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EDITORIAL

Research Assessment: Declaring War on the Impact Factor

Nearly forty years ago, when I began my research career in India, science proceeded at a leisurely pace. There was little by way of funding or major facilities even at the best of institutions. Enthusiasm and interest were the key ingredients in maintaining a focus on research. The environment still contained many role models, who had made significant contributions to their chosen fields, under undoubtedly difficult circumstances. The mid-1970s was a time when political and economic uncertainties precluded a great deal of government interest in promoting science. There was relatively little pressure on researchers to publish papers. The age of awards and financial incentives lay in the distant future. In those more sedate times, the results of research were written up when the findings appeared interesting enough to be communicated. The choice of journals was limited and most scientists seemed to be content with submitting manuscripts to journals where their peers might indeed read the papers. Journals were still read in libraries. Note taking was common, photocopies were rare and the 'on-line journal' had not yet been conceived. The academic environment was not overtly competitive. I never heard the word 'scooped' in the context of science, until well into middle age. Eugene Garfield's 'journal impact factor' (JIF) had not penetrated into the discourse of scientists, although the parameters for ranking journals had been introduced into the literature much earlier. The word 'citation' was rarely heard. In the library of the Indian Institute of Science (IISc) there was a lone volume of the 1975 *Science Citation Index* (a hardbound, printed version, extinct today), presumably obtained gratis, which sat forlorn and unused on rarely visited shelves. Only a few hardy and curious readers would even venture near this sample of the Citation Index, which seemed of little use. It required both effort and energy to search the literature in the 1970s. Few could have foreseen a time when administrators of science in distant Delhi would be obsessed with the many metrics of measuring science, of which the JIF was a forerunner. Indeed, the unchecked and virulent growth of the use of scientometric indices in assessing science has at last begun to attract a backlash; an 'insurgency' that has resulted in the *San Francisco Declaration on Research Assessment* (DORA), whose stated intention is to begin 'putting science into the assessment of research'. The declaration is signed by 'an ad hoc coalition

of unlikely insurgents – scientists, journal editors and publishers, scholarly societies, and research funders across many scientific disciplines', who gathered at the annual meeting of the American Society for Cell Biology ([am.ascb.org/dora/May 16, 2013](http://am.ascb.org/dora/May%2016,%202013)). An editorial by Bruce Alberts in the May 17 issue of *Science* (2013, **340**, 787) notes that 'DORA aims to stop the use of the "journal impact factor" in judging an individual scientist's work in order "to correct distortions in the evaluation of scientific research"'.

The origins of the 'impact factor' may be traced to a largely forgotten paper that appeared in *Science* in 1927, which described a study carried out at Pomona College in California, that begins on an intriguing note: 'Whether we would have it or not, the purpose of a small college is changing'. The authors describe an attempt to draw up a priority list of chemistry journals to be obtained for the library. Budgetary constraints were undoubtedly a major matter of concern in the late 1920s. I cannot resist reproducing here the authors' stated purpose in carrying out this exercise over eighty five years ago, as their words may strike a chord in readers interested in the problem of uplifting the science departments of colleges in India today: 'What files of scientific periodicals are needed in a college library successfully to prepare the student for advanced work, taking into consideration also those materials necessary for the stimulation and intellectual development of the faculty? This latter need is quite as important as the first because of the increasing demand of the colleges for instructors with the doctorate degree. Such men are reluctant to accept positions in colleges where facilities for continuing the research which they have learned to love are lacking' (Gross, P. L. K. and Gross, E. M., *Science*, 1927, **LXVI**, 385). The procedure adopted was simple; draw up a list of journals most frequently cited in the *Journal of the American Chemical Society* (*JACS*), the flagship publication of the American Chemical Society. Much can be learnt about the history of chemistry (and, indeed, more generally about science) by examining the list of the top six journals (other than *JACS*) recommended for a college chemistry library in the United States, in 1927: *Berichte der Deutschen Chemischen Gesellschaft*, *The Journal of the Chemical Society (London)*, *Zeitschrift für Physikalische Chemie*, *Annalen der Chemie (Liebig's)*, *The Journal of Physical*

Chemistry and *The Journal of Biological Chemistry*. Clearly, in the 1920s the literature of chemistry was overwhelmingly dominated by European journals. For students growing up in the frenetic world of modern science, I might add that *Science*, *Nature* and *PNAS* appear far down the list. A similar exercise carried out today would reveal a dramatically different list of journals; undoubtedly a reflection of the turbulent history of the 20th century.

The journal impact factor emerged in the 1970s as a tool to rank journals. In the early years, it was largely a metric that was of limited interest. The revolution in the biomedical sciences resulted in an explosive growth of journals in the last two decades of the 20th century; a period that coincided with the dramatic rise of information technology and the emergence of the internet. The acquisition of the Institute for Scientific Information by Thomson Reuters lent a hard commercial edge to the marketing of the tools and databases of scientometrics; the *Web of Science* began to enmesh the world of science. Journal impact factors appear unfailingly, every year, making the business of publishing science journals an extremely competitive exercise. Journal editors scramble to devise schemes for enhancing impact factors and scientists are drawn to submit articles to journals that appear high on the ranking lists. If JIFs were used only to compare journals there may have been little to grumble about. Unfortunately, individuals soon began to be judged by the impact factors of the journals in which they had published. Some years ago the use of an 'average impact factor' was actively promoted in India, to judge both individuals and institutions. The introduction of the '*h* index', a citation based parameter that appeared in the literature a few years ago, as a means of ranking individual performance, may have drawn away a few adherents of the average impact factor. Very few proponents of the JIF as an assessment tool in India appear conscious of obvious limitations. Most impact factors are driven up by a few highly cited papers, while others bask in reflected glory. The field specific nature of the JIF can lead to extremely misleading conclusions, when comparing individuals and institutions using this imperfect metric. Despite these drawbacks, the use of JIF as a tool of research assessment has reached epidemic proportions worldwide, with countries like India, China and the countries of southern Europe being among the hardest hit. Students in India, particularly those working in the biological sciences and chemistry in many of our best institutions, are especially self conscious; constantly worrying about the JIF when they submit papers.

The Declaration on Research Assessment (DORA) is a call to take up arms against the insidious JIF. Its general recommendation is a call for a boycott: 'Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions.' Scholar-

ship and achievement can be judged without using a metric that was never designed for the purpose. The Declaration also has a message that may well be worth heeding by researchers in India: 'Challenge research assessment practices that rely inappropriately on Journal Impact Factors and promote and teach best practice that focuses on the value and influence of specific research outputs.' In his *Science* editorial, Alberts is trenchant: 'The misuse of the journal impact factor is highly destructive, inviting a gaming of the metric that can bias journals against publishing papers in fields (such as social sciences or ecology) that are much less cited than others (such as biomedicine).'

Research assessments have also become commonplace in ranking institutions. The metrics used rely substantially on publication numbers and citations, invariably based on the *Web of Science*, although additional parameters contribute in differing ranking schemes. In recent times, both the Prime Minister and the President have publicly lamented that no Indian university or institution appeared in the 'top 200' in the world (*The Hindu*, 5 February 2013 and 16 April 2013). While there may be much to lament about in Indian higher education, are the rankings really an issue that needs immediate attention? In an Op-Ed piece in *The Hindu* (9 March 2013), Philip Altbach is categorical: 'For India, or other developing countries to obsess about rankings is a mistake. There may be lessons, but not rules.... The global rankings measure just one kind of academic excellence, and even here the tools of measurement are far from perfect.' Altbach notes, and many analysts would undoubtedly agree, that two systems, 'the Academic Ranking of World Universities, popularly known as the "Shanghai rankings", and the World University Rankings of *Times Higher Education* (*THE*) are methodologically respectable and can be taken seriously'. While the former measures only research impact, with several parameters weighted towards the highest level of achievement (number of Nobel prize recipients in an institution), the latter 'measures a wider array of variables'. Altbach adds: 'Research and its impact is at the top of the list, but reputation is also included as are several other variables such as teaching quality and internationalization. But since there is no real way to measure teaching or internationalization weak proxies are used. Reputation is perhaps the most controversial element in most of the national and global rankings.' Altbach's critique, of an apparent obsession with university rankings in India, was quickly countered by Phil Baty, the editor of *THE* rankings who warns: '...it would be a far greater mistake for Indian institutions and policy makers to under-use the global rankings than to overuse them' (*The Hindu*, 11 April 2013). It may indeed be important for institutions to appreciate the rules of the game if they are to achieve a competitive score. Policy makers would also benefit if they set out to understand the tools of research assessment before they begin to use them.

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