

## Editors' Note: Bibliometrics and the Curators of Orthodoxy

*Received*

Have you ever seen the Citation Indexes (CIs) of year 1600? At the 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. A non-trivial geometrical task, in particular given the lack of analytical tools (sum 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 pressure.

At best, CIs transform this slowness into a tool for judgment. If used unwisely, as is increasingly the case, from the very start they discourage people (young ones in particular) from daring to think, from exploring new paths : how is it possible today to find a job 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 characterizing scientific laboratories. Note that eight out of the nine Field 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 an extraordinary scientific history. In areas which 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 a further step 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” (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 organizations assume the crucial task of deciding which journals to index. From the perspective of this well-established journal, we observe that they 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 publication 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 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 of Martin-Löf algorithmic randomness may be quoted (and re-defined) just as "ML-randomness" without any reference to the founding paper. (By the way, how many papers did Martin-Löf write in the last 40 years of his very active scientific life? Six? Seven? At least two of them opened new paths, yet their references are increasingly being omitted, as they turn into the common knowledge of the scientific community.) 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, see (1)

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 abusive use 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, each purveyor of bibliographic information presents its own aberrations, providing very approximate measurements : coverage varies widely according to the discipline, and there are very few conference proceedings (in computer science, the absence of the major conferences is absurd), as well as very few books, as demonstrated by 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" (2);
- 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 or Google Scholar software are 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" (2).

Despite these known shortcomings, the importance of these indicators in evaluations, be they individual, by team or by laboratory, is growing, and this, instead of veritable 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 ... (4), [p. 10]. They reduce the responsibility of each, hence the role of the good scientist taking a stand, at his or her own risk, in a jury explaining that such and such is profound and original, notions which 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 which 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." (3).

## Références

- [1] *Position du LIENS au sujet de la bibliométrie*. <ftp://ftp.di.ens.fr/pub/users/longo/Data/sur-bibliom.pdf>.
- [2] *Que mesurent les indicateurs bibliométriques?* Document d'analyse de la commission d'évaluation de l'INRIA. [http://www.inria.fr/inria/organigramme/documents/ce\\_indicateurs.pdf](http://www.inria.fr/inria/organigramme/documents/ce_indicateurs.pdf).
- [3] *Tout ce que vous avez toujours voulu savoir sur les indicateurs*. [http://www.inria.fr/inria/organigramme/ce\\_indicateurs.fr.html](http://www.inria.fr/inria/organigramme/ce_indicateurs.fr.html).
- [4] *Citation Statistics*. International Mathematical Union. <http://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf>.
- [5] *A Note on Bibliometrics*. <http://www.pasteur.fr/recherche/unites/REG/bibliography/bibliometrics.html>.

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