

# Don't give yourself a bad name

Scientific papers ought to contain only the names of people who have contributed to the work. But **Eugen Tarnow**, who has carried out a detailed survey, finds that many physics papers contain inappropriate co-authors who do not deserve to be listed

“Like sex before the 1970s, the matter of how authorship is settled is little spoken about but widely understood in the community.” So wrote William Bevan, the then editor of the *American Psychologist* and former president of the American Association for the Advancement of Science, when rejecting the first ever investigation into the authorship of scientific papers more than 20 years ago. The paper by Ross Vasta was eventually published in 1981 in an obscure article depository, and it was to be another 10 years before the next survey broaching the topic – this time in medicine – showed up (1992 *Academic Medicine* **67** 767).

A similar reaction greeted my first attempt to investigate scientific co-authorship in the mid-1990s. I had tried to enlist the help of the American Physical Society (APS), but they refused to sponsor my study. As a member of its publications-oversight committee subsequently explained: “They [the APS] say that if you do find something problematic they would be shooting themselves in the foot, and if you don't find something problematic it would seem self-serving.”

But no matter how much some people may try to suppress or marginalize them, investigations into scientific authorship continue to be carried out. In 1993 Judith Swazey, Melissa Anderson and Karen Louis looked at various ethical issues in science, including co-authorship and plagiarism. They found that faculty staff were three times as likely as PhD students to include inappropriate authors on scientific papers. But while most universities have penalties in place for plagiarism – which is more common among students than among faculty members – no similar penal code for inappropriate authorship exists.

Discussing authorship is as difficult as discussing sex. In fact my original co-authorship study revealed that 75% of postdocs never discuss the issue of authorship with their supervisors at all (1999 *Science And Engineering Ethics* **5** 73). The criteria for designating the postdoc or other researchers as authors are murky and generally “not clearly agreed upon”, just as Swazey *et al.* found. Supervisors, however, are 10 times as likely as their postdocs to be given inappropriate authorship.

Two well-publicized incidents of possible scientific misconduct this year may finally bring the issue of scientific co-authorship out into the open. In May, Bell Laboratories



Unfair advantage – inappropriate co-authors can reap the benefit from those who really did the work.

set up a panel to examine allegations that Jan Hendrik Schön had manipulated data in a series of high-profile papers on semiconducting crystals (*Physics World* June p5, p15). And in June, Victor Ninov of the Lawrence Berkeley National Laboratory was fired for allegedly falsifying data concerning the discovery of element 118 (*Physics World* August p7, p13). Any inquisitive mind must surely wonder what the co-authors in both cases were doing.

## Who's who?

So how do most physicists decide who should appear on a paper? This is a question that I addressed last year in a survey of more than 27 000 members of the APS who have a PhD in physics. The physicists were asked to state the number of authors on their most recent paper, to say how many of the names fulfilled the authorship requirements defined by the APS and similar societies, and to describe the relative contributions of the different authors to the work. The full results appear in the current issue of *Science and Engineering Ethics* (2002 **8** 175).

Having received more than 3500 replies, it does appear that once an authorship list has been written down, it generally remains unchanged – with about four out of five

respondents stating that the authors on their most recent paper had stayed the same during the publication process. Where the list did change, it was lengthened in about 12% of cases and cut back in just 4% of cases. I also found that only 3% of respondents had personally rejected from their latest paper an undeserving scientist who had expected to be an author.

Generally speaking, it seems that researchers prefer to avoid discussing the process of listing authors on a paper. Often the person who did the most work comes first, while the head of the lab – whether he or she contributed much or not – goes last. In solid-state physics, meanwhile, the person who provides a sample may or may not be granted authorship. The decision often rests on whether he or she might withhold samples in the future if no authorship is offered.

Some fields and some research groups in some fields list authors alphabetically, thereby removing some of the need for that awful discussion. In large particle-physics collaborations, for example, the discussion is almost entirely eliminated through the use of pre-existing lists of people who have to appear on papers. But as one particle-physicist friend of mine told me: “It would be an improvement merely to require people to ask to be included – at least they would then have to think about it.”

## Inappropriate authorship

Why are authorship surveys like mine important? Authorship is intellectual property and how it is assigned influences who gets to do science and who sets the agenda for what science will be done. Appropriate assignment of authorship will also help the public – and the funding agencies – to know who exactly did what on a paper. They will therefore be able to shift funds to better scientists and optimize their return on investment in the scientific “market”.

Appropriate authorship will also allow younger physicists to reap the full rewards of their own work, rather than having their credit diluted. Indeed, since papers are so important to one's career, it is strange that more people often do not appear to be bothered about who “owns” it. Have you ever heard of someone buying a £25 000 car and then not mind having to share it with an undeserving colleague? Avoiding conflict is practical, but when you make authorship murky you also remove individual incentives

for performance.

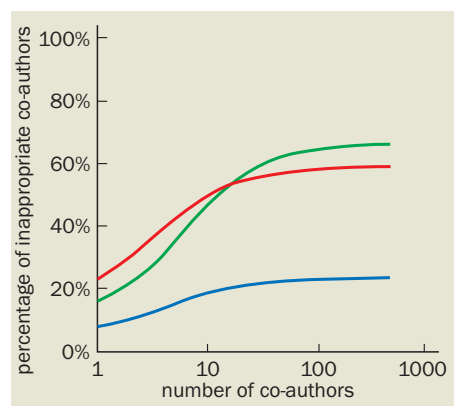
My survey also examined physicists' opinions of three definitions of "appropriate" authorship. Two were from learned societies – the APS and the International Committee of Medical Journal Editors (ICMJE). A third definition, which I devised, limited authorship to those researchers who had contributed "directly" to the "scientific discovery or invention" – the same terms for which Nobel prizes are awarded. (In a pilot version of my survey, I tested another definition that gave authorship only to those who had contributed original science; I was surprised to find that many respondents felt the definition was inappropriate.)

The survey revealed that the proportion of "inappropriate" co-authors on physics papers can be described as a function of the number of co-authors using a simple two-parameter model (see figure). It turns out that there is little quantitative difference in how authorship is assigned whether a paper contains four co-authors or 600. The model only breaks down for papers with three or fewer co-authors, which are less likely to have inappropriate authors.

The probability that a co-author is inappropriate varies strongly with the definition of authorship. My survey showed that 23% of respondents believed that the fourth and subsequent co-authors on their latest paper were inappropriate when judged against the APS guideline and that 67% felt that they were inappropriate when judged against the ICMJE and my guidelines. The APS guideline was used to decide the list of authors for only 8% of papers, while 46% of respondents reported that the most important contributor cannot be identified from the byline of his or her last published paper.

When asked which authorship definition they liked, 65% of physicists said they preferred the APS guideline, while the ICMJE definition, which is relatively tighter, was preferred by only 25%. Some 6% wanted no such requirements at all, while a similar proportion preferred other criteria.

Using the comments from respondents, a combined definition that might have a higher approval rating than either alone might read: "Authorship should be limited to those who have made a significant contribution to the concept, design, execution or interpretation of the research study. All those who have made significant contributions should be offered the opportunity to be listed as authors. Other individuals who have contributed to the study should be acknowledged, but not identified as authors. Acquisition of funding, the collection of data, or general supervision of the research group, by themselves, do not justify authorship. A final statement from all authors on the final version of the paper must be recorded, indicating that the version has been read and whether the author approves or rejects the contents of the paper."



Percentage of "inappropriate" co-authors as a function of the number of co-authors on the most recent paper of each of the 3500 members of the American Physical Society (APS) who replied to the author's survey. Respondents were asked to decide inappropriateness relative to definitions given by the APS (blue line) and the International Committee of Medical Journal Editors (green line), and to whether the co-authors had contributed "directly" to the "scientific discovery or invention" (red line).

### Vested interests

It is doubtful that there will be an immediate solution to the problem of inappropriate co-authorship. Powerful scientists – probably the main beneficiaries of inappropriate authorship – have no incentive to fix the problem. Journal editors, meanwhile, like to talk about fixing the problem, but cower when the going gets tough. The *Lancet* now asks all authors to give descriptions of what each author contributed and has found that at least 40% of authors were inappropriate according to the ICMJE guidelines. However, the journal has so far removed none of the undeserving authors.

Two long-term solutions that I have proposed remain to be tested. One would be to include at the end of all papers a description of what each author did. The other option, which is fairer, would be to have a lawyer inquire into who did what on a paper and assign authorship based on a guideline such as the one proposed above. Although some may think this option impractical, it would probably require less than an hour of a lawyer's time – an investment well worth it to preserve individual incentive in science.

Maybe a team of lawyers will ask the 14 co-authors on Ninov's paper on the discovery of element 118 to describe in detail their contributions. Maybe the lawyers will ask the co-authors on Schön's papers in *Nature* and *Science* what they knew. I am not, however, holding my breath.



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