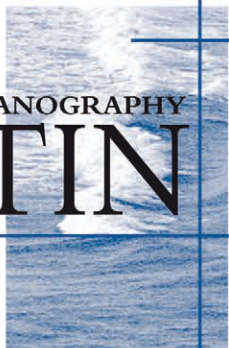


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THE PARADOX OF THE PUBLICATION

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I think everyone would agree that we are now faced with a bewildering variety of journals. To paraphrase Hutchinson's Paradox of the Plankton, "How do so many journals co-exist?" All these titles persist only because we as authors give them (or sometimes pay them to take) our manuscripts. When we choose a journal there are probably a limited number of factors or characteristics considered, analogous to ecological niche parameters. We are, after all, scientists and probably like to think of ourselves as rational, discriminating consumers. But is the decision simple, based on a few more or less quantifiable parameters, like deciding where you buy fuel for your car, or is it a much more complicated 'fuzzy' choice involving subjective factors, rather like choosing the model of car you drive?

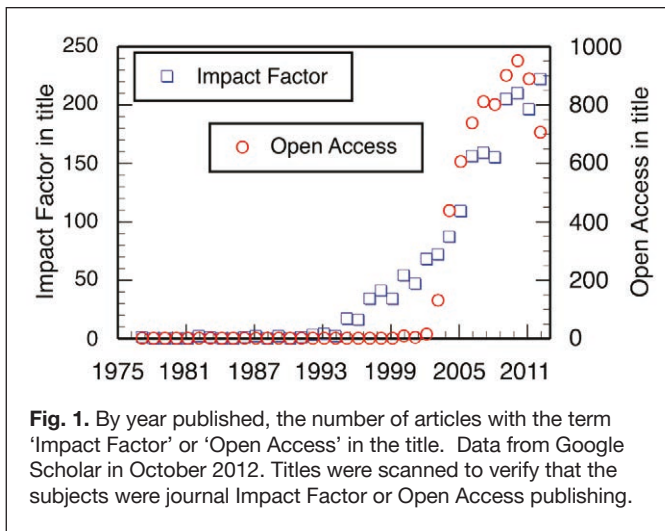
There are only a few brands of gasoline but an enormous variety of cars sold. The plethora of journals in the market suggests that decisions made by scientific authors are not simple calculations but rather complex individual choices. But exactly what are the considerations? Quite high on the list one naturally places the almighty Impact Factor and the newly-mandated Open Access, given the demands of funding agencies. However, is this the case?

Here I present the results of a small investigation. I attempted to determine the relative importance given by authors to various characteristics of a journal. The goal was to identify the most important journal characteristics among roughly comparable journals and to see if there is a clear hierarchy of factors used by authors in selecting a journal for their work. But first, a little background, revealing my motivation or the events that piqued my interest in this topic.

A few months ago I was asked to review a manuscript submitted to a new, obscure pay-for-publication Open Access journal. The paper was by a well-known colleague and was rather good. It did not appear to be one of 'left-over data', a 'salami slice' publication or a previously rejected manuscript. The online journal has not yet any Impact Factor and charges about \$1500 for the publication of accepted manuscripts. The paper, and another article in this new journal by yet another established researcher, could have gone to any of several traditional journals, all without any publication charges, of various Impact

Factors, and even one with free Open Access. Clearly, the authors had considered things other than Impact Factor, or cost of Open Access, when choosing a journal for their papers.

We talk a lot about the importance given Impact Factors, and the changes in publishing, moving inexorably towards Open Access. However, it is worth recalling that neither of these was given much thought a few years ago. In the “old days”, preceding our reliance on the Internet and the introduction of Open Access (only about the year 2002), choices and reading habits were much more limited. Remember reprint request cards, *Current Contents*? Each field had a few core journals and one tended to publish in the same journals addressing mostly the people in one’s own field. While there has always been a hierarchy of prestige, the Impact Factor of journals, although catalogued and published since 1975 was by and large unknown to most of us. Communicating our results to people outside of our own well-circumscribed community was rarely a major consideration. Just how quickly the terms Impact Factor and Open Access appeared in our vocabulary and the place they now occupy can be seen in Figure 1 showing their occurrence in the titles of article since the mid-1970’s.



Title	Year Founded	Size (articles/yr)	Acceptance rate	Processing time (months)	Impact Factor	Open Access Charge
<i>Antarctic Science</i>	1989	60	60-65%	7±3.5 range 3-12	1.556	\$2700
<i>Polar Biology</i>	1982	150	50-60%	4.9±4.9 range 3-9	1.659	\$3000
<i>Polar Research</i>	1982	40	66%	11±3.1 range = 3-13 (not public)	1.616	free
<i>Polar Science</i>	2007	36	68%	8.6±3.9 range 6-18	1.508	\$3000

Table 1. Quantitative characteristics of the 4 polar studies journals. The acceptance rates are shown as supplied by the journal editors, the rates do not appear on the journal websites. The processing time is months from submission to posting online of the 15 most recently posted papers (avg±SD and range). The Impact Factor is from the Journal Citation Reports except for *Polar Science* which I calculated based on Web of Science citation data.

Today, how do we choose the journal to which we send our work? Pete Jumars (2008) wrote that authors should be both discriminating and socially conscious. An author should consider not just the Impact Factor of a journal but also the journal’s cost to the consumer by comparing the price per citation and price per article when selecting a journal. He pointed out that ASLO journals stand out when such calculations are made. The arguments for us to consider ourselves as journal consumers and the power we have, as authors, to influence journal price and prestige are clear and persuasive (see Bergstrom & Bergstrom 2006). While we are well advised to consider such factors, it does involve extra work that few of us are likely to do after finally having finished an article.

I was faced with choosing a journal recently when I finished writing up a study of Antarctic tintinnids (organisms of the marine microzooplankton). The work was purely descriptive so I looked for journals specializing in the region of Antarctica or polar studies rather than a very broad audience journal. I found 4 major specialized journals spanning the entire range of publishers – for profit academic, purely commercial, and non-profit: *Antarctic Science* published by Cambridge University Press, *Polar Biology* published by Springer, *Polar Science* published by Elsevier and *Polar Research* published by the non-profit Norwegian Polar Institute. While they have different scopes as indicated by the titles, all carried some papers on Antarctic plankton. The journal *Polar Research* was the only not-for-profit publication and is free Open Access so I chose it without much thought.

Sometime later I thought that I might have been a bit hasty. Perhaps I should have considered Impact Factor? Maybe I should have thought about processing time (the time between submission and first editorial decision or eventual publication online). Taking a second look at the journals, I found that 3 had remarkably similar official Impact Factors (1.556 - 1.659) and the third, though not indexed in Journal Citation Reports has an Impact Factor for 2011 of 1.508 based on Web of Science citation data. None of the journals gave information on the average time to first editorial decision. While comforted in my choice of journals, a question arose. From outside the community of Polar studies, the journals

appear virtually indistinguishable – How do they co-exist? A set of journals serving the same community with basically the same impact factors appeared anomalous. Clearly, considerations other than Impact Factor are used by authors (myself no exception) in deciding where to send their work. Intrigued, I compiled public data on these journals and asked the editors for data concerning acceptance rate of their journal. I included acceptance rate because, like processing time, authors usually have a good notion of these with regard to the journals in their field even when data is not publically available. Table 1 shows that while the journals have very similar Impact Factors there are other characteristics which distinguish them.

The most obvious differences among the journals are size and processing time. The discriminating author might note that there appears to be a negative relationship between the two (Fig. 2). But are such quantitative differences of importance to authors or do perhaps qualitative differences count more?

Large scale surveys, for example an on-line survey open to all ecologists, found Impact Factor to be the most important consideration in choosing a journal, far ahead of a high likelihood of acceptance or decision time (Aarssen et al. 2008). In a survey that targeted editors of ecology journals, a large majority also ranked Impact Factor as very important or important. The editors themselves indicated that rejection rate was not important in their choices but the accessibility and familiarity of the journal was considered by most to be very important or important (Grod et al. 2010). Clearly qualitative factors enter the equation, if an equation exists.

Among qualitative factors, for example, there is the audience of a journal (real or perceived) as well as its historical reputation, perhaps distinct from Impact Factor. To address the question of which factors are of importance among 4 seemingly very similar journals I surveyed the authors of recent papers. For comparability among all 4 journals, only authors of 'biological' papers on Antarctic subjects were chosen. The survey message specifically pointed out that the four journals appear comparable, especially in Impact Factor, and asked why they chose the journal they did.

Authors were asked to rate, in the choice of the journal, the importance of each of 8 factors:

- 1.) Impact Factor, 2.) Cost - page charges for color or Open Access, 3.) Quality of Reviews, 4.) Journal Readership, 5.) Acceptance rate of the Journal, 6.) Speed of Processing, 7.) Journal's Historical Reputation, 8.) My Colleagues Publish in the Journal.

Each factor was assigned one of three grades:

- “A” = very important,
- “B” = somewhat important,
- “C” = not important or did not consider

Knowing nothing about surveys, I decided to ask about 100 authors based solely on the highly subjective considerations that 100 seemed a manageable number and also seemed a fairly large portion of the roughly 300 papers published each year. Requests to rate the factors were sent to 45 authors from *Antarctic Science*, 45 from *Polar Biology*, 6 from *Polar Research* and 6 from *Polar Science*. The small numbers surveyed for the latter 2 titles are due to restricting the authors to those of “Antarctic Biological” papers published in 2012 and 2011 as *Polar Research* became Open Access beginning in 2011. Note that the goal was to see which factors were valued by authors when choosing among similar journals, not to compare the authors of one journal with the authors of another journal. To analyse the data, perhaps overly simplistically, I concentrated on trying to distinguish factors most often deemed ‘very important’ and those most often judged ‘not important or simply not considered’.

Table 2 summarizes the responses received. Admittedly, the small sample size gives poor resolution. However, a fuzzy hierarchy does appear. The subjective consideration of journal readership was most often marked ‘very important’ but was closely followed by a three-way tie of Impact Factor, processing speed, and review quality. While publishing in the same journal as your colleagues was judged most often as ‘not important,’ I was surprised to see both acceptance rate and cost were graded as ‘not important’ more often than ‘very important’. The small sample size makes comparing the authors of the different journals very hazardous (recall this was not a goal) but it does seem that *Polar Biology* authors, compared to the other journal authors, have a particular disregard for manuscript acceptance rate but value processing speed (actually it has the lowest acceptance rate and fastest processing time).

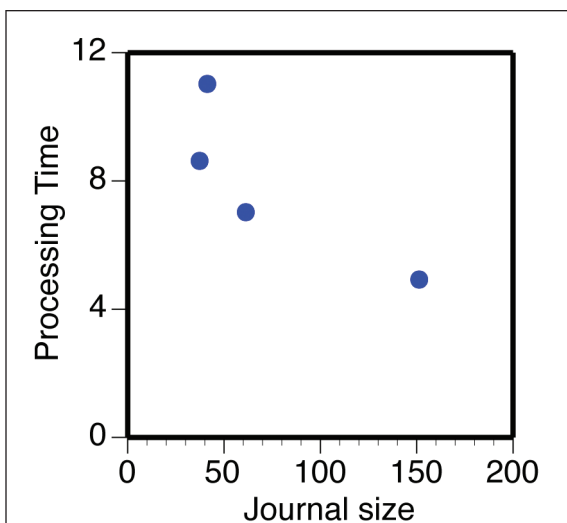


Fig 2. Among the 4 journals for which there seems to be a negative relationship between the number of manuscripts published per year and the average time from ‘received’ to ‘posted online.’

Factor	Overall n = 57	Antarctic Science n = 23	Polar Biology n = 29	Polar Research n = 4	Polar Science n = 1
Readership	47% ±12 27, 11	9, 5	16, 4	1, 2	1, 0
IF	37% ±11 21, 6	7, 4	11, 2	2, 0	1, 0
Speed	37% ±11 21, 10	5, 4	14, 7	1, 2	1, 0
Review Quality	37% ±11 21, 13	7, 4	13, 9	0, 1	1, 0
Cost	30% ±11 17, 22	8, 8	8, 11	1, 3	0, 1
Historical Reputation	25% ±10 14, 14	8, 6	7, 6	1, 2	0, 0
Accept rate	19% ±9 11, 22	4, 10	6, 13	0, 3	1, 0
Colleagues also Publish	18% ±9 10, 32	5, 13	5, 20	0, 4	0, 1

Table 2. Results of the author survey. The percentages (± 95% CI) of respondents stating a consideration is ‘very important’ are given only for the overall pool. Data by journal are shown only for illustrative purposes. The numbers in red are the number of times the factor was marked ‘very important’ and the numbers in blue the number of times the factor was marked ‘not important or not considered.’

One might wonder if categorizing factors as either 'very important' or not ignores a significant middle ground of 'some-what important.' In fact, most factors were judged most often to be 'somewhat important' by the respondents. Thus, if these authors are representative, there is a hierarchy of factors. Oddly enough, Impact Factor looms large despite the fact that the journals have indistinguishable Impact Factors. There are many considerations of middling importance and some surprises such as the low importance given acceptance rate and publication cost. Highest in the hierarchy is the subjective factor of the readership of a journal, a perhaps paradoxical consideration. What is a journal readership today? Most of us no longer follow a set of particular titles (outside of a maybe scanning *Science* or *Nature* and a particular society journal) but when the need arises, we gather papers based on keywords or the equivalent, not paying much attention to the journal.

Overall, the decision of an author to submit a particular journal is far from a simple calculation of Impact Factor and cost. While this conclusion is not surprising, the variety of weights given by authors to other factors, both subjective and objective, is perhaps surprising and in any case heartening. The decision of an author as to which journal to use appears as no more predictable than the model of car she or he purchases. Chances are quite good that in looking over the numbers in Table 2 that you find yourself thinking, 'That's odd, I'm not like these authors.' I take comfort in concluding that the variable valuations we use, and the dynamic nature of many of the factors we consider, suggests that we not immediately headed towards a relatively boring world of just a few journals.

Before closing- I'd like to return for a moment to the event that provoked my curiosity concerning author behaviour: the colleague who submitted a paper to a not-yet-indexed and pay-for-publication Open Access journal. Michael Melkonian, the editor of *Protist* (to which journal the article in question could have gone) offered the opinion that the author's choice was perhaps a complex calculation or a wager. Most new journals have low rejection rates and some (but far from all) will quickly obtain high Impact Factors (*PLoS ONE* comes to mind). The author may have been wagering that the journal will acquire prestige and a respectable Impact Factor. In point of fact, the journal was one of the *Frontiers* titles and the publishers in early March announced a merger of sorts with the Nature Publishing Group. It seems that my colleague had made a wise bet.

ACKNOWLEDGEMENTS

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