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The misuse of metrics can harm science

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Country trends

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Shifting language preferences

Whatever the reason, the use of English as the scholarly *lingua franca* has become self-reinforcing, with academic reward schemes in many countries placing great emphasis on publication in international (mostly English-language) journals. Figure 1 shows the ratio of the number of journal articles published by selected nations' researchers in English to those published in that nation's official language in three consecutive four-year periods.

The Netherlands has always had a strong tradition of publishing in English, and so the ratio of English to Dutch journal articles is

quite high and shows no clear trend in this analysis. Conversely, Italy's ratio has risen dramatically over the period of analysis, suggesting a very strong impetus by Italian authors to publish in English. More modest, but equally important, trends away from local-language authorship are repeated in Germany, France, Spain and the Russian Federation.

Reference:

(1) Tardy, C. (2004) "The role of English in scientific communication: *lingua franca* or *Tyrannosaurus rex*?" *Journal of English for Academic Purposes*, Vol. 3, No. 3, pp. 247–269.

Expert opinion



The misuse of metrics can harm science

Professor David Colquhoun

When Eugene Garfield devised the **Impact Factor (IF)** in 1955 to help select journals for the Science Citation Index, he had no idea that 'impact' would become so controversial.

The IF ranks journals based on how many citations they receive over a particular period. However, in recent years, certain misuses of the IF have been brought to light, including its emergence as a performance-measurement tool. Garfield himself has noted that the IF was never intended to assess individuals (1).

Assessing individuals

In a letter to *Nature*, Professor David Colquhoun of the Department of Pharmacology, University College London, voiced his concerns about the way IFs are being misused to assess people (2). According to him, it is all part of a worrying trend to manage universities like businesses, measuring scientists against key performance indicators. "IFs are of interest only to journal editors. They are a

real problem when used to assess people," he says.

This becomes clear when one looks behind the figures. Bert Sakmann may have won a Nobel Prize in 1991, but under some current assessment criteria, he would have been unemployed long before that happened. From 1976 to 1985, he published between zero and six papers per year (average: 2.6). Yet, despite this low output, during these years he produced scientifically important papers.

Problem of perception

The real problem may be one of perception. Colquhoun says, "No one knows how far IFs are being used to assess people, but young scientists are obsessed with them. Whether departments look at IFs or not is irrelevant; the reality is that people perceive this to be the case and work towards getting papers

into good journals rather than writing good papers. This distorts science itself: it is a recipe for short-termism and exaggeration."

"People believe Impact Factors are being used to assess people, and work towards getting papers into good journals rather than writing good papers."

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Expert opinion

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He continues, "Good departments don't measure applicants or staff by arbitrary calculations at all. All universities should select by references and assessment of papers, and those that already do so should publicly declare this to ease the fears of applicants."

In an essay by Eugene Garfield published on its website, Thomson Scientific itself addresses the scope of the IF and the potential for misuse. "Thomson Scientific does not depend on the Impact Factor alone in assessing the usefulness of a journal, and neither should anyone else," it says (4). It recognizes that while the IF has in recent years been increasingly used in the process of academic evaluation, the metric continues to provide an approximation of the prestige of the journals in which individuals have been published and is not an assessment tool for the individuals themselves.

Metrics will never be able to provide a holistic picture of an individual scientist or journal and should certainly not determine science. However, they can function as an initial indicator, thereby providing a starting point for further discussion or assessment.

References:

- (1) Garfield, E. (2005) "The agony and the ecstasy: the history and meaning of the Journal Impact Factor". *International Congress on Peer Review and Biomedical Publication, Chicago, September 16, 2005.*
- (2) Colquhoun, D. (2003) "Challenging the tyranny of impact factors". *Nature, Correspondence, 423, 479.*
- (3) Colquhoun, D. (2007) "How should universities be run to get the best out of people?". *Physiology News, Vol. 69, pp. 12-14.*
- (4) Garfield, E., "The Thomson Scientific Impact Factor"

Photograph of David Colquhoun © Mark Thomas

Why did you cite...?



Why did you cite...?

More than 913,700 French articles are referenced in Scopus. Of these, "*Note préliminaire sur le traitement des angiomes vertebraux par vertebroplastie acrylique percutanée*" (1) is ranked as the most cited article, with more than 500 citations to date.

To gain some insight into what makes a successful non-English paper, we asked the authors and those who have cited the paper frequently why they thought this paper had such an impact. The unanimous response was that the main reason for citing the article so frequently was because it represented a landmark in the field and was the first to describe a technique that was adopted internationally in the years thereafter.

One of the authors, Professor Deramond from CHU Amiens, says: "It is the first article describing the original vertebroplasty technique [...]. A considerable number of articles [...] focus on this minimally invasive therapeutic method [...] [hence the article] is cited systematically."

Frequent citers agree with this. Dr. Pflugmacher, from the University of Berlin, says that "the article is cited several times because it is the origin of vertebroplasty." Dr. Liebermann of the Cleveland Clinic, Dr. Burton from the University of Texas and Dr. Jensen from the University of Virginia expressed very similar views.

Effect of language on diffusion

It seems, however, that the fact that the article was written in French was rather an obstacle to its early diffusion. Professor Deramond notes that "it wasn't until 1997 and the publication of an article in the *American Journal of Neuroradiology* that vertebroplasty became really recognized and spread worldwide." One of the other authors, Professor Le Gars from CHU Amiens, stresses: "This article is often cited because it is the first to describe the vertebroplasty technique, devised in our hospital and now used worldwide. This is what explains the high number of cites, the usage of the French language in an Anglo-Saxon world being rather a penalizing factor."

Professor Belkoff, a frequent citer from the John Hopkins Medical Center, adds: "Vertebroplasty would have become the mainstream practice that it is perhaps 10 years earlier, had the article been written in English. If it were not for Jacques Dion, a French Canadian, hearing about vertebroplasty presented in French at a meeting of radiologists, the introduction of vertebroplasty to the US may have taken even longer. Jacques brought back what he learned to UVA, where he and colleagues Mary Jensen, John Mathis and Avery Evans used it and started spreading the word."

Reference:

- (1) Galibert, P., Deramond, H., Rosat, P., Le Gars, D. (1987) "*Note préliminaire sur le traitement des angiomes vertebraux par vertebroplastie acrylique percutanée*". *Neurochirurgie, Vol. 33, No. 2, pp. 166-168.*