How to counter undeserving authorship

The average number of authors listed on contributions to scientific journals has increased considerably over time. While this may be accounted for by the increased complexity of much research and a corresponding need for extended collaboration, several studies suggest that the prevalence of non-deserving authors on research papers is alarming. In this paper a combined qualitative and quantitative approach is suggested to reduce the number of undeserving authors on academic papers: 1) ask scholars who apply for positions to explain the basics of a random selection of their co-authored papers, and 2) in bibliometric measurements, divide publications and citations by the number of authors.

STEFAN ERIKSSON

Associate Professor,
Senior Lecturer
Centre for Research
Ethics & Bioethics
Uppsala University

TOVE GODSKESEN

Senior Lecturer,
Researcher
Ersta Sköndal Bräcke
University College
Stockholm, and
Centre for Research
Ethics & Bioethics
Uppsala University

LARS ANDERSSON

Senior Lecturer
Ersta Sköndal Bräcke
University College
Stockholm

GERT HELGESSON

Professor
Stockholm Centre for
Healthcare Ethics
Karolinska Institutet

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Introduction

There is an alarming inflation of scientific authorship, not least an immense increase in the number of authors listed on research papers[1,2,3] and a prevalence of so-called honorary (or undeserving) authors.[4,5,6] The term 'honorary' refers to authors whose inclusion in by-lines misrepresents their contribution; rather than having contributed significantly to the work and drafting of the article, they are included for some other reason (strategic, economic, etc.) without this being made transparent. These practices have been going on for decades: for example, an analysis of a sample of *Croatian Medical Journal* articles showed that less than half of the authors publishing during 1999–2000 seemed to fulfil established criteria for authorship,[7] and the problem just seems to grow.

In a systematic review from 2011, many studies on authorship criteria were shown to substantiate such worries; for example, the probability that an additional author would not satisfy the most widely used and known authorship criteria was 67% for physicists in one study and 65% for pathologists in another.[8] The number of authors has also risen sharply: in 2010 there were more than 1,000 scientific papers with in excess of 50 authors, and the number of papers with more than 1,000 authors rose from 17 in 2010 to 140 in 2011, provoking comments about 'hyperauthorship'.[9] Of course, papers and citations are

increasingly important for scientists, and by being a co-author you can add to the number of both publications and citations. Moreover, according to some studies, the number of authors might positively affect the number of citations collected from a paper.[10,11] This may provide an additional incentive for groups, who might believe these things to be causally related, to overpopulate papers. It is especially tempting when every author gets as much credit from being a co-author as a sole author would. So, although one explanation for the increasing numbers of authors on papers is the rise of collaborative and large-scale research,[12] another is the strategy of adding authors who have not made substantial contributions to the work.

We believe that these practices undermine the function of the research merit system. When authorship does not accurately reflect accomplishments, it becomes harder to choose the right people for academic positions and external funding, thus potentially eroding the quality of research. It also disadvantages those who play by the rules, and tempts people into becoming cheats. Yet another reason for being concerned about honorary authorship is the many problems faced by editors and others involved in misconduct investigations when authors of a reported paper wash their hands of it and do not want to assume responsibility for the paper.[13] As a result, we find a situation where the 'multiplication of the number of authors … has the double consequence of multiplying the credit attributed for the knowledge produced – each author can claim a publication count – and dividing the responsibility for its reliability'.[14] Guidelines such as the 'Vancouver rules', which provide criteria on who should be listed as an author (see Table 1), as well as codes of ethics that condemn questionable practices, all seem to have had a very limited influence on the situation.[15,16]

'these practices undermine the function of the research merit system'

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Table 1. Authorship criteria from *Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals* by the International Committee of Medical Journal Editors

What to do about the problem

Elliott et al. have pointed to the *cultural aspects* that contribute to these practices, such as the desire to avoid conflict, minimal management training, and power issues as to who can influence team decisions. Honorary authorship, it is claimed, often occurs when research teams decide to include additional authors in order to 'promote team cohesion or to avoid difficult decisions about who deserves to be an author'.[17] Thus, approaches for alleviating honorary authorship practices need to go beyond producing more and stricter authorship policies; they should also address such cultural aspects. To do this we need incentives that promote the opposite tendency; we need psychological nudges to restrict the number of authors.

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Structural changes could significantly affect research culture. While measures such as working for contributorship models and creating better, novel authorship policies are valuable and important to develop,[18] they are solutions that primarily have the potential to change research culture in the long term. We believe there is a faster, more effective way to start to counter undeserving authors. We propose two structural but simple measures that could significantly reduce the number of undeserving authors on papers. They could do this by changing behavioural aspects of the research culture.

A combined qualitative and quantitative approach

The first measure is *qualitative*. Today, when scholars apply for academic positions, there is a strong reliance on bibliometric data to evaluate them.[19,20] If some of these bibliometric data are the result of honorary authorships, these scholars often have limited or perhaps no knowledge of the results, methods or central concepts being used in a paper. We therefore suggest that, in addition to bibliometric data, it should be customary in the hiring or promotion process to ask the applicants to give an account of their contribution to, and explain some of the basics of, (a random selection of) the papers they bring up in support of their expertise and accomplishments. The point is not that this would be a superior way to judge expertise, but that it would be a way to expose those who systematically make sure they end up on papers to which they have not contributed substantially. This suggestion makes psychological sense: if scientists knew such questions were likely to be asked, they would presumably be more careful about being 'co-authors' on articles they have not contributed to – as it would be hard to provide a lucid overview of how the articles were created.

The second measure is *quantitative*. As noted, scientific merit is often calculated based on measures concerning the impact of publications. For example, the ResearchGate website displays on every scholar's 'contributions' page the number of articles they have written, by themselves or as co-author, and the total number of citations these articles have received, thus reinforcing the impression that these are the major measures of quality and achievement. Our suggestion does not counter the intellectually dull approach of trying to grasp quality by a few simple measures (which would indeed be laudable if feasible), but it replaces present inflationary calculations with more measured (balanced) scores where both publications and citations are divided by the number of authors. An article with four authors would then count as 0·25 per author, while a sole author would get 1·0. The same division should be used for the calculation of a personal citation score. To calculate such normalized numbers of papers and citations per author is quite straightforward. We already have such alternative metrics, such as SNIP (source normalized impact per paper).[21] Although the merit of such normalized metrics can be questioned,[22] the idea here is, again, a psychological one: to add an undeserving author would result in a lower score, which would make all deserving authors more reluctant to accept such a practice out of pure self-interest.

Possible drawbacks

This proposal will meet some challenges. A possible drawback of this strategy is that some deserving collaborators may unfairly be kept out of papers by the principal investigator or main author(s) to limit the cost of sharing authorship. For example, we know that in general, younger,[23] as well as female,[24] scientists are assigned more limited work tasks and more often given a more insignificant position on the author list, and they may also be the most likely to be excluded. But while the present system flourishes because people participating in it perceive it as a win-win situation, our proposed system might have the effect of energising those scholars who are incorrectly excluded from papers, and their protests would then expose unacceptable practices more often than we see today. There is, however, still a risk that our proposal would result in more frequent exclusion of collaborators with little power. In this regard, it is important to highlight and firmly stand behind the inclusion norm that was added to the latest revision of the Vancouver rules which outline criteria for authorship:[25] 'The criteria are not intended for use as a means to disqualify colleagues from authorship who otherwise meet authorship criteria by denying them the opportunity to meet criterion #s 2 or 3. Therefore, all individuals who meet the first criterion should have the opportunity to participate in the review, drafting, and final approval of the manuscript.'

This means that participants who engage substantially in the project work should be given the opportunity to engage in the subsequent writing/revision and publication of the paper. To bring this about, we need to focus on several things: rigorous training, clearer demarcation of what is acceptable, and a support structure for those who call out the

irregularities. The opportunity to contribute must be introduced as a norm in the education and training of researchers, any deviation from it should be considered a clear case of misconduct (whereas authorship issues seldom are so considered today), and there should be a strong support structure in place (like an ombudsman) to establish a clear, transparent handling of the matter. The long-term success of our proposal is thus dependent on some of the cultural changes discussed earlier. While we believe our proposal will improve things, it needs to go hand in hand with a renewed focus on research cultures, or organizational climate, as Elliott et al. suggested. To foster responsible research conduct is and will be a slow, laborious endeavour (cf. recent suggestions for attending more to the cultural aspects of research integrity).[26,27]

'our proposal … needs to go hand in hand with a renewed focus on research cultures'

Another challenge is that our quantitative proposal can be viewed as being unfair in failing to properly express relative contributions, i.e. how much each author has contributed to the work. This challenge can be met, however. Firstly, it can be noted that the same problem comes with any system where all contributions, minor and major, count the same. More generally, the problem arises for every system where a fixed value is given to the different positions of the paper, whether the same or differentiated – it will be fair to the extent that the standardized interpretation reflects the relative contributions in the specific case, otherwise not. For instance, if the relative values are allocated such that the first and last positions are allotted 40% each of the total value and the remaining positions get to share the remaining 20%, then this will be fair in those cases where the relative contributions are distributed between the authors in exactly this way, otherwise not. So we are not worse off if adapting the proposal given above. Secondly, it is true that some faculties and scholars prefer to assign more weight to certain author positions, presently often the case in medicine where first and last authors are especially recognized. They can continue to do so if they wish, as our proposal does not affect such practices (since the scores proposed are independent of any significance put on authorship order). Thirdly, and importantly, there already is a superior system to handle relative contributions, as many journals now advocate a contributorship model, which presents a way forward that has already been implemented and tested.[28] Such models should be further developed and used. For example, the CRediT project has produced a contributor role taxonomy which identifies specific contributions to published research,[29] which should be implemented more broadly by journals; not least as it is envisaged as a way to influence the co-operative culture of research and promote better incentive structures in academia, something we sorely need.

Conclusion

'we urge that all academic organizations agree to use these simple measures'

This article has suggested that the prevalence of undeserving authors on research papers is highly problematic. To alleviate problems with honorary authorship practices there is a need to address aspects of the research cultures, but also to create incentives for scholars to restrict the number of authors. A combined qualitative and quantitative approach is suggested: 1) ask scholars who apply for positions to explain the basics of a random selection of their co-authored papers, and 2) in bibliometric measurements, divide publications and citations by the number of authors. In conclusion, we urge that all academic organizations agree to use these simple measures to put an end to honorary authorship and the excessive number of authors on scientific papers.

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Abbreviations and Acronyms
A list of the abbreviations and acronyms used in this and other *Insights* articles can be accessed here – click on the URL below and then select the 'Abbreviations and Acronyms' link at the top of the page it directs you to: http://www.uksg.org/publications#aa

Competing interests
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Corresponding author: Dr Stefan Eriksson
Associate Professor, Research Ethics
Centre for Research Ethics & Bioethics (CRB)
Uppsala University, SE
E-mail: stefan.eriksson@crb.uu.se

ORCID ID: http://orcid.org/0000-0001-7486-4678

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