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Mathematics, physics, computers, and the globalisation of culture

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Abstract

It is widely believed that globalisation relates to values, and does not concern mathematics, science, and technology, which are value-free, and universal. I will argue to the contrary that mathematics, science and technology are permeated with culture, hence their perceived universality and value-neutrality plays a key role in facilitating the globalisation of culture.

Consider mathematics (on which depend physics and the present-day technology of computing). On the one hand, mathematics is believed to be universal enough to be understood even by extraterrestrials. On the other hand, the history of mathematics informs (or disinforms) us that real mathematics developed only in Greece,[1] and subsequently in Europe after the "renaissance". Setting aside questions about history, isn't it strange that something so allegedly universal could be produced only by a single culture?

In fact, present-day beliefs about mathematics disintegrate if the underlying cultural assumptions are challenged—for example if Buddhist or Jaina logic is used instead of "Aristotelian" logic.[2] I will also briefly indicate what alternative mathematics,[3] science,[4] and technology have been and are being built, free from local religious or theological bias.

The mistaken beliefs in the universality of current mathematics and science affect values. As an example, I analyse the assumptions underlying the perceptions of "reasonable behaviour", as defined in rational choice theory or utilitarianism,[5] and how these perceptions change with beliefs about the nature of time, logic, and computability.

Notes

[1]E.g., Rouse Ball begins his "classic" account of the history of mathematics by triumphantly proclaiming: "The history of mathematics cannot with certainty be traced back to any school or period before that of the Ionian Greeks. . . ". W. W. Rouse Ball, *A Short Account of the History of Mathematics*, Dover, New York, 1960, p. 1.

[2]C. K. Raju, "Mathematics and Culture", in *History, Culture and Truth: Essays Presented to D. P. Chattopadhyaya*, ed. Daya Krishna and K. Satchidananda Murthy, Kalki Prakash, New Delhi, 1999, pp. 179–193. Reproduced in *Philosophy of Mathematics Education* **11** (1999), available online at `http://www.ex.ac.uk/~PErnest/pome11/art18.htm`. 'Culture, logic and rationality", postscript to chp. 10, in *The Eleven Pictures of Time: the Physics, Philosophy and Politics of Time Beliefs*, Sage, 2003.

[3]C. K. Raju, "Computers, Mathematics Education, and the Alternative Epistemology of the Calculus in the YuktiBhāṣā", invited plenary talk at the *8th East-West Conference*, University of Hawai'i, Jan, 2000. In *Philosophy East and West*, **51**:3, July 2001, pp. 325–362. Preprint available online from `http://www.IndianCalculus.info/Hawaii.pdf`. Also, *Cultural Foundations of Mathematics*, PHISPC, New Delhi 2004 (to appear).

[4]C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994. (Fundamental Theories of Physics, vol. 65.)

[5]"Time as Money", chp. 10 in *Eleven Pictures of Time*, cited above.