

Impact Factor and Science Publishing: What Impact Should It Have on Selecting Journals in Which We Publish?

Eric J. Murphy

Published online: 16 April 2013
© AOCs 2013

A year or so ago, I published an editorial about citations. In part, because young colleagues had started the process of citing reviews as primary citations rather than citing the original work. In addition, the fact that in the world of Google and other search engines, we have moved into cite by title or by the contents of the abstract without ever immersing ourselves in the nuances (ok, let's just say reading) of the paper. However, citation of our work is important because our intellectual bank account is our published work and our value is based upon how this work is perceived (or cited) by others in our field. Yet, another important change in the little society we call science is the inappropriate use of Impact Factor (IF) to perceive value of people, of work, and of journals. So I ask you to consider a few questions.

Has the use of IF evolved past what was ever intended by its inventor? What role, if any, should a journal's IF have on whether we choose to publish our work in it? Should IF be used to evaluate the quality of individual work published in any given journal? Should IF be used to evaluate the performance of a faculty or whether a certain person should be hired over another person? Should IF be used to determine who gets a grant and who does not? Of course these questions can go on and on, but why do I raise them? Because it appears that we have collectively fallen into a deep love affair with IF and we run the risk of passing on this ill-advised affair to our students.

In my Science Ethics course (BIMD 516), amongst the many topics taught on ethics, I teach a session about the

rules, written and unwritten, regarding publishing one's work in the scientific literature. One important lecture topic is about the value of IF and what this number means and what it does not mean. Unfortunately, I find graduate students' perception of the importance of IF is much different than many of my colleagues who serve as their mentors and advisors. Similarly, I find that my colleagues, both here at the University of North Dakota and elsewhere have a false perception of what IF means and its ill-conceived use in evaluating individuals' published work or as a measure of journal worthiness.

To put it into perspective, IF is a population statistic that reflects how many citations of a journal's papers published over a two-year period receive during the subsequent year. That is, citations referencing citable material published in 2012 and 2013 will be the bases for a journal's IF in 2014. Or "*The annual Journal Citation Reports impact factor is a ratio between citations and recent citable items published: a journal's impact factor is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years*".¹ Hence, it is not an indicator of potential future performance for any published paper nor is it an individual statistic, but rather a population statistic based upon the general population of what has been published.

Simply put, an IF of 2 suggests two citations on average for each paper published over that 2 year period in the following year. So, is a journal with an IF of 2 half the quality of a journal with an IF of 4? Is it one-quarter of the value of a journal with an IF of 8? Alternatively, does publishing in a journal with an IF of 2 mean that my work

E. J. Murphy (✉)
Department of Pharmacology, Physiology, and Therapeutics,
University of North Dakota, 501 N. Columbia Rd., Grand Forks,
ND 58202-9037, USA
e-mail: eric.murphy@med.und.edu

¹ "Introducing the Impact Factor" sourced from Thomson Reuters: http://thomsonreuters.com/products_services/science/academic/impact_factor/.

published will only be referenced twice, while work in a journal with an IF of 16 will be cited 16 times over that time period? I think we all know the answer is absolutely not. Yet, we more often than not teach our students that there is value in publishing in high impact journals and that they should strive to do so, because publishing in low IF journals is indicative of poor work. Cannot get a job without high IF journals on their CV! Is that true? Or is it a falsely created point-of-view based upon misperceptions of what IF means and for what it should be used? In other words, has academia fallen into a rose colored glasses view of IF in our torrid love affair with this metric?

To make it worse, we evaluate grants based upon the IF of the journals in which the applicant publishes. “Oh my, I think I see a pattern here of low IF journals, no high IF journals here, must be low quality work.” Recently, I had an intramural grant application come back with the comment that I publish in low to mid-level IF journals like, *Journal of Neurochemistry*, *Biochemistry*, *Journal of Lipid Research*, *Journal of Biological Chemistry* and last, but not least, my own journal, *Lipids*. In no way did the individual reviewing the application have a true perspective of my work, but merely inferred that I did not have any work published in journals like *Science*, *Cell*, or *Nature*, not taking into account that publishing in these journals is uncommon for a lipid biochemist. Hence, the conclusion was inferred that my science is not worthy of publishing in these journals and as such is mediocre at best. I think for colleagues around the world that this is often the perception, rather than work should be published in journals that fit that type of work, regardless of its IF.

So I took a look at how many of my 87 peer-reviewed papers are published in *Lipids* (15 or 17 %) and how many times these papers have been cited over the years (231). Of course my first paper on which I was the first author was published in *Lipids* and I am proud to say that my oldest son’s first paper was published in *Lipids*. We are after all a family of lipid biochemists with another son perhaps entering the field. I digress, something to which students have become well accustomed, by the way. Collectively these papers have been cited 231 times or an average of 15.4 citations per paper. Over the period of 2006–2013, I have published 6 papers in *Lipids* and these have been cited 51 times or on average 8.5 times per paper. From 2000 to 2005 I published 4 papers in *Lipids* that have been referenced 47 times or 11.75 times per paper. From 1995 to 1999, I published one paper that has been cited 78 times, but from 1990 to 1994 I had published 4 papers in *Lipids* that have been cited 55 times or 13.75 citations per paper. So, as the last IF for *Lipids* was 2.13, should I publish elsewhere if I want my work cited because it will not be adequately cited if published in *Lipids*?

Clearly, good work is cited, although I do believe that there is an ever growing view that work published in lower IF journals is not as worthy of citation as that published in higher IF journals. However, there is a growing movement to place an emphasis on how many times individual papers are cited, a metric much more reflective of how well work is accepted by the individual’s field. Nonetheless, even this metric is not without issues, as some people in more esoteric fields may do fantastic work that is viewed as key to the field, yet because of the size of the field, not cited to the extent of what might occur in other fields. In addition, paper maturity happens at different rates in different fields and may even depend upon how forward thinking a piece of work might be viewed by the field. Hence, really important, interesting work may very well take some time to overcome the status quo and associated dogma in order to begin to be accepted. This is difficult to predict and is an important point to keep in mind.

There are many reasons that IF is a really bad reason to use as a sole guiding light for journal selection. First, as a student I was taught that journals were classified by tiers and that tier I journals were generally those supported by scientific societies, e.g. *Lipids*. Then there were high end, tier II commercial journals that were well respected mainly due to the editor-in-chief and the rigor they placed on the acceptance of work. Tier III journals were the lower end commercial journals that published just about anything. So journals were ranked by tiers, with the highest being those in which the distinguished individuals of a society served as the editors, on the editorial board, and generally as the reviewers. Hence, there was an elevated level of rigor that was society based, but nonetheless recognized as equal amongst societies. This view of journals’ worth was challenged by the IF generation in which the net worth of a journal was not its editorial board or position in the field, but rather a metric that was derived for one reason but morphed into a “I’ll pick that journal” number.

I often hear that my colleagues, and their young protégées, want to publish in “high impact” journals. The strategy is that one or two “high impact” papers, note not highly cited, but rather published in journals with a high IF, will propel their career forward and in fact be considered like 4 or 5 publications in say a society-based journal. We’re talking the biggest bang for the tax-payers buck, so why should we argue about that point? Simply because the logic is flawed as these young colleagues are driven to revision after revision committing precious capital, intellectual and financial, into these revisions, hampering other efforts in their laboratories. Progress is reduced on other important topics all in the elusive search for that publication in *Cell* or *Nature*.

In the end, I think we have simply lost our way by the deceptive lure of the IF compass. We need to teach our

young colleagues and our students that all work that is of a high quality will be cited regardless of the journal. We need to teach them that more complete work is published in better journals and that this is the one major reason that it is cited more often. Not due to the journal, but rather due to the rigor that the journal places upon the work that is published therein. Work that is less complete is cited less, but often this work is found in lesser journals. Again, not lesser because of some magical number, but less due to the incomplete nature of a lot of the work published therein. Experimental design, interpretation, and quality of the analysis are a huge factor in how well work will be viewed by the field.

As Editors, we should not have our judgment clouded by IF and reject manuscripts based upon a perception of its current value. As a young Associate Editor, I one time handled a manuscript on two novel ceramides from the Patagonian star fish. It took me 6 months to find two competent reviewers and in the end the work was accepted. Let's face a simple fact, this work would more than likely be poorly cited, but who am I to predict whether the compounds reported therein might in 10 or 20 years become the next cure for cancer? How can I predict such a worth? This one paper was a key teaching point for me as I began to become acquainted with my role in peer-review.

Now as the Editor-in-Chief of *Lipids* I must constantly hold fast to some key, guiding principles. One key principle is that *Lipids* has been and will continue to be a

repository for analytical oriented papers. We house a lot of the world's data on lipid composition of various cells and organisms and will continue to do so. Frankly these papers are not loaded with Western blots and countless experiments testing a mechanism, but nonetheless these papers describe, oh yes the word descriptive study comes up, key elements important to our field and to the world.

Additionally, I will resist the urge to reject manuscripts based upon a preconceived notion of its potential, projected worth. This does not mean we are interested in publishing papers merely demonstrating an incremental advance or in the papers that demonstrate what has been repeatedly done by others. But what it does mean is that we'll continue to publish papers about unique lipids from the Patagonian star fish or other work that might be judged as too esoteric to elicit many citations to support raising our IF. I have resisted and continue to resist becoming just a review journal or publishing reviews that are not from those distinguished in the field merely as a means to game the system. No, I would rather think that business at *Lipids* is done in the absence of the lure of the love of the IF.

So, I suggest that we take a little IF break. Look at journals through the lens of what is published therein and ignore the population statistic as a guiding light as to where our work should be published. As we ready ourselves for another season of baseball, just go with the pitch, don't try to pull everything down the line.