

BOOK REVIEW

Mathematics and culture

Implications of philosophy and culture for contemporary mathematics

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This book is a part of the major project undertaken by the Center for Studies in Civilizations, with Professor D.P. Chattopadhyaya as the Chairman of the Governing Body along with eight other distinguished professors. It is Part IV of Volume X (and the 25th published, of 54 planned parts) in the History of Science, Philosophy and Culture in Indian Civilization.

Science, philosophy and culture (or religion) are an eternal braid. The attempt to assimilate the vast amount of literature that is available on "mathematical proof" on the one hand and the "transmission of the calculus from India to Europe in the 16th c. Christian Era (CE)" on the other, to present a cogent and coherent picture in a volume of 477 pages by the author is a commendable effort.

It is interesting to read passages such as the following: "Greek' notion attached a mystical significance to numbers, so that in 16th century Europe a typical challenge problem to the mathematician was "Is unity a number?" Expected answer, 'NO' - unity is not a number! 'Indian' notion has no such hang up. A more subtle problem related to the question non-representable (Sunya, both infinitely large and infinitesimally small, later zero)."

'Math wars'

The author opines that the 'First Math War', during the period 10th to 16th century was between the Abacus and Algorismus methods. The advent of calculus is due to Leibniz and Newton, according to

the prevalent Western lore. The author states that in the 'Second Math War', key results of calculus were in astronomy and mathematics texts of Aryabhata, Bhaskara, Nilakanta, Sankara Variayar, Jyestadeva, and were transmitted from Cochin to Europe by the Jesuit Matteo Ricci. The Indian notion of "Pramana" is different from the European notion of proof, since it permitted the empirical and rounding off procedures. European certitude did not allow the neglect of even the smallest quantity. Dedekind's 19th century did semi-formalisation of real numbers and this led to the set theory of the 20th century, completing thereby the formalisation of real numbers. Thus, a long time elapsed before calculus was

assimilated in India.

The following is a sample of an interesting construct: "Plato clearly thought of mathematics-as-calculation as distinctly below mathematics-as-proof, and this Platonic valuation led to the implicit valuation of pure mathematics and superior to applied mathematics, and to the resulting academic vanity of pure mathematicians, who regarded (and still regard) themselves as superior to applied mathematicians..."

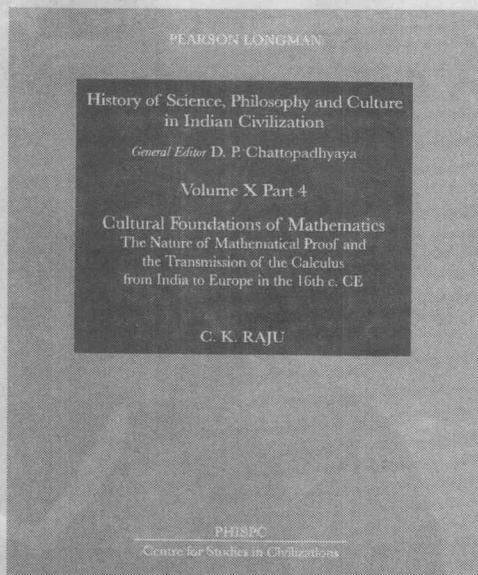
No conflict

"In traditional Indian mathematics, however, there never was such a conflict between "pure" and "applied" mathematics, since the study of mathematics was never an end in itself, but was always directed towards some other

practical end. Geometry, in the "sulbasutra", was not directed to any spiritual end, but to the practical end of constructing a brick structure... Rationale was not valued for its own sake. Hence, rationale was not considered worth recording in many terse (sutra-style) authoritative texts on mathematics, astronomy, and timekeeping. On the other hand, rationale was not absent, but was taught, as is clear, for example, from the very title "Yuktibhasa, or in full form, the GanitaYuktiBhasa," which means "discourse on rationale in mathematics."

C. K. Raju misses an opportunity here (or anywhere in this volume) to refer to the notebooks of the 20th century mathematical genius, Srinivasa Ramanujan, whose 3254 entries in his celebrated notebooks did not provide proofs, and the entries were to him, perhaps, sutras, discovered by his untutored mind! "Computers have precipitated a third math war by again greatly enhancing the ability to calculate in a way regarded as epistemically insecure - according to Western metaphysics. The suggested correction is to recognise the distinct epistemic setting of mathematics-as-calculation and teach it accordingly." This is a sample of a debatable point and several such points have been raised by the author in this treatise.

Finally, it is noteworthy that this commendable effort has been provided in an excellent quality production by the publisher and is recommended for the discerning historians and history-oriented and mathematically inclined readers. It is an essential reference book in libraries the world over.



CULTURAL FOUNDATIONS OF MATHEMATICS - The Nature of Mathematical Proof and the Transmission of the Calculus from India to Europe in the 16th c. CE: C. K. Raju; Pub. by Center for Studies in Civilizations (CSC) and Pearson Longman, 482, FIE, Patparganj, Delhi-110092. Rs. 1600.