

A welcome but puzzling contribution

I recently read Raman's interesting article¹ on the need for a philosophical grounding in the pursuit of higher degree science education in India. It was with pleasure that I noted the author's concern for inculcating the spirit of self-learning motivated by the search for truth. Not only is the article timely, but the author's description of the evolution of the spirit of inquiry and search for truth is truly commendable. I particularly appreciate the balanced manner in which he has traced the traditions of intellectual inquiry in both Indian as well as Western contexts, an approach sadly missing in these days of academic one-upmanship and scientific chauvinism. However, notwithstanding the evenhandedness of the author in these matters, I was puzzled by the following observation, offered by him, that 'Intense discussion is currently ongoing in seeing principles of quantum mechanics in Vedanta', an observation which he seems to make with a sense of approval.

Apropos this observation, I have always wondered at the correctness or otherwise of this curiously ahistorical and anachronistic study of a complicated modern scientific theory along with or in comparison with an ancient and abstruse (in the sense of being very complex) philosophical doctrine. What surprises me is the uncritical manner in which the author refers to such parallel studies. As the author's focus is on context-based learning and related methodologies, it is important that one pays attention to that critical component of scientific method:

scientific experimentation and instrumentation (specially in the context of modern science, big science) that accompanies it. But the learned Swamiji of the book to which Raman refers to has this to say about the method applied in the ancient period: 'The ancient seers of India evolved a number of concepts on space, time, causality, matter, energy, the origin of our universe, and the limitations of reason, which are in striking conformity with the ideas of modern physicists. How did they do this? Certainly not through telescopes or electron microscopes. Their only technique was meditation, which opened the door to higher intuition or pure imagination that transcends reason, but never contradicts it'². From a methodological viewpoint, this is a strange observation. I am not against meditation as such, but I am strongly skeptical about its effectiveness as any kind of 'scientific' method. In addition, the observational and mathematical techniques used by our own remarkable astronomers like Aryabhatta, Brahmagupta and others, would be rendered inferior if we take the Swamiji's comment seriously. Moreover, if one were to draw inspiration from this idea of method, then Raman's own multi-component approach would become irrelevant. One is reminded of the quip offered by Einstein's wife that the great man saw and solved the problems of the universe on the back of an envelope. The point here is not that our ancient thinkers did not have the kind of insights ascribed to them, but that those findings and the methods they really used should be han-

dled carefully and critically, so that such methodologically dubious statements can be completely rejected. Also, statements such as the one quoted by Raman smack of easy appropriation and as such do not deserve a place either in a scientific or philosophical discussion.

In addition, while I fully agree with the author in his contention that ancient Indian philosophical tradition was rich in terms of its insights into the nature of reality, and the logical and methodological approaches which made possession of such insights possible, nevertheless it happens to be the case that there were built-in problems in our philosophical tradition, problems which gave our tradition an overemphasized slant of otherworldliness (I have no problem in being as critical of Western tradition, but that is an entirely different story). So even while agreeing with Raman concerning the need for philosophically informed context-based learning, I think we are obliged to operate with a strong critical stance, especially in the case of higher learning scenarios.

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Is certification needed for 'jhum' cultivation?

'Jhum' (slash and burn agriculture) cultivation has been considered as a means of sustenance to the indigenous community of the biodiversity-rich northeastern hill region of the Indian subcontinent, and as an integral part of our culture and tradition. More than 100 indigenous people and over 6.2 lakh families of the region depend on jhum¹. More than 85% of the cultivation is under shifting cultivation in this region². Earlier the jhum cycle was

20–30 years, which was enough to sustain production³. However, growing human population and increasing anthropogenic pressure on the land has reduced the jhum cycle to 2–3 years, thus resulting in the degradation of the ecology and environment of the hilly region. For instance, the magnitude of its effect has been estimated⁴ as ca. 1.73 m ha of forest cover loss in Northeast India from 1987 to 1997.

To protect the rich forest area and conserve soil and water resources, the government has initiated various measures to tackle jhum cultivation. About 54% of the forest area in Northeast India is under the custody of the community and is managed by Indigenous Traditional Institution⁵. Ecologically, the adversity of jhum with shorter cycle is found to be worse than a long jhum cycle⁶. Therefore, to ascertain sustainable jhum production,

there is a need to develop criteria and indicators (C&I) for the jhum system for the northeastern states in particular and India in general. Similar to the Bhopal India Process for sustainable forest management that assures sustainable development of the nation⁷, this initiative will facilitate a third-party monitoring and assessment of the management practice of jhum cultivation in the country and help reduce the adverse affect of jhum cultivation with the help of standard C&I. At the same time, it would help the indigenous community to sell the jhum agriculture produce², viz. rice, chilli, potato, cucumber, etc. as a certified product that may have more market value as well, due to its organic nature, as most jhum fields are managed as low-input systems.

The C&I initiatives for the jhum system will eventually help to provide the source and potential of the jhum produce to the national as well as the interna-

tional consumers. For example, *Oryza sativa* total yield from the fields⁸ could be to the tune of 66 to 1161 kg/ha/yr. This is comparable to a marginal agriculture system elsewhere. Besides, this initiative must be incorporated in the policy-making process to restore the cultural identity of the indigenous communities through scientific, sound and eco-friendly traditional management practices/systems and certification.

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Scientometrics and modified *h*-indices

The editorial by Balaram¹ entitled 'Scientometrics: A Dismal Science', rightly points out the improper emphasis being placed, especially in India, on scientometric data, such as the journal impact factor and more recently the *h*-index, in the assessments of individuals and institutions engaged in research.

We wish to highlight one more problem with the *h*-index, in addition to those mentioned in the editorial. An individual's *h*-index does not take into account the number of co-authors in the relevant publications, even as it is intuitively obvious that in the case of two individuals with the same *h*-index, the one whose cited papers were shared with fewer co-authors deserves a higher performance ranking. This problem was alluded to by Hirsch himself in his paper describing the *h*-index². Recently, Schreiber³ and Egghe⁴ have independently proposed modifications to the *h*-index that takes multiple co-authorship into account, by assigning fractional (rather than whole) credits to each of the authors

on any paper. The resulting indices have been shown to lead to the generation of a different rank order amongst a group of researchers than that obtained by rankings based on the *h*-index above³.

If one were to take this idea further, more complex equations can also be envisaged in which the fractional credit apportioned to different co-authors in a paper varies according to the position of each in the author list (but such that the sum of all fractional credits for a single paper equals 1). For example, at least in the biological disciplines, the perception has gained ground that the first author and the corresponding author have contributed proportionately more to the paper than other co-authors (who are themselves often perceived to be listed in descending order of their contributions to the paper). The take-home message then is that if it is true that 'counting papers and citations has become an inescapable activity in the field of science'¹, let us at least use multiple indices rather than place undue reliance on just a single

number, as has recently also been emphasized by Wilcox⁵ in his editorial entitled 'Rise and fall of the Thomson Impact Factor'.

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