

Utilizing citation networks to explore and measure scientific influence

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Abandoning Impact Factor: a growing consensus

San Francisco Declaration on Research Assessment

Putting science into the assessment of research



Ending the tyrannical factor



Bruce Alberts is Editor-in-Chief of Science.

No shortcuts for research assessment

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Funding agencies, journal editors, and hiring and promotion committees expend large amounts of time and resources deciding how to allocate precious funds, what science to publish, and which scientists deserve a job or promotion because of their scientific contributions. Now imagine an automated information system that can make this process much more efficient. Every academic researcher in the world is ranked based on a productivity index. Let us call it the Metric for Evaluation of Scientific Scholarship (MESS). This system works with an algorithm that tabulates the number of grants awarded to a researcher, the award amount for each grant, the number of publications authored, and the number of times those publications were downloaded and



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hypothetical one, and researchers have only themselves to blame for this unfortunate state of affairs.

The Journal Impact Factor (JIF), developed to help librarians make subscription decisions, has de facto been repurposed by researchers, journals, administrators, and funding and hiring committees as a proxy for the quality and importance of research publications. The result of this shortcut is that researchers are judged by where their articles are published rather than by the content of their publications. This is fundamentally wrong.

To address the issue, a group that includes representatives from many leading scientific journals, funding agencies, and research institutions across the globe has released the San Francisco Declaration on Research Assessment (DORA), which has been posted on the website of the American Society for Cell Biology (www.ascb.org/SFdeclaration.html) and is attached here as Supplemental Material. This document is a call for reform of how research outputs are assessed. Anyone can sign the document, if he or she wants to support this cause.

There are many reasons why shortcuts to research assessment don't work. One reason is that outputs and outcomes

Impact Factor Distortions

THIS EDITORIAL COINCIDES WITH THE RELEASE OF THE SAN FRANCISCO DECLARATION ON RESEARCH ASSESSMENT (DORA), the outcome of a gathering of concerned scientists at the December 2012 meeting of the American Society for Cell Biology.* To correct distortions in the evaluation of scientific research, DORA aims to stop the use of the "journal impact factor" in judging an individual scientist's work. The Declaration states that the impact factor must not be used 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." DORA also provides a list of scientific articles featured at introducing the new scientific publications are assessed to be taken

Forming research assessment

or the research community to rethink how the outputs of research are evaluated and, as the San Francisco Declaration on Research Assessment makes clear, this should involve the journal impact factor with a broad range of more meaningful approaches.

Policy

Editors Call for Factors

EDITORIAL



Meeting the needs of funding agencies and the scientific community

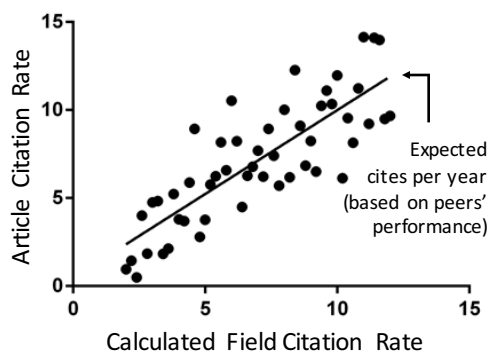
- **Limitations of commonly used bibliometrics in measuring/comparing the value of a publication or group of publications:**
 - ✓ *Publication Counts*: field-dependent, use-independent
 - ✓ *Impact Factor*: journal-level metric
 - ✓ *Citation Rates*: field- and journal-dependent
 - ✓ *h-index*: field-dependent, time-dependent
- **Considerations**
 - ✓ Assumption: Citation of a publication reveals value to or influence on the citer
 - ✓ Citation rates are an indication of the breadth and speed of the diffusion of knowledge
 - ✓ Need: An article-level metric that is independent of field, journal, and time

Calculating the Relative Citation Ratio

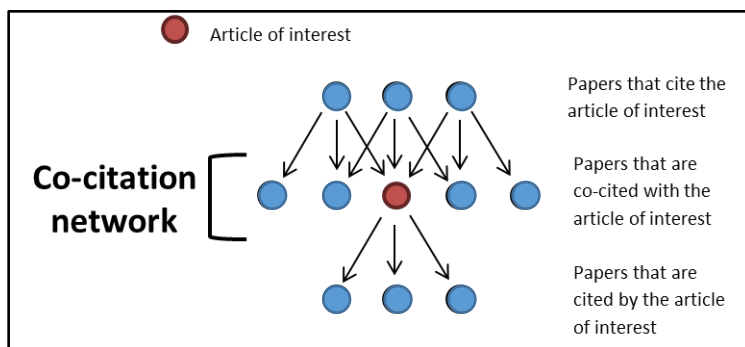
How many citations per year compared to **peer articles** in the **same field**?

$$RCR = \frac{\text{Article Citation Rate}}{\text{Expected Citation Rate}}$$

NIH-funded articles



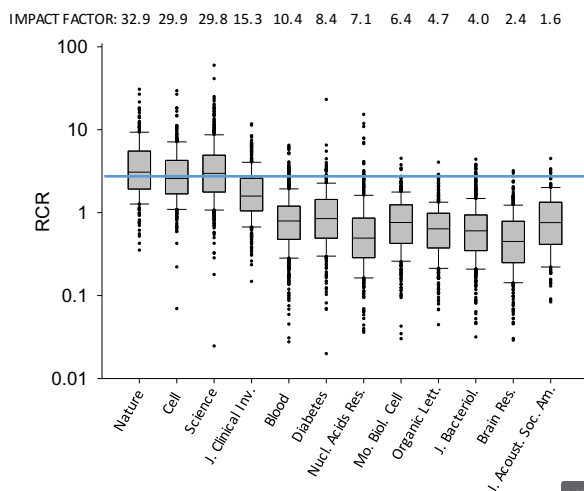
Co-citation networks embody a field



RCR 0 = never cited
 1 = average
 2 = twice the average
 >20 = exceptionally highly cited

Publications of NIH investigators with continuous R01 funding from FY2003 to FY2010

2003-2010 articles: Selected journal IFs from 32.9 to 1.6



The publicly available *iCite* tool: input any paper(s) in PubMed and calculate their Relative Citation Ratios (RCRs)



Thank you

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- Jim Anderson, Director, DPCPSI
- Jean Yuan, OPA
- *iCite* developers
 - Jason Palmer, OPA
 - Fai Chan, OPA
 - Rob Harriman, OPA
- OPA Staff
- Contact: B. Ian Hutchins (bruce.hutchins@nih.gov)
- More details on bioRxiv: <http://biorxiv.org/content/early/2015/10/22/029629>