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The top-ten in journal impact factor manipulation

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Abstract

A considerable part of the scientific community is, at least to some degree, involved in the "impact factor game". Editors strive to increase their journals' impact factor (IF) in order to gain influence in the fields of basic and applied research and scientists seek to profit from the "added value" of publishing in top IF journals. In this article we point out the most common "tricks" of engineering and manipulating the IF undertaken by a portion of professionals of the scientific publishing industry. They attempt to increase the nominator or decrease the denominator of the IF equation by taking advantage of certain design flaws and disadvantages of the IF that permit a degree of artificial and arbitrary inflation. Some of these practices, if not scientifically unethical, are at least questionable and should be abandoned. Editors and publishers should strive for quality through fair and thoughtful selection of papers forwarded for peer review and editorial comments that enhance the quality and scientific accuracy of a manuscript.

Key words: scientific quality, scientific productivity, research funding, citation, self-citation, editorial policies.

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In 1963, Eugene Garfield, co-founder of the Institute of Scientific Information (ISI), conceived and developed an index to measure scientific journals' quality and in this way guide, in an objective manner, decisions regarding the journals that would be covered by the Journal Citation Index [4]. The impact factor (IF) soon became widely accepted among the editorial staffs of journals as the gold standard of quality scientific publishing and a journal's prestige. No doubt, the quantification of quality is very useful in helping people evaluate a journal's scientific importance. However, the assumption that IF is a number absolutely proportional to science quality has led to misuses beyond the index's original scope, even in the opinion of its devisor [5]. When the IF is inappropriately attributed to all articles within a single journal, it leads to false applications regarding the evaluation of individual scientists or research groups. This is, unfortunately, a common practice, especially among governmental funding boards and academic institutions entitled to judge scientists for positioning and grant allocation [11]. The IF has thus accumulated huge strength and importance, mainly implied by its, at least to a degree, undue application as an index of overall scientific quality.

Today, a considerable part of the scientific community is involved in a frenzied race beyond reason, called by some "the impact factor game" [1, 12]. Editors strive to increase their journals' IF in order to gain influence in the field of research and scientists seek to profit from publishing in top IF journals. Science publishing is a potentially profitable business and therefore dominated by commercial publishers rather than academic institutions, scientific societies, and nonprofit organizations. In this article we sought to summarize for the scientific community common "tricks" used by a portion of publishers and editors to boost their journals' IF artificially. Publishers often forget that the IF was designed as a measure of quality, innovation, and contribution to scientific advance and, instead of trying hard to improve their journals in terms of scientific quality, they take advantage of certain design flaws and disadvantages of the IF that permit a degree of artificial and arbitrary inflation of this index. Eugene Garfield wrote in an editorial comment that in 1955, when he conceived the idea of an IF, he expected that it would be used constructively, while recognizing that in the wrong hands it might be abused [5].

Regardless of the efficiency of the IF in judging scientific journals objectively, we believe that bias originates mainly from misuse as well as abuse, and thus we will try to discuss the most common practices of engineering and manipulating the IF undertaken by some

Table. 1. Top-ten in journal IF manipulations

1. Requiring revision of the manuscript references section and inclusion of articles published in the editor's journal or affiliate journals
2. Publishing summaries of articles with relevant citations to them (usually in the form of "what was published in the journal last year")
3. Inflating self-citation through editorials and readers' comments on published articles
4. Publishing articles that add citations to the nominator but which are not counted as "citable"
5. Publishing a larger percentage of review articles over less-cited articles, including original research and, especially, case reports
6. Rejecting negative studies, regardless of their quality
7. Rejecting confirmatory studies
8. Favoring the acceptance of articles originating from large and scientifically active research groups as well as articles with a large number of authors
9. Attracting the work of renowned scientists and leaders of research regardless of the real quality
10. Publishing mainly popular science articles that deal with "hot" topics

publishers and editors. These strategies mainly take advantage of the form of the equation that defines the IF, i.e. the number of citations received by a journal in a certain year for articles published during the two preceding years divided by the number of "citable" articles published by the journal during the same two years [4]. All definitions of "citable" articles as well as calculations of the IF are made by the ISI. Thus the practices that tamper with the IF figure attempt either to increase the nominator or decrease the denominator of the above equation (Table 1).

Perhaps the most questionable editorial policy used to inflate self-citation rates is that in which editors suggest or even require revision of the manuscript references section to include specific relevant articles published in the editor's journal or affiliate journals. This practice, fortunately undertaken by a small minority of scientific journals, is not only potentially insulting to the authors, but may also cancel the original meaning and value of references in scientific writing. We have already openly expressed our disagreement with such an editorial policy and called upon editors' sense of responsibility and science ethics to abandon it fully [2].

Self-citation substantially influences the total level of a journal's citation and thus plays a major role in the formation of the journal's IF. Journals inevitably contain some reference to their own articles. The ISI reports a mean self-citation rate of 12.41% for the covered journals [9]. However, certain editorial policies can boost self-citation and distort the true ranking of the journal in the scientific literature. The ISI claims that a self-citation rate of 20% is characteristic of most high-quality science journals [9]; however, some editors systematically try to enhance these numbers by self-citing their journals' articles in any given circumstance, usually by publishing summaries of past publications in the form of special journal articles at the beginning of each year. It is noteworthy that this practice may produce an inflation of up to one point (1.0) of the IF of the journal. To understand the effect of such a strategy it should be mentioned that 45% and 60% of the 6164 and 1768 journals included in the "Science" and "Social sciences" 2006 edition of the Journal Citation Reports have IFs of less than 1.0. Certain journals cite, in the form of a monthly commentary/editorial summarizing the published material, every article published in the given issue of the journal, although it should be acknowledged that this strategy does not have an impact on the most commonly used form of the IF that refers to citations to articles published in the journal within the previous two years.

Decreasing the denominator of the IF equation is perhaps the most efficient way to boost the prestige of a journal. Although the process of defining which articles are "citable" (articles that are included in the denominator of the IF equation) has not been clearly described by the ISI [1], it is well known to the scientific community that publications without an abstract and/or with a limited number of references are generally not included in the denominator of the IF equation. In brief, news articles, editorials, letters to editors, correspondence, and errata are the types of articles that add citations to the nominator while at the same time are not counted as "citable". Some publishers even require that all communications (letters) submitted for publication in their journal refer to past articles of the journal. This way they ensure that the self-citation rate is enhanced and the journal's IF is substantially inflated. This strategy has an effect on the most commonly used form of the IF when the correspondence refers to articles published during the previous calendar year(s). On some occasions, authors of original research articles may be asked to retract the abstract and cut down on the references. Articles are thus not counted as "citable" by the ISI, yet we all know that they may be cited.

A very efficient editorial policy that increases the IF is publishing a larger percentage of review articles [13]. Reviews, in contrast to original articles that sometimes remain uncited for many years, frequently receive a considerable number of citations. So it comes without surprise that 60% of the top 25 journals, as ranked by the ISI impact factor, are journals publishing only reviews and summaries of past research. Although the educational value of these important journals is unquestionable, someone may at the same time ask the simple question whether these journals are of higher scientific quality and overall value compared with journals with considerably lower IF that publish the best original research. Subsequently, editors who are willing to tinker with their journal's content in order to engineer an inflated IF may favor the submission of reviews and technical reports that attract citations and refuse publishing certain types of articles, especially educational case reports and essays, which are less frequently cited.

Editors are often reluctant to publish studies with negative or confirmatory results [6]. Such studies do not draw the same level of attention and number of citations that original positive-result studies attract. However, both types of studies make considerable overall contributions to the advancement of science. A negative and confirmatory study may be identical, in the experimental procedures followed and the level of research and scientific standards set, to a positive study. However, in many circumstances it is treated with a strongly biased way by the editors and reviewers [7]. Most prestigious and top IF journals reject the submission of negative or confirmatory studies regardless of their quality, considering that they would not profit from such publications. Still there are certain exceptions to this rule. For example, PLoS ONE as well as several BioMed Central journals have taken a leadership role in publishing any methodologically correct study, including negative and confirmatory studies.

An important part of the citations attracted by a certain article originates from the author(s) of the article, especially in the case of low-IF journals [8]. The "eigenlob" author self-citation phenomenon [3] is of great importance for the calculation of the IF. Taking into consideration that authors may inappropriately use a large number of citations to their own previous work, journals often choose to publish articles written by scientists with high research productivity and frequent coauthorship. This way they receive a considerable number of citations, originating from the authors' future works, especially by self-citation within two years, contributing to inflation of the journal's IF. Furthermore, the greater the number of authors of a certain article, the more self-citations it will receive. This suggests that publishers of scientific journals may favor the acceptance of papers originating from large and scientifically active research groups and reject papers written by scientists who are less often contributors.

In some cases, science is judged by its wrapping rather than by its value [13]. Scientists thus try to gain prestige and recognition by publishing their work in top IF journals. This goes both ways. Publishers seek to attract the work of renowned scientists and leaders of research, believing that their recognized and landmark contributions to science guarantee that future work will retain the highest standards, will receive special attention, and thus high citation rates. However, we believe that peer review should be fair regardless of the researchers' past work. The author's scholarly work and ideas should be submitted to scrutiny and be judged according to uniform criteria. Fairness and equality in scientific publishing means that all research work submitted to a journal be treated by the editors and reviewers on its own, and that the referee's judgment not be unduly biased by the author's reputation.

It is well known to those involved in science publishing that IF figures are comparable only within the same field [5]. Comparative analyses among different research areas should therefore be adjusted to take into consideration the citation density (mean number of citations per article), half-life (number of years, prior to the current, covering half of the citations given to the journal during the current year), and special citation practices that are specific and unique to each scientific field [5]. However, even within a certain discipline there are specific areas of higher intensity of research activity and publication rate, a kind of scientific trend, sometimes attracting only precarious and superficial interest. The popular science papers that deal with "hot" topics are not only citation attractive, but also have small citation half-life, receiving most of their citations within less than two years. Even if such an article does not become a landmark contribution to science, it is certainly IF--friendly. Many publishers aiming for a short-term citation gain therefore adopt an editorial policy of favoring the publication of articles in areas of high research interest and popularity, at times regardless of their true scientific value. They even sometimes overlook, in favor of such papers, work that could in time contribute a lot more to science and even become classic, receiving a considerable number of citations later, sometimes decades after they are published.

The temporal window for citations to be included in the IF calculation is only two years. When a manuscript is finished and submitted for publication for the first time it generally contains many up-to-date citations that can substantially contribute to the IFs of all the cited journals [13]. Considering that articles submitted to a journal tend to include in their reference section a lot of citations of the journal's previous publications [10], a short publication lag is to the profit of the journal. Thus an editorial policy that favors a fast peer review process is not only welcome by authors but also profitable for the journal even if the editor decides not to publish the article in his journal.

We would like to emphasize that our view is that editors and publishers are understandably concerned about the quality, prestige, and even commercial success of their scientific journals. Furthermore, we believe that the IF is perhaps the most successful index used to date that measures and quantifies journals' quality and serves at the same time as a marketing tool. In fact, Garfield's simple idea has served various needs constructively for decades and helped publishing move forward in an endeavor to increase quality and popularity. The scope of this commentary is to point out the most common practices of engineering and manipulating the IF undertaken by a minority of professionals of the scientific publishing industry. We think that such practices, if not scientifically unethical, are at least questionable and should be abandoned. Editors and publishers may, on the other hand, strive for quality through fair and thoughtful selection of papers forwarded for peer review and editorial comments that enhance the quality and scientific accuracy of a manuscript. Finally, university administrators who serve on faculty appointment and promotion committees should take cognizance of the potential manipulation of the IF in their quest for

"objective data" to evaluate academic merits and scientific productivity. The same can be said for faculty and university administrators who serve on institutional research committees that assess faculty for receipt of research funding as well as institutional administrators who may wish to use the "collective faculty IF" in determining departmental budgets and funding.

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