What can be done to resolve academic authorship disputes?

With careers riding on young scientists' position in author lists, friction is all too common. A snowballing initiative to list authors' contributions aims to make sure credit is always given where it is due. But will it be enough to ease the angst? Jack Grove is first author

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"I knew something strange was happening when my colleagues stopped responding to my emails," says Sarah, recalling the moment she suspected something unusual was happening with a forthcoming journal paper.

"I'd spent a couple of weeks doing mathematical modelling work for the theoretical paper we were writing and, while I wasn't the main contributor to the paper, I established some conditions for the project and helped to make sense of the results," the physicist explains. Sarah (not her real name) soon learned, however, that her fellow authors had removed her name from the paper without informing her – a move, she believes, that was linked to her decision to leave her postdoctoral position a

few months earlier. “I was now in a faraway country – without an academic job and having a tough time personally – so they thought they could get away with it,” she says.

Source: Getty

Happily, Sarah was eventually able to convince her collaborators of the value of her contributions, even if she was listed as having made the smallest contribution. “Having my name on the paper was important because it recognised what I’d done,” she reflects.

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Nevertheless, her case is illustrative of the very fraught, distinctly unscientific process by which the authorship of academic papers is determined. Some disciplines – particularly those involving large teams, such as high-energy physics – simply list authors in alphabetical order, but a 2012 analysis (https://arxiv.org/ftp/arxiv/papers/1206/1206.4863.pdf) by Ludo Waltman, professor of quantitative science at Leiden University (https://www.timeshighereducation.com/world-university-rankings/leiden-university), suggests that this practice is in decline and accounted for less than 4 per cent of all papers published in 2011.

The vast majority of disciplines instead list authors in order of the perceived significance of their contribution to the published work. And an early career researcher’s position in that order is particularly crucial given that, in an era of intense competition for permanent academic positions, landing first- or even second-author status on a highly rated paper can make the difference between staying in academia or not. The era when young scientists might amicably settle authorship order with a series of croquet matches on the lawns at Imperial College London (https://www.timeshighereducation.com/world-university-rankings/imperial-college-london) – as British ecologists Michael Hassell and Robert May did (https://twitter.com/VolkerNehring/status/917384523599568901) in 1973 – seems a long way off.

Even with the best will in the world, it has never been easy to compare the relative values of intellectual and practical contributions to papers. Is coming up with the idea for the key experiment more worthy of recognition than carrying out the bulk of the experiments, for instance? What about the contribution of someone who did a lot of experiments, most of which threw up negative results through no fault of their own, compared with that of someone who did much less experimental work but got lucky with their results? And with research increasingly being carried out by large, interdisciplinary teams, sometimes involving multiple principal investigators, the judgements involved in determining authorship order have only become harder, even disregarding the inter-lab power struggles that inevitably come into play in these cases.

A further consideration for early career researchers is whether it is worth disputing authorship at all, given the risk of creating enemies of those with the power to make or break careers. One PhD student – who also wishes to remain anonymous – tells *Times Higher Education* that she was removed as first author from a paper she had written while interning at a research institution. She submitted the paper to the journal, but was told by her supervisor that since she "wouldn't be able to answer the reviewers' comments when the time came", she was being demoted to a lower authorship position.

"I am starting out in my career, so I didn't start a formal dispute…because my research space is a very small one," she explains. "I now keep a paper trail and never send any documents out without my name on them in case it happens again."

Sarah, too, is worried that speaking about her experience could attract criticism from her former collaborators, including her former mentor (hence her request for *THE* not to use her real name). However, she had no choice but to risk a falling-out with them to retrieve her credit for her postdoctoral work.

"My PhD supervisor had refused to help me publish, so my profile was not looking very attractive to academia," she explains. But letting the situation lie was not an option given the sacrifices she had made to gain her postdoc position and the chance to publish: "I have moved around the world, said goodbye to friends and relationships and worked long hours, including New Year's Day. Research does literally become your life. You are also told that you're worthless unless you publish."

Fighting your corner on authorship is essential, agrees Philip Moriarty, professor of physics at the University of Nottingham (https://www.timeshighereducation.com/world-university-rankings/university-nottingham), given the need for solid publications when applying for academic jobs.

“What once might have been considered a little bit of a squabble between academics can now be career-defining,” says Moriarty, reflecting that the CV that won him a lectureship in condensed matter physics at Nottingham in 1997 would “not get me within sniffing distance of a shortlist today”.

But Moriarty also agrees on the need for early career researchers to be cautious when challenging their position in the authorship order of a paper. The PI overseeing the paper as senior author (typically listed last in the author order) “will be writing you references for years and you are going up against their judgement”, he notes, adding that the outcome of any such appeal will “depend on the personality of the supervisor, your relationship with them and whether you can raise issues like this without them going ballistic”.

Such disputes typically arise within the context of a wider breakdown in the relationship between early career researchers and their supervisors, Moriarty adds, so approaching a trusted third party to intervene can help. However, he notes that even this approach is not risk-free: “At a PhD supervision conference, this suggestion was raised and one participant was adamant that you should ‘keep your head down’ as you would never get anywhere if you irritated your supervisor.”

Nevertheless, when the stakes are high, passions run high too, and pragmatism can take a back seat.

“You do see papers being retracted (https://twitter.com/VolkerNehring/status/917384523599568901) over authorship order, where people would rather see the work leave the scientific literature altogether than concede the argument,” notes Matt Hodgkinson, who oversees publishing ethics for Hindawi, an open-access publisher that runs about 230 peer-reviewed journals. “Someone who has

been left off the authorship list might choose to let it lie for a while, but then thinks better of it and contacts the journal. When several PhDs or postdocs are on a paper, we also see more than one claiming first authorship," adds Hodgkinson, noting that settling scientific contributions to a paper is "often mixed up with lab politics".

One dispute involving a Hindawi title ran for almost four years after a Turkish medic argued, ultimately successfully, that he deserved to be listed on a paper published in *Case Reports in Emergency Medicine* in August 2015. It was settled by a ruling (https://retractionwatch.com/2019/07/16/no-delight-for-turkish-surgeon-in-authorship-dispute-over-case-study/%20)from Turkey's intellectual property rights court, amid unsubstantiated claims that the author's omission had been motivated by religious and political considerations. "Without doing a raid on the lab, it was not really possible for us to say who had done what, so it went to the institution and then to the court," says Hodgkinson. The journal published an expression of concern over the paper in July 2019 highlighting the court's decision.

"It's rare that we see court cases about articles submitted to us, but the significant ones we've seen relate to authorship," Hodgkinson says. And, more generally, bust-ups over authorship are becoming a growing headache for publishers, with a quarter of anonymised case reviews listed by the Council on Publication Ethics relating to such disputes, according to Hodgkinson. This month, a Wellcome Trust report (https://www.timeshighereducation.com/news/half-researchers-seek-or-desire-counselling-says-wellcome-trust-poll%20), based on a poll of 4,065 respondents, found that 40 per cent of researchers had experienced issues with others taking credit for their work, with those on short or fixed-term contracts feeling "particularly vulnerable" to this kind of exploitation by senior colleagues.

That tallies with similar studies, which indicate that between a third and two-thirds of researchers report having been involved in an authorship dispute, according to a 2018 paper by Zen Faulkes, professor of biology at the University of Texas Rio Grande Valley (https://www.timeshighereducation.com/world-university-rankings/university-texas-rio-grande-valley-0), published (https://researchintegrityjournal.biomedcentral.com/articles/10.1186/s41073-018-0057-z) in the journal *Research Integrity and Peer Review*.

At present, the best-known template for deciding authorial credit is the so-called Vancouver Convention (http://www.icmje.org/icmje-recommendations.pdf), created by the International Council of Medical Journal Editors in 1978 and revised most recently in 2014. But these rules are largely unhelpful in resolving disputes, Faulkes believes, because they were "created from the top down, so they don't have buy-in from most scientists". Moreover, too many medical journal editors "don't seem to enforce their own guidelines", he adds.

In Faulkes' view, the current level of disharmony suggests that a new model of credit allocation is needed. One solution that is proving popular is to give joint first authorship to numerous collaborators. This phenomenon was seen in just 1 per cent of publications in 2000, but that had risen to 8.6 per cent in 2009, according to a study (https://elifesciences.org/articles/36399) by Nichole Broderick and Arturo Casadevall published in January 2019.

By 2019, the majority of papers published in some journals used joint first authorship – with 11 joint first authors listed in two papers, according to the paper, "Meta-research: gender inequalities among authors who contributed equally", published in *eLife.* Of the 28 papers published in the first three issues of the *Journal of Clinical Investigation* in 2019, for instance, 12 listed three or more authors as co-first authors, while one paper listed nine.

However, not everyone is convinced by the merits of this approach. Some view it as an unethical cop-out, via which some demonstrably lesser contributions can receive undue credit. Moreover, female scientists are more likely to be listed second to male co-authors even in cases of apparently equal contributions, Broderick and Casadevall found (https://retractionwatch.com/2019/05/16/sharing-the-coin-of-the-realm-how-one-journal-hopes-new-authorship-rules-will-cut-down-on-bias/).

Indeed, "even when there is joint first authorship, it seems the person who is credited first benefits the most as this is still the currency used by science", observes Hindawi's Hodgkinson. Hence, since joint first authors are likely to be listed in alphabetical order, those with surnames beginning with letters near the beginning of the alphabet are likely to benefit most; previous studies (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2803164) of alphabetical ordering have revealed that researchers with

surnames beginning with letters later in the alphabet are aware of the phenomenon and react by collaborating less. Worse, there is evidence (https://www.liebertpub.com/doi/10.1089/elj.2013.0226) that such “alphabetism” disadvantages certain ethnic groups, such as East Asians, more than others.

For his part, Faulkes advocates “a credit system like movies and television, where contributions are listed by the tasks performed”. For him, a list of authors with no further indication of what they actually did is next to useless.

“If the new *Star Wars* movie was a scientific paper, you'd see [lead actor] Daisy Ridley, [director] J. J. Abrams, [music composer] John Williams, and [set designer] Rosemary Brandenburg all mixed together in a list, with no indication of what each did: it would be absurd,” he believes.

Faulkes is pessimistic about the prospects of a movie-style credit system catching on, given “how slowly innovations in scientific publishing are adopted”. However, substantial movements in that direction are already happening. Some journals explicitly list what each author’s contribution to the paper was. And these include many journals published by Elsevier, the world’s largest science, technology, engineering and mathematics publisher.

The journals have adopted the “Contributor Roles Taxonomy (https://casrai.org/credit/)” (CRediT) system, which requires lead authors to provide an accurate summary of each author’s contribution to 14 distinct areas deemed relevant to authorship: conceptualisation, data curation, formal analysis; funding acquisition; investigation; devising methodology; project administration; contribution of resources; development of software; supervision; validation; visualisation; writing; and reviewing and editing.

The initiative originates from a 2012 workshop of researchers, publishers and others led by Harvard University (https://www.timeshighereducation.com/world-university-rankings/harvard-university) and the Wellcome Trust, and has been piloted in 150 Elsevier journals. The reception from both authors and editors was “very positive”, according to a December press release (https://www.elsevier.com/about/press-releases/corporate/elsevier-expands-credit-approach-to-authorship#https%3A%2F%2Fwww.elsevier.com%3A443) announcing the expansion of the scheme to 1,200 of Elsevier’s 2,500 journals, with “hundreds” more to be added to the list through 2020.

According to the website (https://casrai.org/credit/) of the Consortia Advancing Standards in Research Administration Information (CASRAI), which facilitated the workshop, a total of 30 publishers have so far adopted the system, including Springer, Wiley and Oxford University Press, although not all mandate it.

However, authors in this system continue to be listed in order of perceived contribution. Hence, even if such innovations were universally adopted, it seems unlikely that disputes over that order will disappear. So how *should* the different contributions to papers be weighed? Most crucially, how should inspiration be weighed against perspiration?

For Faulkes, “ideas are cheap in this business, so I tend to put more value on data collection and execution”. Others, however, are wary of establishing the notion that long hours spent on a project should immediately entitle someone to an authorial credit, let alone a substantial one.

“I have a bunch of students working with me all the time, but doing data entry or scanning does not qualify [them] for authorship,” explains Michael E. Smith, director of Arizona State University (https://www.timeshighereducation.com/world-university-rankings/arizona-state-university)’s Teotihuacan Research Laboratory, whose archaeological projects focus on the Aztec civilisations of Mexico and central America.

Smith regrets being too generous in extending authorial credits to minor players on projects earlier in his career – an act that devalued the bona-fide credits won by other co-authors, he now feels. “It made me feel good at the time to include people, but I’m not so sure I was right to do this. It’s a question of drawing the line somewhere,” he reflects, pointing out that the hired hands used on digs in Mexico could be considered co-authors if their number of hours worked was considered a key consideration. On the other hand, “when a student makes a genuine creative contribution or finds something I could not have come up with, this should be recognised”.

Deciding who should be listed as first author is a particularly “big responsibility”, according to Lynn Kamerlin, professor of structural biology at Uppsala University (https://www.timeshighereducation.com/world-university-rankings/uppsala-university) in Sweden, and it is often far from straightforward. Particularly difficult to call are situations in which a project’s initiator has moved on before it is complete, leaving others to complete the work, she suggests.

For Faulkes, the “amount of work done on a project [should weigh] more heavily than a sense of ownership because ‘I started a project’. The latter is mainly ego talking”. Kamerlin agrees with that principle, but she still finds it hard to adjudicate between competing claims in certain cases.

“If someone has left but done the majority of the work, it is easier to make a call, but I’ve also had the opposite,” she says. “You can have someone whose successor finds serious problems with the things that the project’s initiator has done, requiring repeat experiments and a lot of work, so the new person should obviously be first author. This wasn’t very popular with the person who had left, but passions also ran high with the individual who ultimately became first author.”

Kamerlin is also in favour of more detailed descriptions of what co-authors have done, but dismisses the idea that it is a silver bullet to solve disputes. “It’s very much based on the idea of five to 10 people in a laboratory working on a paper, when today’s research sometimes involves hundreds of researchers,” she says, suggesting that, in such cases, “primary authors who drove the work” should instead be listed ahead of less significant collaborators.

As for movie-style credits, this “assumes everyone is telling the truth” about their contributions, Kamerlin adds. “And people sometimes have some very strange ideas about what constitutes authorship – with some thinking a comment here or there is enough.”

That issue is particularly pertinent when it comes to senior scientists who insert themselves as authors on papers to which they had little to no input. This practice allows some leaders of large teams to publish hundreds (https://www.timeshighereducation.com/news/restrict-researchers-one-paper-ayear-says-ucl-professor) of papers every year,

leading to stellar research metrics and the career rewards that come with them. However, if errors or wrongdoing are exposed later on, they typically escape blame by citing their lack of involvement in the hands-on experiments undertaken by junior researchers.

For his part, Moriarty thinks it is “very unethical to put your name to a paper just because you are the group leader”, and he wonders how the world’s most prolific scientists find time even to read their output, let alone oversee, revise and submit it to journals.

“If they are working 80 to 100 hours a week in the lab, there might be some justification”, Moriarty concedes, but, in practice, he believes that such a prolific output is only possible in labs where “postdocs are supervising PhD students on a day-to-day basis, and that is where the intellectual heft is really coming from”. But, in such cases, it is the postdocs who should be the senior authors, he believes.

Kamerlin is likewise sceptical of the tendency for principal investigators to be listed by default as the last author – usually justified by the fact that they “provided the infrastructure” for the research to take place. “It is really unfair on younger people doing the research,” says Kamerlin.

As for the theory that including more well known scientists helps a paper to get noticed by editors and readers, she says the consequence is that the junior researchers who actually did the work can be overlooked by funders or hiring panels. “I recently heard about a supervisor who asked to be removed from a PhD student’s paper for this reason, which was a classy move,” she adds.

However, Faulkes is less convinced that senior scientists are gaining unwarranted authorship credit. Many PIs quietly do a significant amount of unseen work to allow others the chance to publish, he explains. “I hear lots of cases of people saying: ‘This person did nothing!’ But I rarely hear PIs saying: ‘Yes, I did, and here's why I deserve authorship,’” he notes. But that doesn’t mean that the PIs’ case can’t be made.

“A long time ago, I submitted a paper – never published – without my supervisor's name on it, which was badly wrong of me,” he recalls. “I undervalued what my supervisor did to make the project possible, but, with the benefit of experience, I can see how much that individual deserved to be an author on the submission. As a student, I didn't know how important authorship was, and didn't realise the implications of someone’s not being on that title page.”

One important reason that disputes arise is that colleagues rarely have frank discussions about their expectations regarding the authorship of future papers arising out of the projects they are working on, leaving everyone on tenterhooks until the very last minute. But with technological innovations such as pre-print servers shrinking the time between submission and publication, the time and space for disputes to be ironed out post-submission is also being squeezed.

Yet the lack of agreement over how contributions should be assessed and ranked arguably remains the biggest source of conflict. And, unlike the Writers Guild of America, which has established rules (https://www.wga.org/uploadedfiles/credits/manuals/screenscredits_manual18.pdf) over what merits "substantial" credit in film and television work, there is no final arbiter for authorship disputes in science. In the absence of that, the best hope is for colleagues to engage in earlier, more honest conversations about authorship, Faulkes believes.

"I made my mistake because authorship is part of the 'hidden curriculum'," he says. "I doubt many people get explicit training on authorship conventions until they are in the advanced stages of graduate school or are about to submit a paper."

Yet conventions are one thing and interpretation of them is quite another. Academics are only human, and with whole careers and identities hanging on publication success, is it hard to imagine any set of rules so watertight that their application to particular cases could never be disputed. As with many of the disputes and foul play associated with academic publishing, reducing that pressure may be the only way to get back from blood on the carpet to chats on the croquet lawn.

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