ELEPHANT

IN THE LAB

MOONSHOT

Authorship revised

Short title	Authorship revised
Long title	Authorship revised. Making a compromise between 2.1 and 1.268
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In a series of short analyses we took a closer look on the practice of (co-)authorship in various disciplines, using a Scopus database (see www.elephantinthelab.org). We found significant differences among the subject areas that we analyzed. While in nearly all disciplines the mere number of authors per article increased (2010-2016), the average number of authors per paper in these disciplines varies considerably. If we just look at the amplitudes of our analyses, the mean of authors spans between 2.1 and 1.268 (Schmidt et al. 2017).

First and foremost, the findings point to different working habits and ultimately publishing cultures in the disciplines we looked at. While research in experimental physics can (often) be compared to a car factory, in which hundreds or thousands of researchers work collaboratively on a finding, philosophy resembles an artisan workforce in which often only one single person crafts an idea. Regarding the complexity of the workforce, we therefore assume that in some disciplines it is appropriate to speak of Factory Science (Schmidt et al. 2017).

Nevertheless, the author line can hardly depict this complexity. It provides no adequate information on the qualitative contribution of the single persons listed. Therefore, we discuss some (bold) alternatives of showing the contribution to a scientific discovery.

There are at least three necessary criteria that an alternative should fulfil.

1. It should take into account, that various cultures of scholarly publishing do exist and that the mere number of people involved until a scientific endeavor is ready to be published varies considerably.
2. It should need to acknowledge that authorship or its equivalents are (still) a major currency in the academic reputation economy at the moment.
3. It should make the individual contribution quantifiable.

Alternatives to traditional Authorship

Alternative 1: Orthodoxy

The orthodox understanding of authorship says that only those who actually wrote the paper deserve to be called authors. All others are sentenced to find themselves in citations and acknowledgments.

Alternative 2: Science Factory

Some academic fields—first and foremost (experimental) Physics and Astronomy (Schmidt et al. 2017) or Medicine (Schmidt et al. 2017)—can be described as Science Factories. As within traditional factories it is not only the contribution of the single person who finalized a product, but all contributions that led to a very product which are worth mentioning. Therefore everybody who was involved—directly or indirectly, still alive or already passed away—should deserve to be on the ticket.

If we take our fist necessary criterion serious, neither Alternative 1 nor Alternative 2 is really an option for all scientific disciplines.

Alternative 3: Narrative Science

[This proposal contains product placements.]
What if no one is an author anymore? Some of the data we have analyzed left us with the impression that for some disciplines typewriting their groundbreaking results is only tiresome duty. Why not leave this task to machines then, who already get better and better in narrating the story behind your data?

Obviously, this is also not a serious option.

Alternative 4: The Cake

Why don't we perceive the contribution to a scientific publication as 100 percent in total and then start a calculation: Who did what to come to it and how should it be quantified? What we get as a result is a more or less complex list or cake diagram of all people involved. This marks clearly and transparent that Jane Doe's contribution was 55 % while John's is only worth 14.7 %. This should also go along with a division of citations. The author with most contribution should get most out of the impact in terms of the citation the paper has.

An honorable approach that does in fact correspond with our necessary criteria. But, for us its complexity seems to be a major hurdle.

See for example Plöder (2010) or Lozano (2013).

Alternative 5: Final Credits

When it comes to crediting contribution to a finding, academia could learn from film. In a movie, everyone who contributed—from the lead to the caterer—is listed in the final credits with his or her individual contribution. Similarly, not everyone that is listed as an author on a paper really wrote on the text. Arguably many that are listed have not written a single word yet without their expertise the finding would not exist. As this should be done in a quantifiable manner, we could replace the very unsexy and very unquantifiable acknowledgements with something new. Final Credits in movies do follow an inherent logic though and do have (more or less comparable) categories. What if we introduce four simple categories more to the author's line:

1. Author
2. Contributor (e.g. wrote a paragraph, analysed some data)
3. Adviser (e.g. advisers of early career researchers, colleagues as advisers e.g. on research design, formulation of hypotheses)
4. Facilitator (e.g. acquisition of relevant funding)
5. Supporter (e.g. data collection and data visualization)

See for example: Frische (2012), Brand et al. (2015), Molla & Gardner (2007)

Alternative 6: Entity Approach

Another possible solution would be to just mention the entity you are working for or with: your working group, a group of collaborators, a collective of people, or just the institute you are working for. This is somehow charming because it is something beyond the ego of researchers. You contribute to a collective work and so everybody gets the same attention: the professors, doctoral researches, senior scientists, and technicians. You will never face the problem again, that the head of the institute or director is on your paper as author although he or she never even wrote a word just because he funded the project.

Judging by our findings, scholarly knowledge production is getting increasingly complex. More people are needed to answer research questions. Yet, in times where collaboration seems to be an imperative in many disciplines and in which many are needed to solve increasingly complex questions, academia sticks with the very analogue author principle to show the contribution to a finding. It is therefore hardly surprising that it is still common practice to hand out Nobel Prizes in science to individuals instead of groups of researchers. While the traditional conception of authorship to show the individual contribution to a finding seems overdue for an update, most researchers still seem hesitant. For example: Steven Burgess (2014) from the University of Cambridge asked his Twitter followers if they would support replacing author order on papers with alphabetical listing. More than 60 % of the 1,084 people that answered the poll ticked the "no" box.

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