



# Limits on Research Article References: Do they make Sense in the Modern Era?

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### Opinion

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The number of research articles published in journals dedicated to original peer-reviewed scientific research have both exponentially expanded in the last couple of decades. In parallel, many of the new scientific publishers as well as some of the older prestigious journals have either switched or expanded their online footprint and adopted a mandatory or voluntary open-access model. This has led to rising visibility of research conducted in many smaller institutions, as well as a general increase in access to cutting-edge research to many under-privileged sections of the research fraternity. Overall, this is a major step forward for scientific publishing which will enhance the productivity of the future generation of scientists.

References are a key aspect of any scientific article whether it is a research article, letter, review, or report. Traditionally, many of the top journals started as print journals and thus imposed hard limits on the number of references included with any article. This made logistic sense for the print model of publishing. It also forced authors to be extremely selective with which references to include, and ideally would choose only the ones most relevant to their study or review topic. While this would encourage concise writing and discourage gratuitous citations, this has also often served as a pretext for many authors to exclude relevant citations from their competitors. The scale of either the former or latter is difficult to determine but many of my peers and colleagues have personally encountered or indulged in both. Often there was, and still exists, a tendency among certain researchers to attempt to enhance the visibility and popularity of their research and ideology by reducing the visibility of their

competitors' research. Their excuse for doing this tends to almost always be the strictly enforced reference limits by journals, and thus their actions cannot be challenged even though their intentions are transparent. Often, this is a result of differences in interpretation or conflicting ideas which serve as the foundations of a healthy scientific debate. Ideally, even if one disagrees with an idea or model, one must still acknowledge the existence of conflicting ideas in one's area of research to stimulate scientific debate and enlighten new researchers to all aspects of that research area. In reality, this is often not the case as certain researchers can indulge in "pushing" a train of thought or idea even without concrete evidence.

Earlier in publishing, the number of citations for any given article was difficult to determine and hence the number of citations were not a significant measure of research "impact". However, later there was an increased push to determine how important a research study is on the basis of how many times it was cited leading to the citation index metric also known as the impact factor (IF). IF is still the most prevalent and popular metric that the research community uses to judge research impact. With the growing importance and application of the impact factor to determine prestige of journals, papers, and scientific careers of researchers, there exists an urgent need to make the reference section of journal articles as inclusive as possible without compromising on its integrity. This would mean achieving a delicate balance between reducing gratuitous citations, and simultaneously ensuring that all directly relevant research is included in the references. This would also remove the pretext for not

citing competitors' work in order to reduce their visibility and "impact".

Most of the newer open-access, online only publishers are not bound by the limitations of the traditional publishing model that relied on ink and paper. Thus, these publications already allow an expanded reference section, and in general most researchers include references that are directly relevant and few that are peripheral to their study but can add important insights for readers, especially those that are new to that field of research. Personally, I often rely on expanded reference sections to obtain a general sense of where that particular field of research is, and how it got there. This has also helped me significantly as an early-career peer-reviewer, where I am often invited to review articles not directly within my field of expertise, but of which I have some knowledge. Many articles also cite insightful reviews of their field of research which provide a general summary of a possibly large body of research, which would otherwise be impossible to cover in a limited amount of time.

That then raises the question of how print journals would be able to expand their reference section and allow additional or unlimited reference given the strict page limits and prohibitive costs that it will generate? The answer is not simple, but one possibility is to include an online-only supplemental reference section along with the supplementary information. Some print journals already do this, but if others follow their example, it will allow including more references without compromising on costs. To encourage researchers

to effectively use this section, one can impose hard limits on the main references and only allow directly relevant studies there, while also maintaining strict character or word limits in the article. This would hopefully reduce the number of gratuitous citations in the supplement since each time a paper is referenced in the main text, it uses up characters/words. Lastly, if this is indeed implemented, journals must ensure that the references in supplementary information are also automatically included in the various citation metrics databases such as Scopus, Web of Science etc. This implies that the references in the main text and supplemental text are treated as equally important to the study and the only reason to demarcate the two are the page limits for printing. The editors and peer-reviewers are also critical to weed out gratuitous citations and ensure the integrity of the citing process.

In summary, an expanded and inclusive reference section is necessary and conducive to a healthy scientific publishing environment in the modern era that is increasingly leaning towards online and open access publishing. This ensures visibility of research and open exchange of ideas and debate, while orienting researchers with the current state of thinking in the field. It is also important to help reduce the tendency to reduce visibility of competitors' research, by not citing their work on the pretext of reference limits imposed by print journals. This can be achieved by increasing the prevalence of allowing supplemental references to be included in the online-only supplementary information section.

