Abstract for spl, lecture, Natn'l seminar on "Kashmir philosophers and the Indian knowledge system",
Kashmir Univ., Srinagar, 5 July 2022.

Is math universal?

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Abstract.

Much has been written about Kashmir Saivism and Sufism. But what is the Kashmiri philosophy of math? This is found in current *practice*: the philosophy on which all universities and schools in Kashmir teach math. That is just the Western philosophy of formal math, copied *in toto*.

This philosophy of formalism, though globalised by colonialism, is certainly NOT universal: the traditional Indian philosophy of गणित is different.[1] A clear difference is this: as in the definition of proof in the Nyaya Sutra 2,[2] traditional Indian गणित accepted empirical proof (प्रत्यक्ष प्रमाण),[3] while formalism PROHIBITS the empirical.[4] Though most school math today is historically of Indian origin,[5] it was misunderstood[6] when misappropriated[7] in the West. But that misunderstanding was returned as "superior" during colonialism, and is what is taught today worldwide.

This aspect of formalism (prohibiting the empirical) is very little **understood**: few can explain why Bertrand Russell needed 378 pages to formally prove 1+1=2, or what is there on that p. 378 of his *Principia*.[8] With 1 regarded as a formal "real" number, not a cardinal, the proof is even longer. To publicly demonstrate this lack of understanding of formalism, I offered a prize of Rs 10 lakhs in JNU[9] for my "Cape Town challenge": an axiomatic proof of 1+1=2 in formal reals, from first principles, straight from the axioms, and without assuming any theorem from axiomatic set theory. No one claimed the prize! Formal math has been accepted as "universal" solely on Western शब्द प्रमाण, without understanding, [10]by declaring as inferior the different philosophy of normal math which was prevalent for most of human history, and by blindly accepting the false Western claim of Greek "superiority",[11] without any attempt to compare the two philosophies to decide which is actually better, and by censoring all attempts to do so.[12]

It has been falsely asserted (Kant et. al) that prohibiting the empirical makes math infallible.[13] On that foolish logic, the empirical (experimental method) ought to be prohibited also in science to get a "superior" science! Actually the prohibition of the empirical reduces formal math to a subjective (Western) metaphysical fantasy (which *never* exactly applies to the real world[14] even when it seems to "work" because the fantasy mimics normal math).

Because prohibiting the empirical allows the unfettered reign of fantasy, the empirical was first prohibited for "superior" reasoning by the church[15] during the Crusades, when it concocted the Christian theology of reason to counter the earlier Islamic theology of reason (aql-i-kalam). This results also in an anti-Islamic metaphysical bias in current (formal) math[16] (the continuum vs atomicity of Asharites) and science[17] (eternal "laws" of nature vs al Ghazali's stress on habits). These biases are blindly accepted and used by Muslims worldwide because of post-colonial Western hegemony.[18] Further, the use of formal real numbers for calculus forces time in physics to be superlinear, regardless of empirical facts, and contrary to the Sufi ethic based on the belief in quasi-cyclic time.[19] But those "philosophers" who think it is right and proper to be ignorant of why 1+1=2 in real numbers are easily fooled by church tricks about math. They will hence stay dominated for ever by the West and church, until their indigenous culture is decimated like so many other cultures were extinguished by the West.

About the author

C. K. Raju was on the editorial board of JICPR, After an MSc in math and a PhD from Indian Statistical Institute, he initially taught math in Univ. of Pune, and was Visiting Professor of Mathematics at the Universiti Sains Malaysia. He applied math to mathematical physics and to practical problems of space, oil, etc. as part of the initial C-DAC team which built the first PARAM supercomputer. He was Professor and Head of India's biggest department of computer science, He was an Editorial Fellow of PHISPC, and twice a Fellow of the Indian Institute of Advanced Study. He has worked extensively on decolonised courses and especially the philosophy of decolonised math. Currently, he is an Honorary Professor at the Indian Institute of Education. For a photo and more details see http://ckraju.net/cv.

1 C. K. Raju, ‘गणित बनाम मैथमेटिक्स [Ganita vs Mathematics]’, *Himanjali* **20**, no. July-December (2020): 34–44. http://ckraju.net/papers/ckr-article-Himanjali-22%e2%80%94Final-18-06-2021.pdf. Or see the video of the seminar at IIAS Shimla: “Ganita vs formal math: an obituary of formal math”, https://youtu.be/0UrMypVN6c0, along with related documentation.

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

3 C. K.. Raju, “Indian notion of proof (in math)”, https://www.youtube.com/watch?v=d85UOuY0DFU.

4 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**.**

5 C. K. Raju, ‘Precolonial Appropriations of Indian Ganita: Epistemic Issues’ (International round table on Indology, IIAS, Shimla, 2020), http://ckraju.net/papers/ckr-indology-abstract.pdf

6 C. K. Raju, ‘Eternity and Infinity: The Western Misunderstanding of Indian Mathematics and Its Consequences for Science Today’, *American Philosophical Association Newsletter on Asian and Asian American Philosophers and Philosophies* **14**, no. 2 (2015): 27-33. http://ckraju.net/papers/Eternity-and-infinity-Pages-from-APA.pdf. For a more recent account, see C. K. Raju, ‘Marx and Mathematics. 4: The Epistemic Test’, *Frontier Weekly*, 8 September 2020,https://www.frontierweekly.com/views/sep-20/8-9-20-Marx%20and%20mathematics-4.html

7 E.g., for misappropriation of the calculus, 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); for recent popular-level articles, see C. K. Raju, ‘California, Indian Calculus and the Technology Race. 1: The Indian Origin of Calculus and Its Transmission to Europe’, *Boloji.Com*, 11 December 2021, https://www.boloji.com/articles/52924/california-indian-calculus; 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://www.boloji.com/articles/52950/california-indian-calculus-and

8 A. N. Whitehead and B. Russell, *Principia Mathematica* (Cambridge University Press, 1927).

9 C. K. Raju, talk at JNU 16 Sep 2020, “Statistics for social sciences and humanities: should we teach it using formal math or normal math?” starting at https://youtu.be/A9Og1k-Z5O4?t=662. Or see the slides starting at http://ckraju.net/papers/presentations/statistics-jnu.html#slide-org948751a.

10 For a quick overview of the difference between pre-colonial normal math which accepted empirical proofs and post-colonial formal math which prohibited them, see, “How colonial education changed our math teaching and what we can do about it today”, https://youtu.be/Rm6d-bUmmGg.

11 NCERT, class IX textbook, “Mathematics”, chp. 5.

12 C. K. Raju, ‘To Decolonise Maths, Stand up to Its False History and Bad Philosophy’, *The Wire*, 2016, https://thewire.in/history/to-decolonise-maths-stand-up-to-its-false-history ; C. K. Raju, ‘Black Thoughts Matter: Decolonized Math, Academic Censorship, and the “Pythagorean” Proposition’, *Journal of Black Studies* **48**, no. 3 (2017): 256–78, https://doi.org/10.1177%2F0021934716688311 ; C. K. Raju, ‘To Decolonise Math Stand up to Its False History and Bad Philosophy’, in *Rhodes Must Fall: The Struggle to Decolonise the Racist Heart of Empire* (London: Zed Books, 2018), 265–70; C. K. Raju, ‘Mathematics, Decolonization and Censorship: C. K. Raju’, KAFILA, 25 June 2017, https://kafila.online/2017/06/25/mathematics-and-censorship-c-k-raju/

13 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, ‘Buddhism and Science: conversation with the Dalai Lama’, 2016, https://youtu.be/SkS1HM6g0O4.

15 The first actual use of axiomatic proof (prohibiting the empirical) is by Aquinas in his angel theorem. Thomas Aquinas, *Summa Theologica*, First Part, Q. 52, article 3. http://www.newadvent.org/summa/1052.htm#article3. For an elaboration of why the church prohibited the empirical, NOT prohibited in Greek math, see C. K. Raju, “The church origins of (axiomatic) math”, https://tinyurl.com/axiom-math.

16 C. K. Raju, ‘Teaching Mathematics with a Different Philosophy. 1: Formal Mathematics as Biased Metaphysics’, *Science and Culture* 77, no. 7–8 (2011): 274–79. arXiv:1312,2099.

17 C. K. Raju, ‘Islam and Science’, in *Islam and Multiculturalism: Islam, Modern Science, and Technology*, ed. Asia-Europe Institute University of Malaya and Japan Organization for Islamic Area Studies Waseda University, 2013, 1–14, http://ckraju.net/hps-aiu/Islam-and-Science-kl-paper.pdf **.** Also: C. K. Raju, ‘Decolonising Mathematics: How and Why It Makes Science Better (and Enables Students to Solve Harder Problems)’, *Palestine Technical University Research Journal* 6, no. 2 (2018): 1–4. https://scholar.ptuk.edu.ps/bitstream/123456789/684/5/2018_%206_2_%20pp1-4%20.pdf. Abstract for keynote which could not be delivered due to Israeli refusal to grant a visa.

18 C. K. Raju, ‘How to break the hegemony perpetuated by the university: decolonised courses in mathematics and the history and philosophy of science (Arabic)’, in *Culturalistion of Humanities: Vision and Experiments. (Proceedings of the International Conference on Culturalization of the Humanities, held in Beirut on 20-21 November 20*18.) (Beirut: Al Maaref University, 2019), 77–114. English version: C. K. Raju, ‘How to Break the Hegemony Perpetuated by the University: Decolonised Courses in Mathematics and the History and Philosophy of Science’, *Studies in Humanities and Social Sciences* **26**, no. 2 (2019): 86–109. http://ckraju.net/papers/Beirut-paper%20for%20iias%20journal.pdf

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