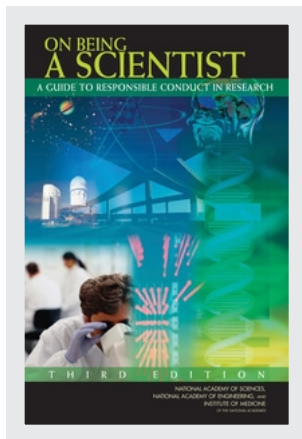


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On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition

DETAILS

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AUTHORSHIP AND THE ALLOCATION OF CREDIT

When a paper is published, the list of authors indicates who has contributed to the work. Apportioning credit for work done as a team can be difficult, but the peer recognition generated by authorship is important in a scientific career and needs to be allocated appropriately.

Authorship conventions may differ greatly among disciplines and among research groups. In some disciplines the group leader's name is always last, while in others it is always first. In some scientific fields, research supervisors' names rarely appear on papers, while in others the head of a research group is an author on almost every paper associated with the group. Some research groups and journals simply list authors alphabetically.

Many journals and professional societies have published guidelines that lay out the conventions for authorship in particular disciplines. Frank and open discussion of how these guidelines apply within a particular research project—as early in the research process as possible—can reduce later difficulties. Sometimes decisions about authorship cannot be made at the beginning of a project. In such cases, continuing discussion of the allocation of credit generally is preferable to making such decisions at the end of a project.

Decisions about authorship can be especially difficult in interdisciplinary collaborations or multigroup projects. Collaborators from different groups or scientific disciplines should be familiar with the conventions in all the fields involved in the collaboration. The best practice is for authorship criteria to be written down and shared among all collaborators.

Several considerations must be weighed in determining the proper division of credit between investigators working on a project. If one researcher has defined and put a project into motion and a second researcher is invited to join in later, the first researcher may re-

ceive much of the credit for the project even if the second researcher makes major contributions. Similarly, when an established researcher initiates a project, that individual may receive more credit than a beginning researcher who spends much of his or her time working on the project. When a beginning researcher makes an intellectual contribution to a project, that contribution deserves to be recognized, including when the work is undertaken independently of the laboratory's principal investigator. Established researchers are well aware of the importance of credit in science where traditions expect them to be generous in their allocation of credit to beginning researchers.

Sometimes a name is included in a list of authors even though that person had little or nothing to do with the content of a paper. Including "honorary," "guest," or "gift" authors dilutes the credit due the people who actually did the work, inflates the credentials of the added authors, and makes the proper attribution of credit more difficult. Journals, the administrators of research institutions, and researchers should all work to avoid this practice. Similarly, ghost authorship,

Who Gets Credit?

Robert has been working in a large engineering company for three years following his postdoctoral fellowship. Using computer simulations, he has developed a method to constrain the turbulent mixing that occurs near the walls of a tokamak fusion reactor. He has written a paper for *Physical Review* and has submitted it to the head of his research group for review. The head of the group says that the paper is fine but that, as the supervisor of the research, he needs to be included as an author of the paper. Yet Robert knows that his supervisor did not make any direct intellectual contribution to the paper.

1. How should Robert respond to his supervisor's demand to be an honorary author?
2. What ways might be possible to appeal the decision within the company?
3. What other resources exist that Robert can use in dealing with this issue?

where a person who writes a paper is not listed among the authors, misleads readers and also should be condemned.

Policies at most scientific journals state that a person should be listed as the author of a paper only if that person made a direct and substantial intellectual contribution to the design of the research, the interpretation of the data, or the drafting of the paper, although students will find that scientific fields and specific journals vary in their policies. Just providing the laboratory space for a project or furnishing a sample used in the research is not sufficient to be included as an author, though such contributions may be recognized in a footnote or in a separate acknowledgments section. The acknowledgments sections also can be used to thank others who contributed to the work reported by the paper.

The list of authors establishes accountability as well as credit. When a paper is found to contain errors, whether caused by mistakes or deceit, authors might wish to disavow responsibility, saying that they were not involved in the part of the paper containing the errors or that they had very little to do with the paper in general. However, an author who is willing to take credit for a paper must also bear responsibility for its errors or explain why he or she had no professional responsibility for the material in question.

The distribution of accountability can be especially difficult in interdisciplinary research. Authors from one discipline may say that they are not responsible for the accuracy of material provided by authors from another discipline. A contrasting view is that each author needs to be confident of the accuracy of everything in the paper—perhaps by having a trusted colleague read the parts of the paper outside one's own discipline. One obvious but often overlooked solution to this problem is to add a footnote accompanying the list of authors that apportions responsibility for different parts of the paper.

Who Should Get Credit for the Discovery of Pulsars?

A much-discussed example of the difficulties associated with allocating credit between beginning and established researchers was the 1967 discovery of pulsars by Jocelyn Bell, then a 24-year-old graduate student. Over the previous two years, Bell and several other students, under the supervision of Bell's thesis adviser, Anthony Hewish, had built a 4.5-acre radio telescope to investigate scintillating radio sources in the sky. After the telescope began functioning, Bell was in charge of operating it and analyzing its data under Hewish's direction. One day Bell noticed "a bit of scruff" on the data chart. She remembered seeing the same signal earlier, and by measuring the period of its recurrence, she determined that it had to be coming from an extraterrestrial source. Together Bell and Hewish analyzed the signal and found several similar examples elsewhere in the sky. After discarding the idea that the signals were coming from an extraterrestrial intelligence, Hewish, Bell, and three other people involved in the project published a paper announcing the discovery, which was given the name "pulsar" by a British science reporter.

Many argued that Bell should have shared the Nobel Prize awarded to Hewish for the discovery, saying that her recognition of the signal was the crucial act of discovery. Others, including Bell herself, said that she received adequate recognition in other ways and should not have been so lavishly rewarded for doing what a graduate student is expected to do in a project conceived and set up by others.