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The mismeasure of scientific research articles and why MBoC quickly embraced preprints

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In this issue, we publish essays from the 2016 recipients of awards bestowed by the American Society for Cell Biology (ASCB). All of the awardees are being honored, at least in part, for the excellence of their research. But how do we recognize the value of scientific research?

In his criticism of attempts throughout history to quantify human intelligence, Stephen Jay Gould highlighted two fallacies (Gould, 1981): the “fallacy of ranking,” which is the “propensity for ordering complex variation as a gradual ascending scale,” and the “fallacy of reification,” which is “our tendency to convert abstract concepts into entities.” These fallacies also apply to attempts to quantify the value of scientific research articles.

There are many nonquantifiable ways in which a scientific research article may have value—it may provide new information, a new concept, a technical advance, and so on. Often, the value of an article is in the eyes of the reader. The value is definitely not determined by where the article was published. While an article may be of little interest to one researcher, it may provide the key piece of missing information or the key technical advance that allows another researcher to make a significant advance. Moreover, the “value” of a research article sometimes is not appreciated until many years after its publication (Wang *et al.*, 2016). This is why *Molecular Biology of*

the Cell's (MBoC's) founding editor-in-chief, David Botstein, opted to “leave it to future generations to decide whether an article was significant.”

And that is why scientific award committees generally seek to look at, understand, and appreciate a candidate's research rather than just counting citations and tallying up the journal impact factors, or JIFs, of the journals in which the work appeared.

WHY MBoC EMBRACES PREPRINTS

Posting unrefereed manuscripts on preprint servers has been common practice in the physical sciences for 25 years and is rapidly catching on in the life sciences (Berg *et al.*, 2016). While some journals are hesitant to consider manuscripts posted on preprint servers, the ASCB's research journal MBoC has no restrictions and allows citation of preprints in the reference sections.

Why would some journals be reluctant to consider manuscripts posted on preprint servers? After all, preprint servers, like poster presentations and research talks at conferences, are just an additional option for communication of results before publication. One reason is that preprint servers are a threat to journals that are slaves to the JIF. This is because certain articles, particularly those in trendy areas, are mostly cited only during a short period of time after publication. When a journal decides to consider an article for publication that was already posted on a preprint server, the journal is missing out on the window of time when that article is likely to get the most citations. In the physical sciences, it is not uncommon for preprints to receive more citations than the final, published,

research article. If a journal dedicates itself to the JIF, rather than to serving science, preprints could be a disaster.

MBoC was started by the ASCB for the sole purpose of serving cell biologists. During the peer-review process, we ask only whether the science is of the highest quality and moves the field forward. Our mission is to serve science, not to jockey for the highest position possible in the journal pecking order. We welcome articles posted on preprint servers, because this practice reduces delays in the communication of scientific results caused by an unpredictable peer-review process. Preprint servers give scientists control over when their results are communicated.

WHY JOURNALS STILL MATTER

While preprints give authors control over when their research is seen by the public, journals still play an important role. For one thing, it is only during the peer-review process that two or three experts will spend several hours thoroughly evaluating the experiments,



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interpretations, and clarity of the writing and data presentation. The monitoring editor—an expert in the field at scientist-edited journals—assesses the author's responses to the reviews, giving the work the final stamp of approval. The reviewers and the editorial board of a journal therefore play a large role in improving and validating the work. Once the article is accepted for publication, it is copyedited to further improve the grammar and clarity and to make sure that the style, language, and abbreviations conform to accepted norms. Many journals also have now adopted author checklists to improve reproducibility (Schwarzbauer *et al.*, 2016). Best practices for how to list on an individual's curriculum vitae articles that have appeared first as preprints and then as peer-reviewed publications must still be established and standardized to avoid

double counting and to allow aggregation of total citations to the work.

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