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OPINION

Perspectives from early career researchers on the publication process in ecology – a response to Statzner & Resh (2010)

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SUMMARY

1. Two senior ecologists summarised their experience of the scientific publication process (Statzner & Resh, *Freshwater Biology*, 2010; **55**, 2639) to generate discussion, particularly among early career researchers (ECRs). As a group of eight ECRs, we comment on the six trends they described.

2. We generally agree with most of the trends identified by Statzner & Resh (2010), but also highlight a number of divergent perspectives and provide recommendations for change. Trends of particular concern are the use of inappropriate metrics to evaluate research quality (e.g. impact factor) and the salami slicing of papers to increase paper count. We advocate a transparent and comprehensive system for evaluating the research.

3. We stress the importance of impartiality and independence in the peer review process. We therefore suggest implementation of double-blind review and quality control measures for reviewers and possibly editors. Besides such structural changes, editors should be confident to overrule biased reviewer recommendations, while reviewers should provide helpful reviews but be explicit if a submission does not meet quality standards. Authors should always conduct a thorough literature search and acknowledge historical scientific ideas and methods. Additionally, authors should report low-quality copy editing and reviews to the editors.

4. Both early and late career researchers should jointly implement these recommendations to reverse the negative trends identified by Statzner & Resh (2010). However, more senior scientists will always have to take the lead with respect to structural changes in the publication system given that they occupy the majority of decision-making positions.

Keywords: journal quality metrics, peer review, publication culture, young scientists

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Introduction

In a recent opinion article, two senior ecologists summarised their experience of the scientific publication process over the past 10–20 years (Statzner & Resh, 2010). They highlighted specific changes that appear to be for the worse and claimed that technical advances, financial considerations, burgeoning international collaboration and the use of journal quality metrics to rate individuals, programmes and institutions are harming the publication process. Statzner & Resh (2010) aimed at generating discussion, particularly among early career researchers (loosely defined as researchers within 10 years of completing their PhDs), who – if they share Statzner & Resh's (2010) concerns – could assist with 'countering this deteriorating situation'.

Our goal here is to comment on the issues raised by Statzner & Resh (2010) from the perspective of eight early career researchers (ECRs) working in the field of aquatic ecology. Our group originates from six countries (Canada, United States, Germany, Spain, France and Australia) and represents two professional sectors (academia and government) and both sexes. After briefly outlining what is different about the position and perspective of ECRs in the context of scientific publishing, we comment on the six trends described by Statzner & Resh (2010). In addition, we suggest ways in which the scientific publication process could improve and how ECRs can deal with the current situation.

The particular situation of early career researchers relative to senior scientists

A goal of all scientists, independent of career stage, is to generate and disseminate new scientific knowledge. At present, in ecology, peer-reviewed journals are the major avenue for disseminating such knowledge. However, the capacity to conduct science and disseminate scientific findings is strongly influenced by career stage. For example, ECRs may face greater challenges than later career researchers (LCRs) in acquiring funds to conduct research projects. ECRs with non-permanent positions experience intense pressure to produce a high quantity of high-quality publications as they compete for fellowships, employment and tenure (Brischoux & Cook, 2009). This comes at a stage where critical communication skills are still under development. In addition, the early career tends to coincide with the human reproductive period, which increases the pressure on women in particular. At the same time, ECRs may lack experience of the publication process as well as the networks that LCRs have developed throughout their careers. Specifically, we hypothesise that, relative to their senior colleagues, ECRs are usually less likely to:

- participate in peer review as a referee (Donaldson *et al.*, 2010);
- be involved in editorial services for peer-reviewed journals (for example, only 5 of 48 persons from the Editorial Board of *Freshwater Biology* are ECRs (at 16 May 2011; derived from the time since first publication or self-reported CV on the internet) and see Grod, Lortie & Budden, 2010);
- be invited as an author/co-author of opinion papers, reviews and syntheses;
- be invited as an author/co-author for books, book chapters or special editions;
- have the funds to pay publication fees in fee-based journals.

Because of these differences, ECRs may have a different perspective on publication trends. Since early careerists are the future, it seems important to consider their views if any changes are to be made. Below we provide our perspective on the six trends in the publication process in ecology identified by Statzner & Resh (2010).

Trend 1 – Institutions are codifying what constitutes 'good research' in terms of what are 'good journals' and the quantity of articles

Statzner & Resh (2010) criticise the use of single metrics [e.g. impact factor (IF), quantity of articles, citation counts] by institutions such as universities, governments or granting agencies to evaluate the quality of research by individuals or institutions. We generally agree with this observation. In particular, the heavy reliance on IF to evaluate scientific quality is a source of immense concern for us. For the IF to be a valid metric of evaluating the research quality among individuals, the quality of an article (and thus the quality of the underlying science) would need to be strongly correlated with the IF of the journal it is published in. However, there is clear evidence that a journal's IF is only weakly correlated with the quality of the science it publishes in terms of citations for individual articles or scientists (Opthof, 1997; Seglen,

1997). Moreover, absolute IFs are not comparable among scientific disciplines or even sub-disciplines of aquatic ecology (e.g. limnology, hydrology and fisheries), and all IFs are prone to inflation independent of journal quality (Neff & Olden, 2010; Rossner, van Epps & Hill, 2008).

There is a fierce competition for space in high-IF journals because of the prestige associated with publishing in them. As a result, higher IF journals tend to have lower acceptance rates, so there may be a long time between the first submission of a manuscript and its eventual publication if the manuscript is rejected from a high-IF journal. ECRs may select a journal based on speed of publication rather than journal IF more frequently, given their insecure employment and the pressure to publish a large number of articles to enhance competitiveness. In contrast, LCRs can usually more readily afford the time to receive several rejections and therefore can try to publish in higher prestige journals more often. In this respect, expectations that are codified by institutions about what constitutes good research provide a particular challenge for ECRs who are in competition with senior scientists for space in high-IF journals.

An alternative model for evaluating the quality of research and researchers, which is not directly related to the number of articles and IF, is the h-index (Hirsch, 2005). This index integrates the number of publications and citations. To consider the career length of a researcher, the h-index can be divided by the time since the first paper and the resulting ratio is called m-ratio (Hirsch, 2005). While the m-ratio may indeed represent a better single metric to measure research performance compared to the number of articles in high-IF journals, it imposes a negative bias on smaller scientific fields that have lower overall citations rates. Further, the m-ratio does not acknowledge innovative or seminal papers that can have a substantial lag phase before citations accumulate. Finally, it should not be used to compare researchers of different generations, since publication practices can change over time. For example, the main focus of many ecologists today lies on the publication of journal articles, whereas some well-known ecologists of the past (e.g. G.E. Hutchinson, A. Thienemann, R. Margalef) published their findings in books.

One of our particular concerns with metrics for the evaluation of scientific quality is their reliance on the Web of Science and (consequently) journal IFs (Rossner *et al.*, 2008). The Web of Science considers only articles published in ISI listed journals, but many applied ecology journals or conservation and management literature are not included. As ECRs in the fields of both applied and basic ecology, we embrace the notion that some research should be directed towards achieving societal goals (e.g. the United Nations millennium development goals or the Convention of Biological Diversity 2020 targets [Perrings *et al.*, 2010]). In terms of reaching a particular audience, the appropriate place for such research can be in applied journals that have no or lower IFs and citation rates. Indeed, because many practitioners and managers would read but not publish (or cite) papers in peer-reviewed journals e.g. *North American Journal of Fisheries Management*, a paper can have a large impact, which is not expressed in its citation rate (and thus does not contribute to the calculation of the h-index and m-ratio).

Arguably, the best way to evaluate research quality would involve quantitative and qualitative metrics with weights that are based on the needs of the evaluating body. Because LCRs currently dominate bodies that conduct evaluations, they are responsible for promoting changes in the system (Brischoux & Cook, 2009) and we strongly urge them to counter the trends identified, e.g. institutions judging what constitutes high scientific quality based on a limited set of biased indices.

For ECRs, we recommend journal selection based on audience and reputation in a wider sense rather than exclusively on metrics such as the IF. Although an occasional paper in a high-IF journal may be wise to satisfy expectations of some institutions, ECRs should target the most suitable journals to avoid rejection and 'trickling through the system' (Statzner & Resh, 2010). Not every paper can be seminal, and lower 'impact' studies can provide training for ECRs and are usually the starting point for more significant studies. Therefore, we strongly encourage ECRs to publish in both low- and high-IF journals. In the long term, an ECR should aim to develop a clear research programme and identity and to write synthetic, comprehensive papers that build up a good reputation among peers rather than focus on quantitative criteria such as the number of articles or the IF of a journal.

Finally, Statzner & Resh (2010) questioned whether increased publication pressure codified by institutions

and peers decreases the attractiveness of careers in ecology. As ECRs, we admit that pursuing a scientific career imposes a high workload and that the publish-or-perish atmosphere may deter some people (Brischoux & Cook, 2009). Nevertheless, most early careerists regard their path as a vocation rather than only as a profession and it certainly offers more opportunities than 100 years ago (Weber, 1922). Furthermore, the situation is not specific to academia since workload has risen overall in most professions and countries in the last decades (Sennet, 2007). Finally, the general trend towards evaluating the research quality can make the filling of positions more transparent and the research career open to planning by ECRs. We therefore disagree with Statzner & Resh (2010) that the attractiveness of research as a career path is necessarily decreasing.

Trend 2 – Editors want to publish shorter articles

As mentioned by Statzner & Resh (2010), salami slicing (i.e. splitting large complex manuscripts into smaller units) has become more common as a result of (i) the pressure to increase one's publication count (see Trend 1) and (ii) journals requiring shorter articles. As ECRs, we lack a long-term perspective, but have nevertheless witnessed editorial policies that focus on short articles, and some of us have engaged in salami slicing to increase publication count.

A long-term solution is to promote quality independently of quantity and consider this criterion in job placements and research funding. For example, the German Science Foundation (DFG) and the US Department of Defense's Environmental Research Programmes have adopted rules limiting the number of articles by principal investigators listed in applications, to emphasise their focus on quality rather than quantity of publications. Regarding article length, online appendices, if easily accessible, represent a good option for describing additional details of methods (despite journal page limits) and they help to reduce repetition of method descriptions published in separate papers (Statzner & Resh, 2010). Conversely, journals could opt to become exclusively digital. This would alleviate pressure on paper limits, be more environmentally friendly and would reduce expense for journal publishers. As ECRs, we mainly use electronic databases for literature research and note that (for us) printed versions of journals are becoming expendable.

Like Statzner & Resh (2010), we recommend to those both in early and late career that all relevant information and insights generated are published, but in a way that does not promote salami slicing. For more complex studies, we suggest submitting papers to journals that do not impose page limits or allow for extensive appendices to facilitate detailed method description and citation of all relevant work. Independent of whether a journal has page limits, the studies should always be written as clearly and concisely as possible to allow for understanding by the reader.

Trend 3 – The power of reviewers to accept or reject an article has increased

We largely agree with the claim of Statzner & Resh (2010) that editors seem increasingly to rely on reviewers in their decision to accept or reject a paper, which increases the decision power of reviewers. Reasons for this include the high number of manuscripts handled by editors (who often also hold other positions), limited journal space and that editors cannot be experts in all fields (Grod *et al.*, 2010). The trend towards an increasing power for reviewers would not be overly problematic if the quality of the current peer review system was sufficiently high and if reviewers were more aware of journal objectives and target audiences. However, despite peer review, there are still a substantial number of errors in publications (Wager & Jefferson, 2001; Lombardi & Hurlbert, 2009), in addition to major methodical flaws that can remain undetected (Baxt *et al.*, 1998; Schroter *et al.*, 2008; Mayer-Pinto *et al.*, 2010).

Some biases in the system place junior scientists at a particular disadvantage (Cole, Cole & Simon, 1981; Baxt *et al.*, 1998; Rothwell & Martyn, 2000; Schroter *et al.*, 2008). For example, peer review seems to favour manuscripts with more co-authors (Tregenza, 2002), and the acceptance rate depends on the prestige of the authors, their nationality (and thus mother tongue) and their institution (Hojat, Gonnella & Caelleigh, 2003; Ross *et al.*, 2006; Clavero, 2010). Both biases affect junior researchers disproportionately since ECRs may have smaller networks and have less prestige. Although it is unclear whether ECRs are more likely to promote innovations and new

paradigms, peer review can also impede the dissemination of novel ideas (Bauer, 2004; Hojat *et al.*, 2003; Wager & Jefferson, 2001). However, there is no alternative to peer review to control the quality of scientific publications, but we do suggest two immediate lines for improvement of the system, from which both ECRs and LCRs would benefit.

First, editors should reclaim their position and be confident to make the final decision on a paper, which includes overruling reviewer statements and recommendations. This is especially important as several studies have highlighted the subjectivity of reviewers judgments (Cole *et al.*, 1981; Rothwell & Martyn, 2000; Rasmussen, Langer & Alroe, 2006; Neff & Olden, 2006), which may inhibit the spread of innovative ideas. Others have suggested a more thorough monitoring of reviewer comments, either by the editor or by editorial staff, for rude and overtly biased reviews (Mulligan & Raphael, 2010). To avoid an increase in the already high workload of editors that would be associated with the suggested changes, the number of editors could be increased. Such approaches may be supplemented by a system designed to allow reviewers, editors and/or the authors to rate the reviews. This may not only improve the peer review system generally but also specifically aid ECRs when they begin to serve as editors or reviewers since they will have a reference that specifically relates to reviewing. The problem of retaliation by authors for negative reviews is certainly important, but this could be alleviated by focussing on the average ratings of reviewers and the general acceptance/rejection rate recommended by a reviewer. Hence, the rating system could at least be used to identify 'black sheep' in the reviewer community.

Second, the peer review system would benefit from double (authors and reviewers anonymous)- or triple-blind (authors, reviewers and editors anonymous) review. This may alleviate several of the biases mentioned above (e.g. facilitating the acceptance of female first-authored papers: Budden *et al.*, 2008; reducing the trend of accepting papers from near-top-ranked universities: Blank, 1991). Blind review is already in practice in several journals in psychology and medicine (Ross *et al.*, 2006; Budden *et al.*, 2008). The lack of double- or triple-blind review in ecology is surprising, given that only marginal technical and structural changes would be needed. However, blind review is not a universal panacea because the reviewer may still be able to identify institutes and working groups.

Like their more senior colleagues, ECRs should provide impartial, balanced reviews that enable editors to make final decisions based on the review. If graduate courses on article reviewing are not available, LCRs should provide guidance and feedback to junior reviewers on how to write useful reviews. For example, the journal *Marine and Freshwater Research* has a process where ECRs sign up to review several papers and the editor then provides feedback on those reviews. Furthermore, at the 2011 Ecological Society of America annual meeting and the Symposium of the European Freshwater Societies, workshops explored the peer review process and editors-in-chief of various ecological journals (e.g. *Ecology Letters*, *Trends in Ecology and Evolution*, *Frontiers in Ecology and the Environment*, *Ecology*, *Freshwater Biology*, *Aquatic Sciences*) offered advice and guidance (especially) to ECRs. Mentors can also involve their postdocs and postgraduate students in the peer review process and debrief them on the outcome of reviews with which they were involved (Donaldson *et al.*, 2010). Although the quality standards should not be lower in the review of papers by ECRs, editors could potentially request reviewers to be more constructive and specific (e.g. to suggest alternatives) with their comments. It may also be beneficial for editors to allow ECRs to revise or resubmit their manuscripts (potentially for a second round of review) before they are rejected. Overall, more guidance for ECRs at the beginning could pay dividends because a proportion of them will become senior scientists and some will hold editor positions later in their careers and they will be influenced by previous experiences and quality standards.

Trend 4 – Editorial policies are encouraging a reduction in the number of citations and limiting citations to the most recent articles

There is indeed a challenge in trying to balance the citation of historical literature with contemporary articles. We are concerned with this trend given that scientific ideas and methods should be acknowledged irrespective of the date of publication. The trend probably emerges from the digital world, which facilitates a focus on the most recent articles, and some editorial polices encourage that approach (Wilson, 2007; Sarkis, 2009). For example, the default for a search

in Web of Science is to order results from most recent to oldest. Moreover, Web of Science has good coverage back to 1996 but is less complete before that. This leads to a bias towards more recent papers in a literature search that relies only on Web of Science and other digital sources. Similarly, older sources are underrepresented in Google Scholar as they are less covered in the digital world. Generally, older papers are less easily accessible. To counter this, we suggest that historical works should be (i) increasingly archived digitally, as for back issues of many journals and for some topics (e.g. http://www.biodiversitylibrary.org), and (ii) included in scientific databases.

We recommend that ECRs always conduct a thorough database search and also study the reference lists of seminal papers and reviews for an overview of all relevant publications. We also recommend challenging reviewers and editors if they want to replace old seminal papers with more recent literature. New papers should cite all relevant work, including 'outdated' key papers from the past and acknowledge the origin of ideas (McIntosh, 1985).

Trend 5 – Reviewers regularly add comments about the poor language skills of non-native writers of English, and the tenor of reviews has become harsher and less helpful

Most of us have received reviewers' comments on English writing skills, but we are unsure whether reviews have become harsher because of our lack of long-term experience in the review system. Receiving harsh reviews may be especially disheartening for young scientists. Possible reasons for harsh reviews seem mainly to relate to a shortage of time. Authors may submit sloppy papers that have not adequately been proof read, and hard-pressed reviewers write terse, possibly rude, reports (McPeek *et al*., 2009). We have outlined above how the peer review system may be more supportive of ECR development (see Trend 3), and we encourage ECRs to have their papers reviewed prior to submission by an independent senior colleague with expertise in scientific writing in English.

Reviewers should always avoid being rude and editors might consider censoring unnecessarily harsh reviews. Poor-quality English and writing skills are certainly problems for reviewers and readers, but given the differences in writing styles between generations and disciplines, some comments may not be valid but simply reflect preferences in writing styles. We suggest that such comments should be cross-checked in the editorial office before returning the reviewed manuscript to the authors. Moreover, the quality of the research should be the main concern of reviewers as long as a manuscript is understandable and spelling and wording is grammatically correct.

We encourage ECRs themselves to refrain from callous and unhelpful criticism when they are reviewing and to report unnecessarily harsh reviews of their own work to editors. Nevertheless, it should be made explicit when a submitted manuscript's format, methods, style and grammar do not meet the required standards.

Trend 6 – To save money, more copy editing is being outsourced from journal editors to others

The role of the journal editor has undoubtedly changed through time. Rarely do the editors themselves provide detailed copy edits and in many cases copy edits simply do not take place. However, as long as a paper is easy to read and understand, is free of mistakes and the page is professionally set, it probably does not matter to the author or reader, exactly who has done the copy editing. There are certainly errors during copy editing, but mandatory professional copy editing would increase the costs of publishing and ECRs, in particular, already find publication fees for some journals prohibitive. The quality of copy editing can also vary greatly between publishing houses. We are unaware of any study that documents a decline in copy editing over time. Nevertheless, given the increased reliance on technology (e.g. spell checks and grammar tools) and the increased volume of submissions that result from the desire to publish rapidly (Aarssen *et al*., 2008; Neff & Olden, 2010), the suspected deterioration of copy editing may be real. Another potential cause of deterioration is the profit motive of publishing houses, which have outsourced or limited the checking of manuscripts. We suggest that authors comment on low-quality copy editing to journal editors and resist unrealistic time pressures imposed by technical editors at the proof stage.

Conclusions

Publishing is an essential part of science. Deterioration of the publication system therefore threatens the

dissemination of knowledge and scientific careers in important ways. We clearly share many of the concerns identified by Statzner & Resh (2010), and we have outlined several recommendations on how the negative trends can be reversed through cooperation between the generations. In addition to negative trends, there are also positive trends: the increasing digital access to information; shift from quantity to quality in research evaluation; and increasing transparency in evaluations are all examples. Further, the pressure to disseminate science (both through journals and other outlets) is not inherently bad since the majority of research is funded by the taxpayer. However, these positive trends do not negate major problems, such as the inappropriate use of some performance metrics, salami slicing of papers and growing publication pressure on researchers. These potentially lower the quality of publications and slow down the dissemination of ideas.

Mentoring and greater involvement in the publication process would facilitate the development of ECRs and help to rectify some of the challenges faced by ECRs. Given that ECRs are the future, senior scientists should involve their junior colleagues in discussion, action and positions regarding publication and evaluation of science. All members of the scientific community are responsible for developing and maintaining a publication process that is as sound as possible.

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