

## History and philosophy of science

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### Extended abstract

The history of science has emerged as a key battleground in India over the past two decades. Nevertheless, surprisingly, there still isn't a single department for its study in the country, and no serious courses are being taught (perhaps because of some deep-seated fear that the truth may not be flattering). I explain why these fears are unfounded, and why history is not just about past glory but also about learning from past mistakes.

Because of the persistent neglect of the subject, Indians have failed to understand the simple Western trick of mixing philosophy with history. Hence, Indians keep repeating the same mistake, and keep making the same wrong claims for decades, without understanding the *purva paksa*. I illustrate this trick using the example of the "Pythagorean theorem in the *sulba sutra*". On Western history, the question is NOT who did it first, but who first did it "correctly", by providing a proof. Since there is no universal notion of proof, this brings in deep questions about the philosophy of *ganita* and how it differs from the philosophy of mathematics, which few historians have cared to address.

More recently, the worldwide battle against racism has led to highlighting of the Western (colonial and racist) rhetoric of Western/White "superiority" in intellectual achievements, by appropriating world knowledge through fabricated claims about Greek and post-renaissance European achievements in science. I illustrate this with the examples of (a) the appropriation of Indian "trigonometry" to Greeks and post-renaissance Europeans, and (b) the appropriation of Nilakantha's "Tyronic" model which is indistinguishable from "Copernicus's" or rather Ibn Shatir's heliocentric model.

The interplay between history and philosophy of science also works in the reverse direction to complete the vicious circle: false myths from history of science, such as "Euclid", or the invention of calculus by Newton and Leibniz, planted in our school texts, are used to misguide a mass of students into accepting an inferior philosophy of mathematics which makes math impossibly difficult. This was declared "superior" (or "normatively universal") just because it involves silly church superstitions, such as the infallibility of deductive or axiomatic proof, and was globalised by colonialism. I explain why it does NOT "work" and has nil value for any practical application of math.

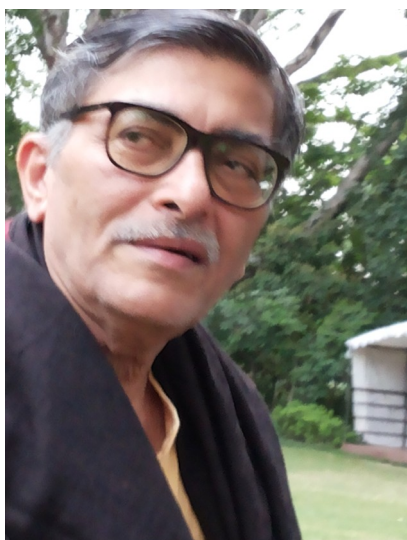
We need to examine this philosophy critically, and compare it with the philosophy of Indian *ganita*, though colonial education discourages critical thinking and instead teaches obedience, lots of interconnected stories without evidence, and blind trust in the West and its propagandist instruments such as Wikipedia.

## Some pre talk questions

- The original Sanskrit word for “angle” is कोण.  
(a) True.  
(b) False.
- The earliest occurrence of the word कोण is in which text?  
(a) The RgVeda  
(b) The Vedanga Jyotish  
(c) The sulba sutra-s  
(d) The Surya Siddhanta  
(e) Bhaskara II’s Lilavati  
(f) Neelkantha’s Aryabhatiyabhashya  
(g) Samrat Jagannatha’s 1723 translation: Rekhaganita.
- The first medicinal texts taught in European universities were those of  
(a) Hippocrates  
(b) Galen  
(c) Ibn Sina  
(d) Susruta
- Which of the following are true? Tick all that apply.  
(a) The **heliocentric** theory is true and the sun is static at the centre of the solar system.  
(b) The **barycentric** model (that the sun and the planets all move around the solar system barycentre) is superior to the heliocentric model.  
(c) Observations support the **galactocentric** model, that the sun and all the planets move around the galactic centre at around 250 km/s.  
(d) Until the 20<sup>th</sup> century, all astronomical theories had to be transformed to a **geocentric** frame to check theory with astronomical observations.

## About the speaker

Professor C. K. Raju holds a PhD from the Indian Statistical Institute, Kolkata, preceded by an MSc in math and BSc (Hons) in physics from Mumbai University. He played a key role in building India’s first parallel supercomputer, the C-DAC Param. In 2010 he received the TGA Award in Hungary, for correcting an error made by Einstein and others.



He has long been a Professor of mathematics and computer science in various universities in India and abroad. An internationally renowned scholar, he has lectured on six continents (see videos of his recent lectures in [Durban](#), [Cape Town](#), [Berlin](#), [Amsterdam](#), [Pretoria](#), [MIT](#), [Lima](#), [Indian Institute of Science](#), [Tehran](#), [Universiti Sains Malaysia](#) etc.).

He has been a Fellow of the Indian Institute of Advanced Study, an Editorial Fellow of the Project of History of Indian Science, Philosophy, and Culture, on the editorial board of *Journal of Indian Council of Philosophical Research*, an affiliated Fellow of Nehru Memorial Museum and Library. Currently, he is Tagore Fellow at the IAS Shimla, and an Honorary Professor of the Indian Institute of Education, etc.

He has advanced several revolutionary ideas. In *Time: Towards a Consistent Theory* (Kluwer Academic, Dordrecht, 1994) he proposed to base physics on functional differential equations with a tilt in the arrow of time. In the *Eleven*

*Pictures of Time* (Sage, 2003) he explained how to connect science and various religions across time beliefs. In *Cultural Foundations of Mathematics* (Pearson Longman, 2007) he amassed evidence for the Indian origin of calculus and related Europeans difficulties in understanding calculus to contrasting philosophies of ganita and mathematics.

He has designed and taught decolonised courses in mathematics (calculus, geometry) and the history and philosophy of science.