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Editorial

What You Have Always Wanted to Know about the Impact Factor and Did Not Dare to Ask

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The Impact Factor (IF) is the mainstay tool in scientific publication. It is a bibliometric tool that has become very popular among academic people. This tool was created by the *Institute for Scientific Information* (ISI) to determine the impact of journals among the scientific and medical communities. About 6000 scientific and medical journals are included in this citations measurement by the ISI.

The IF is defined as a journal's number of citations over a period of time, divided by the number of ''citable'' articles published during the same period of time. Usually, it is based on papers published during the two previous years, dividing the numbers of citations by the number of articles published.

$$\mathrm{IF} = \frac{\text{cites in 2004 of articles published in 2002 \& 2003}}{\text{articles published in 2002 \& 2003}}$$

For example, if a journal had published 100 articles in 2 years (original, reviews, editorials), and these were cited 50 times in the 6000 indexed journals, its impact factor would be 0.5.

Please refer to Fig. 1 for the calculation of the *European Urology* Impact Factor in 2004.

The IF is based on the following principle: the more often articles of a journal are cited, the more often is that journal read. The IF is thus an important tool for the editorial policy, for publishers and for the editorial board of a journal. Usually, their task is to improve and increase this index considering that the higher it is, the more it is supposed to be read and thus it will increase the number of subscriptions. This may explain that journals belonging to scientific societies or independent ones sometimes recommend to the authors to cite, in their references, articles published in their own journal. This attitude can of course bias the value of the IF. Self-citation plays a similar role although ''percent self-cited index'' can be analysed separately to avoid this bias.

In several universities, academic and scientific organisations, the IF is used to quantify the value of a person/author or of a research team by looking in which journal they published referring to its IF. To be accurate, this approach pre-supposes that the quality for paper is directly linked to the IF. However, very few works have studied this aspect with an adequate methodology.

For instance, the *European Lung Cancer Working Party* has studied the relation between the IF and the methodological quality of articles [1] for meta-analyses and systematic reviews performed during a period of 10 years. The statistical analyses performed show that the correlation between the quality scores, established according to two different models (the one described by Chalmers and the one by their own group, both having a good correlation) was weak for the journals where these studies were published [2]. This quality scores takes different criteria into consideration like the method of randomisation, the scientific design, the study, the analysis of the results according to their response, the patients characteristics, and the analyses of the survival in randomised studies. The correlation coefficient between the quality scores and the IF was never above 0.40. Journals like the *JNCI* (IF 13), *Annals of Internal Medicine* (IF 10), the *JCO* (IF 8), and *Annals of Oncology* (IF 3.3) are journals that publish articles of very high quality and have an IF of half or even less than 1/3 of journals like e.g. the

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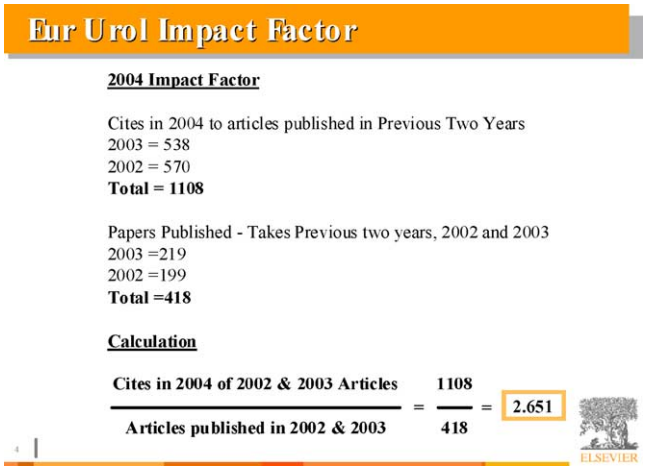


Fig. 1. Calculation of the 2004 Impact Factor for *European Urology*.

New England Journal of Medicine (IF 28), although the quality scores are quite equivalent.

The size of a journal is thus of importance; the more articles it contains, the lower can be its IF. However, non-specialised journals dealing with different aspects of medicine (JAMA, Lancet, New England Journal of Medicine) are clearly more frequently cited.

For instance, a journal which is published only 4 times a year, with less than 10 articles, can have a high IF, even if only 3 or 4 excellent papers are frequently cited. This boosts the entire IF of the journal, balancing the few good papers with numerous poor ones. The opposite is of course similar: for a journal that published huge numbers of articles every week or every month of an average good quality, the total IF might be quite low since many other papers will balance it negatively, thus generating a negative effect on the IF.

The type of articles may also influence the IF (see Fig. 2). For example, review articles have a higher IF because they are cited more frequently than full original papers. The time after publication (years) is also significantly longer for citations of review papers than for original studies [3].

A methodological analysis of the literature has allowed the establishment of a link between the IF, the origin of the authors (American/European), (large randomised) studies reporting positive or negative results. It has also shown that the IF is not well correlated with the quality scores of these studies. For instance, American authors tend to publish their work in American journals with a higher IF, also citing European journals less frequently.

These methodological analyses inspired from the principles of ‘‘evidence-based’’ medicine show that one cannot evaluate appropriately and objectively the quality of a scientist or of a team based essentially on the IF of the publication, which remains essentially a bibliometric tool that evaluates more the journals than the authors. The assessment of the value of a scientist cannot just be based on the addition of the IF of its different publications, but should also take into careful consideration, in a more qualitative approach than

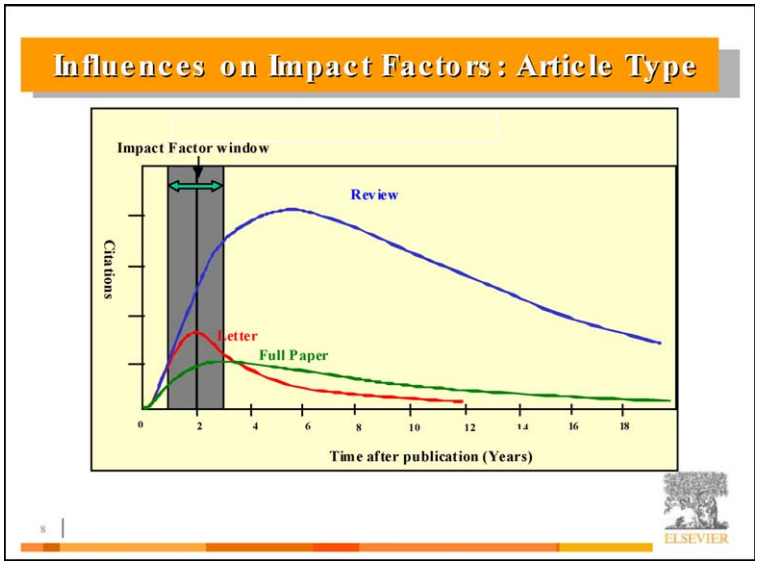
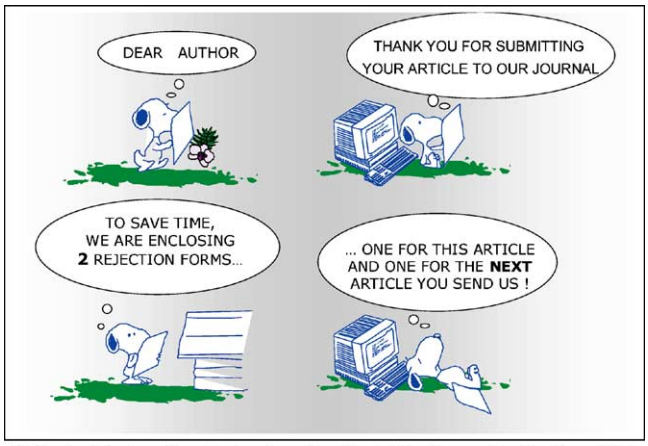


Fig. 2. Influences of different types of articles on Impact Factor.

quantitative one, its curriculum vitae and other important professional qualities.

The exponential development of the use of the Internet, and the ease of electronic cross-linking between different journals and topics will certainly have an increased influence on citations.



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Interestingly also, when analysing the visits and downloads of articles on the web, about 90% are limited to the abstract. This questions the future evolution of publication in paper journals. One main advantage of the electronic publication is that there is no limitation of space. Indeed, several journals already publish case reports, or less important information, in their electronic version only. This is of course a way to attract authors, but rarely readers!

The IF has other potential applications since it can help libraries in the choice of their subscriptions. It can also be used indirectly, through the citation analysis, to analyse the scientific value of a medical speciality, or the value of a department through its publication and also analyse the origin of papers per country or university in a specific journal.

But frustrated authors should keep in mind that a journal is primarily made for those who read it and not just for those who wish to publish in it.

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