

## Editors' note: bibliometrics and the curators of orthodoxy

MSCS Editorial Board

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Have you ever seen the Citation Indexes (CIs) for the year 1600? At that time, a very active community was working on the reconstruction of planetary movements by means of epicycles. In principle, any ellipse around the Sun may be approximated by sufficiently many epicycles around the Earth. This is a non-trivial geometrical task, especially given the lack of analytical tools (sums of series). And the books and papers of many talented geometers quoted one another. Scientific knowledge, however, was already taking other directions. Science has a certain 'inertia', it is prudent (at times, it has been exceedingly so, mostly for political or metaphysical reasons), but even under the best of conditions, we all know how difficult it is to accept new ideas, to let them blossom in time, away from short-term pressures.

At best, CIs transform this slowness into a tool for judgement. If used unwisely, as is increasingly the case, they discourage people (young ones in particular) right from the outset from daring to think, from exploring new paths: how is it possible to find a job today in the field of science or to get tenure without the inertial consensus of the majority, of the largest research areas, imposed by CIs? So the avalanche effect inhibits or even eliminates variety, which is at the core of culture and science. And the preventive effect against novelty is what we particularly fear.

At Ecole Normale Supérieure, in Paris, the departments of Mathematics, of Physics, and of Computer Science have expressed their firm opposition to the increasing use of CIs as a tool for scientific evaluation, or for characterising scientific laboratories. Note that eight out of the nine Fields Medals obtained in France have been given to former students and/or teachers from this Mathematics department (Grothendieck is the exception: outliers are always to be expected). The Physics department counts two Nobel Awards and has an extraordinary scientific history. In areas that are familiar to the readers of this journal, as well as in many other fields, the relatively young Computer Science department, which originated from the Mathematics department, has an impressive record. We join our colleagues in this institution, as we all believe that the use of CIs, as a spreading international phenomenon, is one step further away from a balanced mix between a 'culture of knowledge' and a 'culture of results' towards a pure culture of results: in the field of science, this is an assured path to having no more results.

Concerning editorial and publishing activities, in addition to the distortions in judgements induced by so-called 'impact factors' for journals (see the ranking quoted below, which is fluctuating because ill-founded), further distortion is caused by having a very small number of self-selected commercial organisations assume the crucial task of deciding just 'what' to index. From the perspective of this well-established journal, we observe that

these organisations make it difficult for new journals to get indexed at all. In particular, authors who are consciously trying to break the stranglehold that a few expensive non-academic commercial publishers have on scientific publishing are even more severely disadvantaged by these unreliable and arbitrary numerical evaluations.

Further arguments are exposed in the text below, approved by the ENS Computer Science Department, and in the references therein. In particular, we explain how the discrete charm and the presumed objectivity of the ‘numbers’ provided by the CIs may divert scientific evaluations. We particularly recommend the document by the International Mathematical Union (Adler *et al.* 2008), where both methodological and technical critiques (concerning the flawed use of statistics) are given.

Let us just add one more comment. For a long time now, citations have been made of, say, Riemann Manifolds, Relativity Theory or Connes’ Non-Commutative Geometry without references to writings by the authors. Even worse, the well-known notion, say, of Martin-Löf algorithmic randomness has been quoted and re-defined simply as ‘ML-randomness’, not only without a citation of the founding paper, but also omitting the originator’s name, as being evident for the specialist. Scientific evaluation and promotion is an important and difficult task, as much as refereeing is for a top journal. CIs, increasingly used by managers and administrators, miss out on both novelty and established advances: these are not the tails of a Gaussian of science. They are at the core of scientific construction, and they are what makes science worthwhile and rich with always new, unexpected, heterodox knowledge and technical fall-out.

### **Excerpts from the DI-ENS document (LIENS 2008)**

The use [of CIs] is spreading, to the detriment of motivated and close scientific evaluations. At the same time, ill uses as well as the manipulation of these numbers are increasing, entailing a counter-productive expenditure of energy. We believe that the abuse of such indicators runs counter to the development of knowledge.

- Firstly, the depth and the originality of a scientific publication do not correlate with the expediency with which it is quoted, given that certain trends momentarily emerge and then fall into oblivion (a citation is taken as evidence of “impact” for a journal only when made within two years following the publication of the cited article).
- Each index ranking and each purveyor of bibliographic information presents its own aberrations, providing very approximate measurements: coverage varies widely according to the discipline and within a discipline. Very few conference proceedings are covered (in computer science, the absence of the major conferences is absurd), as well as very few books. This gives the fluctuating classification of journals according to the index ranking being used: “The first journal according to ISI (...) is the 195th according to CiteSeer; the 2nd according to ISI does not appear in CiteSeer; the 6th for ISI is 958th for CiteSeer... Conversely, the 1st for CiteSeer (...) is 26th for ISI; the 4th for CiteSeer (...) is 122nd for ISI” (Kermarrec *et al.* 2007).
- The formal correctness and the semantics of the software used is rather dubious; in particular, could an index ranking calculated today compare with the same index ranking calculated in two or ten years? The Harzing “Publish or Perish” and Google

Scholar software is not free (FLOSS) and can evolve at any moment; the updating of the databases is beyond any form of control.

- *“A systematic study of the CIs of four internationally renowned INRIA researchers shows that the bias and shortcomings observed in the indicators are not exceptions but, rather, the rule – at least in terms of computer science in its broadest sense.”* (Kermarrec *et al.* 2007).

Despite these known shortcomings, the importance of these indicators in evaluations, be they individual, by team or by laboratory, is growing, and often replaces or reduces the role of true evaluation (which we consider a relevant component of scientific work). We are led to believe that these numbers will never be more than an element among others, but the discrete charm, even the objectivity of the number, is incomparable. The temptation is great to calculate these numbers ‘just to see’ and then, because it is easy to do so, to use them to discriminate cases which at first glance may appear to have a comparable standing. In fact, numerous examples demonstrate that these excesses are already occurring, sometimes systematically so – see page 10 of Adler *et al.* (2008). They reduce the responsibility of every scientist to take a stand at his or her own risk, explaining in a jury that such and such is profound and original. Such notions are not conveyed by numerical indicators.

The growing importance of these indicators is therefore contrary to the advancement of knowledge, because it constitutes a hindrance to risk-taking, to originality, to interdisciplinarity and innovation, aspects that are constitutive of scientific progress and research. *“In addition to the fact that it is possible to significantly ‘defraud’ the values used for indicators in this way, the ever-increasing use of these indicators in the assessment of researchers has damaging consequences for science and innovation. Given the bias from which their calculation suffers, an exaggerated consideration of indicators may push young researchers into obtaining quick results, to the detriment of more long-term research and thereby slowing down innovation and penalising the formation of small communities in emerging fields.”* (INRIA 2008).

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This document has been signed by all members of the Editorial Board.

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