



Whose scientific work is it anyway? Knowledge production in the socially constructed fuzzy authorship

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1. Introduction

Authorship is typically employed as the supporting evidence for the assessment of research output, shaping career advancement and rewards, and constituting a highly regarded commodity in an intensely competitive scientific environment (Smith et al., 2019). Established principles concerning the character and ethical consequences of scientific contribution are being questioned by progresses in collaboration and multi-authorship. The latter has proliferated to such a level in certain research communities that the reliability of the scientific publication system has been contested. Reported and confirmed misconducts (e.g. honorific authorship) have grave repercussions with respect to the recognition of authority, sharing out the credit, and designating responsibility (Cronin, 2001). Multi-authorship on publications increases the credit allocated for the created knowledge and splits the accountability for its trustworthiness. A great number of institutions and research councils demand that researchers supply reports of their role in multi-authored work when assessed in promotion, tenure, and funding assessments (Larivière et al., 2016).

The public records of the authorship issue are abundant in half-truths and inconsistencies. A lot of scholars have suspected that William Shakespeare did not write the theatrical work long credited to him, the main candidates being Edward de Vere and Sir Francis Bacon, while more than fifty others have also been suggested. As in other cases, the Shakespeare conundrum can be elucidated only by clarifying what information is plausible, reconsidering approaches, and invalidating deceptive leads (Shapiro, 2009). The European philosophical tradition, as Whitehead puts it, 'consists of a series of footnotes to Plato', and not as 'the systematic scheme of thought which scholars have doubtfully extracted from his writings', but taking into account 'the wealth of general ideas scattered through them' (Whitehead, 1979, p. 39).

2. Unjustified authorship as research misconduct

Authorship and contributorship constitute pivotal features of scientific publishing. Each scholar listed as an author has responsibilities and can be faced with charges for the work as indicated in contributorship statements. It has been debatable whether animals should receive appreciation for their contribution to scientific research through credit in publications. Some animals have been listed as formal co-authors, although their role in research is unclear. Famous instances of co-authorship of animals include: F.D.C. Willard, a cat, with the physicist and mathematician Jack Hetherington, Galadriel Mirkwood, a dog, with the immunologist Polly Matzinger, H.A.M.S. ter Tisha, a hamster, with the physicist Andre Geim, and Wamba K, Wamba P, and Wamba N, three bonobos, with the primatologist Sue Savage-Rumbaugh. In May 2019, Jessica Schleider (Stony Brook University) was applying for a \$100,000 grant when she thought a break was needed from proof-reading and went out for a walk. In the meantime, her cat, Mochi,

decided to get some shuteye on the open laptop and involuntarily pressed 'submit' on the grant application, operation that was fortunately successful. In #LapDogsAreNotCoauthors, Sherri Rose (Harvard Medical School) noted that despite witnessing her writing a scientific article, her dog Polo did not satisfy authorship requirements. As an April Fool's joke, in 2014 American Physical Society reported that it would make all papers single-authored by cats open access, aiming to reflect upon allowing publication by dogs pretty soon. Papers co-authored by animals do not clarify who did what as regards the published work, but possibly the human researchers conducted portions or the entire research by interacting with or being intellectually stimulated by their pets. There is no evidence that animals have extensively generated the crystallization of critical ideas, but in some instances such companions may have contributed to a relaxing or fruitful state of mind without being listed as co-authors. The pertinent way of taking into account animals' legitimate role in scientific articles should be the Acknowledgements section, but such addition of contributions is challenging as a significant number of journals ask that individuals who are praised confirm in writing such recognition, unless they participated in basic science and preclinical research, and thus no expression of gratitude can offset their suffering (Erren et al., 2017).

Last year, a South Korean education ministry report exemplified 11 scholars who had credited high-school or middle-school-aged children as co-authors on publications that the latter supposedly did not contribute to, bringing the entire number suspected to 17, and the whole amount of scientific articles having unjustified authorship to 24 (out of a total of 794 papers having child co-authors, with 549 being peer reviewed), since the practice was initially made public in late 2017. The children seemed to have been listed on papers to increase their prospects of winning fiercely competed university places. There were several situations in which a child was admitted into university after mentioning in their application an apparently questionable co-authorship (Zastrow, 2019).

Can peer reviewers be credited as co-authors? Initially, a manuscript is generally presented in a draft form at a conference or more. Then, after collecting various comments from the audience, the author submits it to a scholarly journal. If it passes initial desk assessment by the editor, the manuscript will be sent out to at least two peer reviewers. Sometimes, it ends up by being rejected, and thus possibly submitted again to the same journal, after making all the requested improvements, or to another outlet that will ask at least two experts to act as peer reviewers. Maybe the manuscript is still not good enough after many rounds of peer review from the two journals and thus the author have to submit it to a third one that, after asking for several revisions, decides it is worth to be published. The final paper may be much different now from the original draft and perhaps it misrepresents some of the core ideas the author had initially in mind, but s/he needs a swift publication and thus nothing else matters. Sometimes the peer reviewers carefully copyedit and proofread the manuscript while simultaneously possibly altering the original ideas by providing numerous alternative phrasings in the narrative arguably in the interest of clarity, conciseness, accuracy, and cohesiveness. Author services provided by journals, especially through translation and language editing, can also shape the meaning of original ideas. The author's scientific contribution may be minor in the end, especially as a lot of the ideas incorporated in the text already belong to the cited authors or to the people who attended the conference(s) and made influential suggestions. Some sources are not clearly traceable (and definitely not citable), as pieces of thoughts (turned lately into fully developed ideas) can come through various discussions with colleagues, while surfing online without purpose or watching scientifically unrelated television items, etc. In most situations when a source is mentioned, it is difficult to discern whether the interpretation belongs to the commenter or to the cited author. Some time ago I received a manuscript for consideration and among the reviewers I included the scholar whose work was debated. He accepted all the comments made by the author, while the other three reviewers indicated that the paper had to be rejected for grave errors in understanding the topic. I define predatory authors as persons who submit their

manuscripts (sometimes to several journals simultaneously) without having the intention to publish them but to collect comments from the peer reviewers, and sometimes have their research copyedited and proofread, planning in fact to have the such improved version considered by a top-tier journal (Jackson et al., 2018; Lăzăroiu, 2017; Lăzăroiu et al., 2019).

3. Assessing credit and responsibility in the case of multi-authorship

In certain scientific disciplines, contributors are displayed alphabetically, but in others, authorship order is expected to indicate the volume of work dedicated to the research project, shaping the positive result of grant applications and tenure assessments: the most preferred positions are first author (typically the scholar who performed most of the experiments) and last author, who supposedly was the cerebral inspiration behind the project (Carpenter & Fritz-Laylin, 2013). The character of research is variable, with growing involvement by nonprofessionals. Citizen scientists supply all or a relevant quantity of the data in natural science research via online platforms without being listed as co-authors, although researchers may be able to publish important findings only due to such input. With a little concession as regards authorship criteria, scientific fraud can be deterred and the contributions of each person who was instrumental in the research can be adequately recognized (Ward-Fear et al., 2020).

Hyperauthorship has altered and disintegrated the notion of authorship having a distinct value. The shift to progressively long author lists on scientific articles is not viable, while also undermining the whole system by which scholarly work is recognized. As a rule, academic publications have constituted the highest level of performance in the scholarly world, justifiably being the chief channel for researchers to make public their discoveries to each other and to the public. Decisions concerning hiring and academic career advancement are also established mainly on scholars' publication records. Scientific articles are to a greater extent collaborative, and a large amount of authors can increase their reach, readership, and citations (even negative ones count positively). Long author lists are sometimes a recipe to manipulate the impact of separate articles, or to boost each author's publication lists, and thus it would be more difficult for universities and funding agencies to evaluate researchers taking into account such records. If identical rules for measuring academic productivity are employed across fields, disciplines where single authors or smaller groups are still the standard would be disadvantaged. Publishing in high-energy physics is predominantly carried out by large teams connecting a number of institutions and even countries, whereas in biomedicine, the likelihood of fraud, data integrity, and quality control is more scrutinized – particularly as regards the listing as authors of persons who have not worked on the project. It is thus difficult to assess credit when co-authorship is in hundreds and thousands. A growing reliance on data results in more teamwork and less work performed by individual scholars even in the humanities. Including students and other collaborators in the Acknowledgements section and not in the author list constitutes an alternative to the current way authorship is attributed. Authors in significantly large collaborations can only credit the title of the shared project. Universities and funding entities cannot keep relying on publication records and generally citations constitute the prevailing measures for scientific achievements, while teamwork should be more actively rewarded adequately (Priego, 2015).

Universities aiming to recruit or to rank scholars typically attribute credit scores to their scientific output. Even by employing use indexes, assessing co-authored papers is challenging. Co-authors could specify how they carried out their activity in producing the research, but they may recurrently bias their answers. As regards scholarly assessment, and when specific information about each author's contribution is lacking, a multi-authored scientific article is counted in most cases as one paper for each co-author (in percents). Multi-authorship enables some researchers to publish collectively, but is also a veritable asset, accelerating publication by facilitating a concrete division of labor among scholars. If a scientific article has been produced by two or more

researchers, the problem that the paper intends to elucidate is either too complex to be managed by an individual author, or the paper requires various abilities and knowledge that are uncommonly identifiable in just one person. Sometimes specialized co-authors can produce a scientific article that is implausible to be written by only one researcher, as each of them has spent a lot of time to gain significant expertise in a specific field. Beyond doubt, working simultaneously results in better papers by the cooperation between specialized co-authors. Unfortunately, in certain disciplines where the order of co-authors complies with certain rules, all researchers listed on the scientific article are not equal in terms of recognition for the work performed (de Mesnard, 2017).

4. Reconsidering the notion of authorship as regards large-scale collaborations

The most noticeable evidence of the shift to teamwork and the growing division of labor are (inter)national co-authorship levels. In biomedicine and high-energy physics, the amount of collaborators occasionally is in the hundreds, whereas in the humanities sole authorship is still the standard. The magnitude and complexity of projects are undeniably beyond the expertise of a person or a small team, necessitating professionally-managed groups of frequently worldwide-distributed scholars assisted by cutting-edge research infrastructures. Some people whose names are listed as co-authors may have (almost) no contribution to the work reported, while others, who have had a significant concrete role in collected data and/or analysis, are not included or are mentioned in the Acknowledgments section. The acknowledgment has slowly but surely established itself as a vitally important component of academic writing, offering a clarifying insight into the character and level of sub-authorship collaboration. The latter appears in acknowledgment statements, frequently compound entities. Acknowledgment data are neglected in sociometric analyses of scientific communication as they are not machine-searchable and analyzable. Length and particularity of acknowledgment have been fleshed out over time because authors plausibly endeavor to express gratitude to any persons who might have contributed somehow to the final draft of the manuscript (Cronin et al., 2003). A physics article having 5,154 authors, published in 2015 in *Physical Review Letters*, includes the largest volume of contributors ever to a single scientific article. The paper is 33 pages long: the first 9 pages, plus references, present the research itself, while the other 24 pages include the authors and their institutional affiliations. In 2008, a scientific article on the CMS experiment at the Large Hadron Collider at CERN was the first research to top 3,000 authors (Castelvecchi, 2015).

The increase of author numbers on scientific articles has been influenced by (inter)national research-assessment routines and shaped by the rise of expanded and shared science, furthered by groundbreaking technologies that are redesigning the research landscape. By only inspecting a paper it is difficult to discern who did what. Cutting-edge manuscript-submission software may assist authors to designate contributor roles quite smoothly in structured formats throughout the operations of developing and publishing a scientific article. For authors, the capacity to more clearly report their specific contributions may enable teamwork and data sharing by facilitating others to identify the researcher who supplied a certain piece of data or statistical analysis. Scholars can start to surpass authorship as the prevailing measure of recognition by the endorsement of distinct contributions that are key to the appointment and promotion process in academic institutions. Consequently, journals would identify the most suitable peer reviewers. For funding agencies, improved information and superior accuracy concerning the contributions of grant applicants may be decisive in the decision-making process, while facilitating automated evaluation of the role and feasible outputs of researchers being funded. More transparency may be decisive in decreasing the volume of authorship controversies being handled by journal editors, reducing the time they spend pursuing listed authors for validation of their contributions (Allen et al., 2014).

5. Conclusions

Authorship represents the routine of a scholarly career for which the amount of scientific articles researchers publish indicates resourcefulness, performance, and impact. To prevent coercive authorship habits and disproportionate publication records, academic outlets ask authors to precisely specify their intellectual contributions. As research complexity advances necessitating larger multi-disciplinary groups, authorship lists are expanding, and thus journals stipulate that corresponding authors mention each scholar's contribution to confirm justifiable recognition through authorship or acknowledgment (Patience et al., 2019). Co-authorship represents a plausible proxy for collaboration as a small number of scholars surrender credit for their scientific articles without reserve, and consequently sharing of authorship denotes a concrete involvement. Such publication data are immediately accessible, concern numerous countries and research disciplines significantly, and have coherent consistency throughout decades. Some of the ascending trend in multi-authorship is not typical teamwork but develops from independent contributions to collective endeavors, generally as data that entail only insubstantial intellectual partnership (Adams, 2012).

Research assessment procedures should be more flexible, taking into account the dynamic (cumulative and integrative) value of scientific products. Significant and influential input from peer reviewers should be clearly attributed to them, maybe in a note or, if extensive comments are provided, such researchers can be listed as co-authors of the scientific articles. Sometimes, peer reviewers or other people involved in the research process (e.g. citizen scientists) contribute more in terms of collected data and analysis than some of the co-authors. Unjustified authorship is research misconduct, while the notion of authorship as regards large-scale collaborations should be reconsidered in terms of credit and responsibility.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

George Lăzăroiu, Ph.D., is a senior research fellow at the Institute of Smart Big Data Analytics, New York City, and an associate professor in communication sciences at Spiru Haret University, Bucharest. His books are indexed in EBSCO and in more than 2,000 library catalogs. He has published more than 50 articles indexed in the Web of Science, and book chapters with Springer, Routledge, Palgrave Macmillan, and Sense. He has reviewed articles for journals published by Taylor & Francis, Elsevier, Wiley, SAGE, and Emerald. He has presented papers at conferences organized by Harvard University, Western Michigan University, University of Glasgow, Queen's University Belfast, Paris-Sorbonne University, Philipp University of Marburg, Wuhan University, etc. He has coordinated the translation of more than 3,000 pages authored by Richard Swinburne, Edward Zalta, Joseph Raz, Nicholas Rescher, Dale Jacqueline, Hartley Slater, etc.

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