

On the impact of impact factors

Q: How do you improve the quality of the scientific papers appearing in journals A and B?

A: Simply encourage the authors of A and B to refer to one another. Then, the citation index, *and hence the quality* of both A and B will go up.

Conclusion: The quality of science can be improved without changing the science at all; you only have to encourage 'co-citation' and fiddle around with the references!

This is not something out of the theatre of the absurd. This is the sort of thing that is actively discussed and propagated by science bureaucrats, most of whom have not done any real science for very long. This is what you would have heard if you had, for instance, attended a meeting organized by NISTADS, New Delhi in April 2003. Such catchy sounding phrases as 'How to encourage co-citation' and 'How to improve the standards of some thousand Indian scientific journals' were doing the rounds. The most frightening part of the entire scenario is the answer one would get to the following question:

How many of these people, who ask and propose answers to the above questions are editors or referees of scientific journals of an international standard?

It must be iterated that one is talking here of genuine science – as in physics or mathematics – and not disciplines of more modern vintage – such as bibliometry – which bestow the term 'science' to themselves. One of us once worked at an institution, where he was astounded by the complete equanimity with which a student undergoing a course on 'documentation research' claimed that he 'could write a state-of-the-art article on any scientific theme that anybody would care to suggest' to him. Such absolute arrogance can only be born out of total ignorance. Einstein, Newton or Chandrasekhar would neither make such a statement nor seriously listen, for any positive amount of time, to the author of such a statement.

There are serious drawbacks to many of the instruments employed by our 'documentation scientists' of today. Consider their fundamental tool: the 'impact factor'. We are given to understand that, by definition, the impact factor of a journal is determined by how often the average paper in it is cited by another paper within two years of its appearance. This is almost antithetical to the nature of high quality science. It normally takes more

than two years for scientists to be truly convinced of the veracity of a fundamental piece of work (such as Wiles' proof of Fermat's last theorem, for instance). An off-shoot of weightage given to the here and now ideology is that while there are a large number (in double-digits, certainly) of journals in biology whose impact factors exceed 25 and even 30, there is almost surely not a single journal in mathematics with an impact factor exceeding 2! Imagine our plight if we let our bibliometrists lead us by the nose (to make somewhat questionable deductions based on parameters concocted by almost ad hoc means) and convince us that we need to hire 15 biologists for every mathematician! The tendency to judge a scientist by an analysis of the number of citations (weighted by the impact factor of the journals where the paper is published, scaled by the number of authors of each paper . . .) rather than an objective assesment of his/her research work is on the rise. Citations vary from subject to subject and area to area (in some areas, it is common to have an extensive literature survey in each paper, while in some this is not done). A deep contribution may take a long time to be understood by others before using it in their own work. Further, we must remember that someone may cite a paper to point out an error or criticise the approach. We firmly believe that there is no alternative to assessing research work purely on the basis of its contents. So-called objective measures based on citations and impact factors are not and cannot substitute judgement based on an understanding of the work.

As it stands, much has been written by our documentation scientists about how science in general – and mathematics in particular – has been suffering a serious decline and we have been warned that if we do not take drastic steps, then we face the possibility of grave consequences. As a result, directors of research institutions have been receiving frantic telephone calls from Delhi demanding all sorts of statistics so as to satisfy various politicians. All this flurry is a direct consequence of the panic raised by our bibliometrists, whose data are based on various numbers which look at the total number of papers published from India, without taking into consideration the quality of the paper or of the journal publishing it. The authors are working research mathematicians who started their careers about thirty years ago.

At that time, there were really only two places in India (at Mumbai and Kolkata, to be brutally honest) which could claim to be turning out internationally acclaimed mathematical research; today that number has swelled to at least seven or eight; and we really believe that there will be almost no serious mathematician who can contest these facts.

We should be supremely wary before letting non-specialists dictate steps to take on specialized matters. (For example, do we want television commentators who have never played international cricket to make decisions on whether Tendulkar should bat at no. 1 or no. 4, and dictate the future directions of Indian cricket?) We will be much better off, if we adopted some of the following measures:

- (a) Call a spade a spade, and state frankly and truthfully that a particular piece of alleged research is a piece of junk which is not worth the paper it is printed on – if that is indeed the case.
- (b) In particular, insist on most exacting standards for a Ph D and do not encourage a proliferation of theses which are nothing but an assemblage of unmotivated definitions and theorems – all of which are a contorted generalization of some existing piece of literature – where there is not a shadow of thinking, original or otherwise.
- (c) Create an ambience of integrity, devoid of hierarchy, where intellectual curiosity is nurtured.
- (d) Concentrate on bringing out at least one Indian journal of acceptable international standards in each area of science. (Contrary to the scares perpetrated by the bibliometrists, there always was one good Indian journal of statistics – *Sankhya* – and there are now two good Indian journals of mathematics – *Proceedings of the Indian Academy of Sciences, Mathematical Sciences*, and *Journal of the Ramanujan Mathematics Society*).
- (e) Reward worthy achievements in science by youngsters based on an assesment of their work and not based on analysis by bibliometrists.

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