Notes

1. Increasing the non-articles in a journal ***increases*** its impact factor, which includes ***all*** citations in its numerator, but only "articles" in its denominator. Therefore a journal with highly-cited non-articles has an overestimated impact factor. For instance, the data for *TREE* Vol.14 (graphed on the previous page), suggests that its impact factor is exaggerated by 29%. Typically the bias is 5% to 40%.
2. In some research areas it takes longer for research results or theories to be rigorously tested or adopted. You cannot compare a scientific field where experiments take months or years to mature, with one where experiments are completed in hours or days. In some fields, e.g. molecular biology, research is expected to become obsolete quite rapidly, whereas research in mathematics is comparatively permanent. Therefore the impact factor of the *average* molecular biology journal is much higher than that of the *average* mathematics journal (Seglen 1997).
3. The number of references per paper varies between fields. The average molecular biology paper has more references than the average mathematics paper — another reason for the difference in their impact factors. Even within the same field, there can be a marked difference between subfields in their number of references per paper, even in the same journal (Seglen 1997).

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Seglen, Per O. 1997. "Why the impact factor of journals should not be used for evaluating research," *British medical journal* Vol. **314** (No. 7079): 498-502 (15 Feb).

Need Further Help?

If you need further help or specific advice, please contact your Subject Librarian

or Michael Parkinson, Mathematics & Statistics Subject Librarian
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There are also the guides: *A helping hand with your evidence portfolio (EP)*
Web of Science
Journal Citation Reports

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Journal Impact Factors

*This is a guide to some technical terms used by the **Journal Citation Reports** database (JCR), published by Thomson ISI. The latest version is JCR2003.*

Journal impact factors are intended to evaluate the relative standing of journals within a particular field or subject. There are 170 subjects in the Science section of JCR, spanning 5907 journals; with 54 subjects in the Social Sciences section, spanning 1714 journals.

*Thomson ISI also produces the citation database **Web of Science**, which covers the above science & social sciences journals, as well as serials in the arts & humanities: over 8000 journals in total. Both **Web of Science** and **Current Contents** have links to specific JCR data from the full record of any item published in a journal covered by JCR.*

Impact factor

The impact factor of a journal is intended to measure how often ***on average*** authors cite **moderately recent** articles from that particular journal.

$$\textbf{2003}\ \text{impact factor} = \frac{[\textbf{\textit{All}}\ \text{citations to}\ \textbf{2001-2}\ \text{issues}]}{[\text{number of "articles" in the}\ \textbf{2001-2}\ \text{issues}]}$$

The term "**article**" is undefined, although it explicitly includes review articles; and often a journal can have peer-reviewed referenced papers that are not considered articles by ISI. Letters or editorials are not counted, even if they generate many citations.

Immediacy Index

The immediacy index of a journal is intended to measure how often ***on average*** authors cite **very recent** articles from that particular journal, and hence how rapidly the average paper from that journal is adopted into the literature.

$$\text{2003 immediacy index} = \frac{[\textbf{\textit{All}}\ \text{citations to}\ \textbf{2003}\ \text{issues}]}{[\text{number of "articles" in the}\ \textbf{2003}\ \text{issues}]}$$

Cited Half-life

The cited half-life is the ***calculated*** point, or age in years, where 50% of the citations are under that age and 50% of the citations are over that age.

Example: *Nature Genetics* has a cited half-life of 4.7; and all the 46,998 citations to it during 2003 may be broken down as follows:

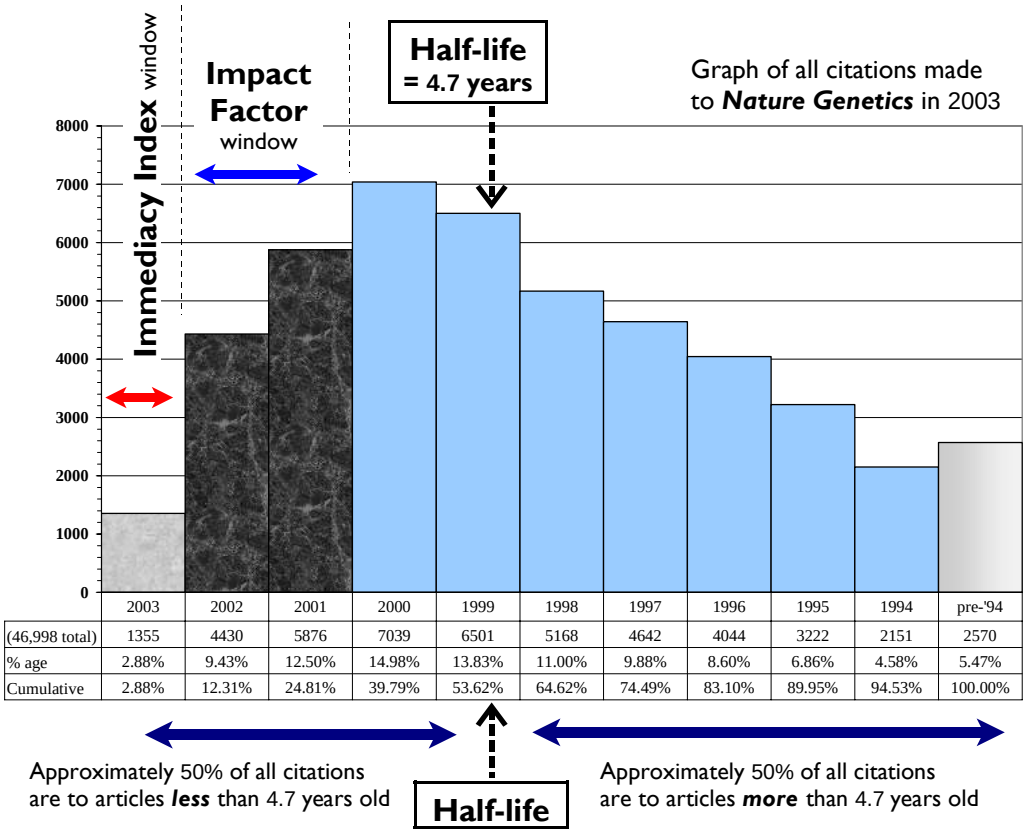
39.79 % of citations are to issues for 2000 or later
13.83 % of citations are to 1999 issues
46.38 % of citations are to issues before 1999 — see the graph, next page.

Example: the cited half-life of the *Bulletin of the American Mathematical Society* is given as >10.0 indeed only 13.9% of all the citations to it in 2003 were for issues after 1993.

Comparing journals by their impact factors

Within each JCR subject, or field, there is a rough correlation between journal impact factors and perceived **quality**: more prestigious journals usually have ***higher*** impact factors. However there are many reasons, deliberate or incidental, why otherwise similar journals can have very different impact factors.

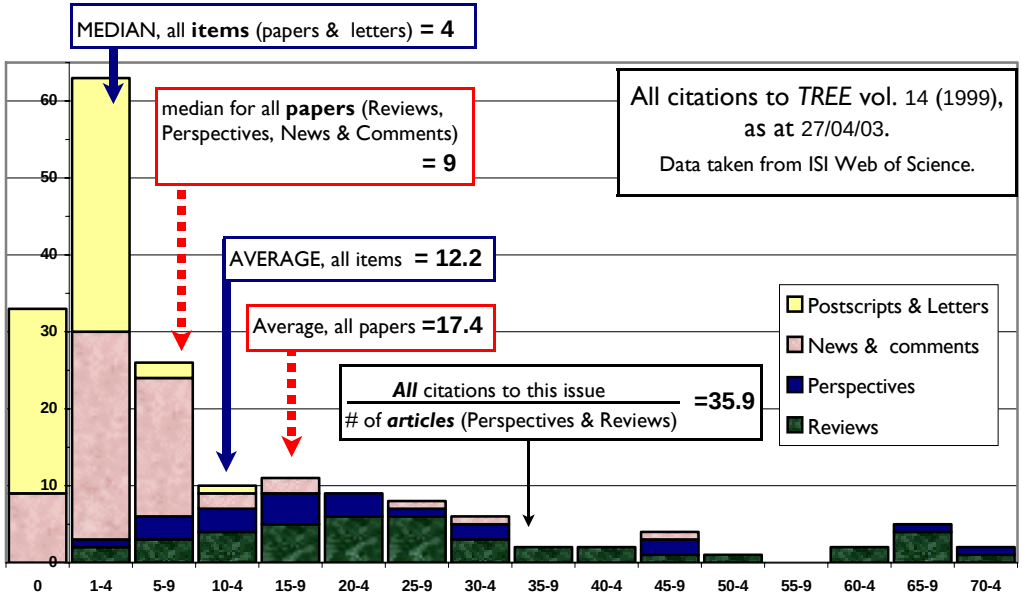
- Journals with **reviews** have higher impact factors.
- The impact factors are ***biased*** estimates, but the proportional size of the bias ***varies***, even within the same JCR subject. [see *Note 1*]
- Journals in fields with a high turnover of research or developing technology usually have larger impact factors & immediacy indexes, but shorter half-lives. [see *Note 2*]
- Avoid comparing journal impact factors from ***different*** fields or JCR subjects. Comparing impact factors can also be unwise if a JCR subject covers several sub-specialities. [see *Note 3*]



	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	pre-'94
(46,998 total)	1355	4430	5876	7039	6501	5168	4642	4044	3222	2151	2570
% age	2.88%	9.43%	12.50%	14.98%	13.83%	11.00%	9.88%	8.60%	6.86%	4.58%	5.47%
Cumulative	2.88%	12.31%	24.81%	39.79%	53.62%	64.62%	74.49%	83.10%	89.95%	94.53%	100.00%

A journal's articles are cited unequally.

The impact factor intends measuring the ***average*** number of citations, in a given window of opportunity, but few articles or papers are comparatively average. Most papers are seldom cited, even when the impact factor is high. For a scientific journal, half the citations come from merely 15% or so of the total articles (Seglen 1997). Here is a typical example of this skewed distribution:



Most items are cited much ***less*** than the average suggested by the impact factor. A journal's impact factor does NOT measure the value of a specific article or author published in that journal (Opthof 1997, Seglen 1997).

Limitations of journal impact factors

- JCR covers some subjects less extensively than others.
- Some NZ journals are not in JCR, because they are less relevant to the international or American world.
- Journal impact factors can NOT be used to evaluate researchers or academic departments.

To evaluate the use of an author's published research, study instead the actual citations of that material as covered by **Web of Science**.