

Upamana (उपमान, analogy) was used as in Aryabhata's statement (Gola 7) that the earth is *like* a kadamba flower. In contemporary science, analogy is used as in using a "perfect fluid" in general relativistic cosmology. (Because GRT is due to Hilbert, not Einstein.[10] Hilbert a mathematician, cared about geometry, not the characterization of matter. Hence, GRT has geometry but no serious characterization of matter, and relies on the analogy with fluid dynamics and e.g. geodesic hypothesis used for motion of matter.)

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1 Satish Chandra Vidyabhushana, *The Nyaya Sutras of Gotama* (Allahabad: Pāninī Office, 1913).

2 दीघनिकाय, Hindi trans. Rahul Sankrityayan, Parammitra Prakashan, Delhi 2002. See also, T. W. Rhys-Davids, trans., *Dialogues of the Buddha*, vol. 2, London, 1910, pp. 346–74. Reprinted by the Pali Text Society, *Sacred Books of the Buddhists*, vol. 2, ed. F. Max Muller, Routledge and Keagan Paul, London, 1977. Reproduced in *Cârvâka/Lokâyata: An Anthology of Source Materials and some Recent Studies*, ed. Debiprasad Chattopadhyaya and Mrinal Kanti Gangopadhyaya, ICPR, New Delhi, 1990, pp. 8–31. See, further, Maurice Walshe, *The Long Discourses of the Buddha: A Translation of the Dîgha Nikâya*, Wisdom Publications, Boston, 1995.

3 C. K. Raju, *The Eleven Pictures of Time: The Physics, Philosophy and Politics of Time Beliefs* (Sage, 2003) chp. 1.

4 C. K. Raju, 'Did Indians Have Scientific Temper?', *ThePrint, India*, 31 March 2019, https://theprint.in/opinion/do-indians-have-a-scientific-temper-ancient-texts-reveal-we-did-way-before-the-west/214767/.

5 In *Novum Organum*, p. 89. *The Works of Francis Bacon*, ed. J. Spedding et al, vol 4, Translations, Longman, London, 1858,

6 Āryabhaţa, *Āryabhaţīya of Āryabhaţa*, ed. K. S. Shukla and K. V. Sarma (Delhi: Indian National Science Academy, 1976).

7 Lalla, शिष्यधीवृद्धिद, ed. Bina Chatterjee (Delhi: Indian National Science Academy, 1981).

8 For the easy methodology, see C. K. Raju, *Cultural Foundations of Mathematics: The Nature of Mathematical Proof and the Transmission of Calculus from India to Europe in the 16th c, CE* (Pearson Longman, 2007) chp. 4.

9 Daniel 4:10-11: 10 ...I saw, and behold a tree in the midst of the earth, and the height thereof was great. 11 The tree grew, and was strong, and the height thereof reached unto heaven, and the sight thereof to the end of all the earth:

10 Raju, *The Eleven Pictures of Time: The Physics, Philosophy and Politics of Time Beliefs 'In* EEinstein's shadow'.

Lastly shabda pramana (शब्द प्रमाण, reliable testimony) used e.g. in Manava sulba sutra 10.10. Rejected as unreliable by all nastik (नास्तिक)[11] schools of Indic thought, but it permeates contemporary science.[12] Science valued on publication and social acceptance ("citation index"), i.e., **reputability** ("impact parameter", "published in "Nature"), not Popper's refutability. "Truth" in contemporary science (and related funding) are decided by the technique of **secretive** refereeing, a technique invented by the church to help preserve church superstitions.

However, there is an even more central (and less obvious) issue which systematically enables Western superstitions to creep into science. Mathematics is needed for science, but contemporary science uses formal math NOT normal math or ganita. (E.g. "quantum field theory needs operator-valued tempered distributions", etc.) It seems poorly known that formal mathematical proof PROHIBITS the empirical.[13] This method of axiomatic proof by **prohibiting** the empirical, though purportedly from Greeks, such as "Euclid", was never used by any Greeks and is not found in even the "Euclid" book.[14] (This is now publicly accepted by the West for over a century, though the Euclid myth persists with shoddy historians and in our school texts.) Axiomatic proof actually originates from the political compulsions of the Crusading church[15] to use reason to justify its dogmas, to contest the Islamic theology of reason (aql-i-kalam, अक्ल-इ-कलाम). The church could accept reason only by first prohibiting facts (or pratyaksh); that enabled it to reason about unreal entities such as angels etc. Obviously, prohibiting the empirical, as done in formal math, bodes ill for science.

Colonialism globalised formal math. The axioms of "modern math" are pure metaphysics (=non-physics=unreal) in a Popperian sense. Hence, their truth can *only* be decided by authority, not pratyaksh or experiment. Therefore, their consequences, i.e., mathematical theorems, are usually not true in the real world. E.g. "Pythagorean theorem" is at best approximately true, as asserted by Bhaskar 1.[16] (While ganita accepts inexactitude or "approximations", formal math claims to be exact, which is never true in the real world.) Many theorems such as the Banach-Tarski theorem are wholly untrue, in the real world. However, it gives power to the West: axioms of "modern math" are all laid down by Westerners, and the "truth" of mathematical theorems can only be decided by reliance on Western shabda pramana.[17] That is, formal math enables the West to control mathematical knowledge. The grossest example of the resulting creep of Western superstitions into science is the award of the physics Nobel prize to Penrose for singularity theory.[18]

Because of colonialism, this slavish criterion of Western social acceptance is still predominant even among those who claim to be champions of Indic thought. Hence, it must be emphasized that **formal math destroys the core of Indic thought**. Thus, the issue about calculus is not merely that Indians did it first, or even that the West might eventually accept that claim, but the use of "real" numbers in calculus.[19] Since the equations of physics are differential equations which require calculus, that metaphysics from formal math forces time in physics to be superlinear, "without regard to anything external"![20] This superstition in science was fatal not only to Newtonian mechanics, but is fatal to the requirement of quasi-cyclic time central to Indic thought.[21] But our champions of Indic thought are often more interested only in a pat on the back from the West, hence do not confront the master or the colonial teaching of math.

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11 नास्तिक, ≠ atheist, a Eurocentric mistranslation.

12 C. K. Raju, *Ending Academic Imperialism: A Beginning* (Penang: Citizens International, 2011).

13 C. K. Raju, 'Computers, Mathematics Education, and the Alternative Epistemology of the Calculus in the Yuktibhāṣā', *Philosophy East and West* 51, no. 3 (2001): 325–62, http://ckraju.net/papers/Hawaii.pdf; C. K. Raju, 'Decolonising Mathematics', *AlterNation* 25, no. 2 (2018): 12–43b. https://doi.org/10.29086/2519-5476/2018/v25n2a2.

14 C. K. Raju, '"Euclid" Must Fall: The "Pythagorean" "Theorem" and the Rant of Racist and Civilizational Superiority - Part 2', *Arumaruka: Journal of Conversational Thinking* 1, no. 2 (2021): 57–105, https://doi.org/10.4314/ajct.v1i2.5.

15 C. K. Raju, "The church origins of (axiomatic) math". https://tinyurl.com/axiom-math.

16 Bhaskar, *Bhaskar I and His Works, Part III: Laghu Bhaskariya*, ed. K. S. Shukla (Department of Mathematics and Astronomy, Lucknow University, 1963).

17 C. K. Raju, "Why axiomatic math is racist", https://tinyurl.com/axiom-math-r.

18 C. K. Raju, 'A Singular Nobel?', *Mainstream* 59, no. 7 (30 January 2021), http://www.mainstreamweekly.net/article10406.html.

19 C. K. Raju, 'California, Indian Calculus and the Technology Race. 2: Don't Cancel the Calculus, Make It Easy!', *Boloji.Com*, 24 December 2021, https://tinyurl.com/ckr-calc2.

20 C. K. Raju, *Time: Towards a Consistent Theory* (Kluwer Academic (Springer), 1994).

21 Raju, *The Eleven Pictures of Time: The Physics, Philosophy and Politics of Time Beliefs*.