23: Peer review: some questions from Socrates

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Editor of scientific journal: I never expected to bump into you in Tavistock Square, Socrates. But I'm pleased to see you, because I have a perplexing problem that I'd like to discuss.

Socrates: I shall do my best.

Editor: You know, of course, that scientific papers submitted to journals are usually sent out for peer review?

Socrates: Such a system was never used in Athens. But I think you refer to the way in which editors request someone working in the same field to comment on the originality, reliability, and value of the work described in a paper in order to help them decide whether to publish it or not. I believe that this procedure is used not only by editors of learned journals but also by officials who dispense money from the public purse to scientists who seek funds to pursue their quest for knowledge.

Editor: You are quite right, Socrates. Peer review is used very widely in the research community. It is generally assumed that the quality of scientific work can best be judged by people with a specialised knowledge of the subject.

Socrates: Your use of the word *assumed* surprises me. I had thought that scientists were by nature sceptical and that they subjected both their hypotheses and their methods to rigorous empirical tests. I had expected that a procedure, which as you say is widely used in the scientific community, would have been exhaustively appraised.

Editor: I have to admit that we have been culpably slow to see the need for this. But we are trying to catch up. Editors and scientists are endeavouring to find ways of evaluating and improving the peer review process.[1]

Socrates: That seems admirable, if belated. Can you now explain what is perplexing you?

Editor: We are concerned that the standard of the reports that we receive from our peer reviewers is not always very high. Many of the men and women whom we ask to review for us are busy people. Perhaps they don't have the time or motivation to do the job as well as they should.

Socrates: Your concerns are similar to those of Juvenal who asked … *sed quis custodiet ipsos custodes*?[2] Let me give a loose translation: peer reviewers judge the papers, but who judges the peer reviewers?

Editor: I wonder how you learned to speak Latin, Socrates? Actually, we did try to judge our peer reviewers. Last year we took a paper that we had agreed to publish but which had not yet appeared in print. We deliberately inserted some errors of method, analysis, and interpretation into the manuscript and sent the modified version out to 400 people on our database of reviewers to see how good they were at detecting the faults.[3]

Socrates: And what did you discover?

Editor: That some of our reviewers were rather prickly. When we told them what we had done, a few felt that they had been tricked and wrote angry letters.

Socrates: Even philosophers might object to having their competence tested in such a manner. However, I imagine that many of the people on your database themselves submit manuscripts to your journal from time to time. Surely they were mollified when they realised that the purpose of your little ruse was to improve the way in which you selected papers?

Editor: I hope so.

Socrates: What about the main outcome, as I believe you call it, of your study? Were your reviewers astute in picking up the faults that you had embedded in the paper?

Editor: I'm afraid that they weren't. We inserted eight errors into the paper. A few reviewers commented on four or five, more managed to identify one or two, but quite a lot didn't detect any. If you had attended the International Conference on Peer Review in Prague last September you would have heard a presentation of the results of the study.

Socrates: Alcibiades and I were otherwise engaged at the time. But it doesn't sound as if your reviewers are very good at the job you ask them to do. I have never tried it myself, but I should think that reviewing a paper is quite a demanding task.

Editor: Yes it is. It requires a background in the design of studies and clinical trials, familiarity with methods of data analysis, and an understanding of concepts such as bias and confounding, quite apart from specialist knowledge of the subject that the paper is concerned with. And, at the very least, it's a couple of hours' work for the reviewer.

Socrates: Could it be your fault that the reviews are poor rather than that of the busy people whom you ask to write them? Perhaps your database includes people who haven't been properly trained.

Editor: Hardly anyone gets trained to review papers, Socrates.

Socrates: Can I have grasped what you have told me correctly? You asked untrained people to do what you concede is a difficult job.

And then you went to the trouble of carrying out a study which showed that they weren't very good at it?

Editor: Hmm.

Socrates: Could you explain a bit more about why editors send manuscripts to peer reviewers. What do they hope to achieve?

Editor: I can't speak for all editors, but I think most feel that peer review is a process that leads to an improvement in the quality of published work. One of the editors of *JAMA* is on record as saying that peer review exists to keep egg off authors' faces.[4] In their commentary on the manuscript, reviewers identify points where descriptions are unclear or arguments obscure. The authors can then modify their paper in the light of these comments.

Socrates: So peer reviewers sometimes make a significant contribution to the value of a published paper?

Editor: Certainly.

Socrates: Authors must be grateful for the assistance they get from peer reviewers. How do they acknowledge their debt. Perhaps, if their contribution really is significant, the peer reviewers become coauthors?

Editor: I think you must be jesting. Authors rarely find that the burden of gratitude they owe to their reviewers weighs too heavily. And I should have explained that peer reviewers almost always write their reports anonymously. So, even if the authors wanted to express gratitude, they wouldn't know who should get the credit.

Socrates: It seems that being a peer reviewer is a rather thankless task. They spend time improving other people's work but get little or no acknowledgement for their efforts. Furthermore, I expect that you end up rejecting many of the papers that your reviewers have spent time trying to improve.

Editor: The journal that I edit receives thousands of manuscripts every year and we only have space to publish a small proportion. We don't send every manuscript out for peer review. But inevitably, a large number of reviewed manuscripts do get rejected. We usually send reviewers' comments to the authors of the papers that we reject so their efforts may not be completely wasted.

Socrates: I wonder what happens to a paper that you decide not to publish.

Editor: The authors will usually send it to another journal.

Socrates: Will the editor of this journal send it out to other peer reviewers?

Editor: Almost certainly.

Socrates: Are there many other journals?

Editor: Index medicus lists over 3000 journals in biomedical sciences.

Socrates: So the authors may eventually find a journal that is prepared to publish their paper?

Editor: If they are persistent enough, that is very probable.

Socrates: By the time a paper appears in print, it might have been scrutinised by half a dozen, or even more, different reviewers.

Editor: I suppose it might have been.

Socrates: Isn't all this peer review very costly?

Editor: Very few journals pay their reviewers.

Socrates: I doubt if many reviewers are retired or unemployed. Do the hospitals and universities and other establishments who pay the salaries of the reviewers know that they subsidise biomedical journals in this way? They might consider that doctors or scientists could better spend their time caring for patients or doing their own research.

Editor: We hope that they take the view that time spent reviewing papers is of benefit first to the research community and ultimately to patients.

Socrates: I wonder if anyone has tried to estimate how much time that is?

Editor: I've never seen any data but 30 years ago the Nobel laureate Leo Szilard joked that the time would come when 100% of the time of the scientific workforce would be spent in peer review.[5]

Socrates: Your study of peer reviewers showed that they often failed to detect serious flaws in a paper. So I suppose that your journal, if it relies on their advice, must sometimes publish papers that contain errors?

Editor: We hope that our editorial staff will identify serious flaws in the design of a study. But, of course, we're not infallible. And we don't usually have the specialised knowledge to detect technical shortcomings in methods or statistical analyses. The answer to your question is that, like all journals, we do publish papers that contain flaws – some serious, some not so serious. Though when we do, readers write to us pointing them out. Our correspondence columns often contain lively discussions between authors and their critics over the methods and interpretation of their results.

Socrates: I'm very familiar with this process. Advance an argument, a hypothesis, an idea; let others criticise it; truth or knowledge may emerge. I suppose that your journal has a large readership?

Editor: We have 100 000 or so subscribers and some copies of the journal will be read by several people.

Socrates: Then each paper has, at least potentially, many thousands of critics. Since you are prepared to publish their comments, would it be fair to think of them as peer reviewers too?

Editor: Yes, I think it would.

Socrates: In that case, I'm not sure why you worry so much about the opinions of the one or two peer reviewers who see the paper before it is published.

Editor: Like all editors, I'm keen to maintain the standards of the journal. People won't read it if the papers we print are inconsequential or dull.

Socrates: So you need peer reviewers to help choose the most interesting and important of the manuscripts that you are offered?

Editor: The responsibility for selecting which papers to publish lies with the editor, of course. But editors need advice about which papers will appeal to the readership of their journal. We feel more confident in our decisions if the opinions of a peer reviewer coincide with our own.

Socrates: I wonder if the editor of *JAMA* was right. It sounds to me as if peer review exists not to keep egg off authors' faces but to keep it off editors' faces. Tell me how you choose peer reviewers for a particular manuscript.

Editor: As I said before, we try to pick a reviewer who is knowledgeable about the subject that the manuscript deals with.

Socrates: I suppose, if the subject is a specialised one, there may not be very many reviewers with the necessary expertise.

Editor: That's true.

Socrates: And in a specialised field, the people researching in it are likely to know one another personally. They may have worked together in the past. They may be friends or even enemies.

Editor: What are you getting at, Socrates?

Socrates: I'm just wondering if this doesn't sometimes place peer reviewers in a difficult position. Might they find it hard to set aside their feelings of loyalty or, occasionally I suppose, malice towards the authors? I'm sure that your peer reviewers are honourable people but however hard they try, they may not be able to be completely impartial.

Editor: Yes, this is something that worries editors. We ask our peer reviewers to declare any potential conflict of interest. But, of course, this relies on the honesty and self awareness of the peer reviewer. We're conscious that it is easier for reviewers to declare financial conflicts of interest than their personal feelings about authors.

Socrates: Earlier in our discussion, I felt sorry for peer reviewers. Now I'm beginning to feel sorry for authors. It seems to me that the relationship that journal editors arrange between peer reviewers and authors is a bit lopsided. Why, since you don't reveal the identity of peer reviewers to the authors, don't you conceal the identity of the authors from the peer reviewers?

Editor: That has been tried, Socrates. But it proved difficult in practice. It's more complicated than just removing the names on the title page of a manuscript. In their papers, authors often cite their earlier work or provide other clues to their identity.

Socrates: Doesn't the same argument apply to peer reviewers? I should think that they sometimes reveal who they are by what they write in their reports even if they don't sign them.

Editor: Authors do try to guess who reviewed their manuscript but the results of a recent study showed that their guesses were usually wrong.[6]

Socrates: Although it may be a comfort to editors that the anonymity of peer review is preserved, it's hard to see how such a state of affairs can encourage trust and cooperation in the research community.

Editor: That's a very good point. It's one of the reasons why several medical journals are planning to move to open peer review – by which I mean that they will require reviewers to sign their reports. But it probably won't do much to improve the quality of those reports. At least three randomised controlled trials have failed to show that signed reviews were superior to those that were unsigned.[3,7,8]

Socrates: Perhaps not. Though it's reassuring to hear about controlled trials in the field of peer review.

Editor: There is no need to be sarcastic, Socrates. In fact, there is quite a lot of information about bias in peer review. The biases tend to run deeper than the personal friendships and animosities of which we were speaking earlier. A Swedish study, for example, found clear evidence of discrimination against women in the awarding of research grants.[9] And there is the notorious study by Peters and Ceci, who resubmitted papers that had already been published after changing the names of the authors and the places where they worked, that showed biases related to the reputations of the investigators and their institutions.[10]

Socrates: Well, I begin to understand your perplexity. Let me try to sum up what you have told me so far. Judging the quality of manuscripts submitted to scientific journals is a difficult and demanding task. Editors often entrust this task to people who haven't had any training in how to do it and, as your study showed, they may not be very good at it. Further, they may well be rivals or, on the other hand, friends or protégés of the authors so it is hard for them to be impartial. The task takes them several hours – time that they might prefer to spend doing something else. They are rarely acknowledged or paid anything for their trouble. However bad they say the paper is in their report, the authors will probably get it into print somewhere. And it doesn't matter too much if they miss errors because readers will pick them up when the paper is published and write letters about them.

Editor: That's a very bleak account of the deficiencies in the way peer review operates. I rather hoped you might have some suggestions about how it could be improved.

Socrates: I'm sorry that you find my comments negative. Let me ask you something. When you judge a paper, are you not concerned that the methods used by the investigators when they carried out the research are valid, accurate, and reproducible?

Editor: Of course I am.

Socrates: Then surely authors are entitled to expect editors to use similar standards in assessing their papers. I wonder if editors aren't

missing the point when they worry about matters like whether reviewers should sign their reports or the difficulties of blinding them to the identity of authors. The fact that reviewers can't reliably detect errors in a manuscript and the vulnerability of the system to bias seem much more serious. Are you sure that your reviewers really know what you expect of them when you ask for a report on a paper? Might it be worth while to introduce training for reviewers and a way of auditing their performance? And what about authors? No one seems to have asked them what they would consider to be a fair way of having their work assessed? Do you even know if they find reviewers' reports helpful?

Editor: That's a lot of questions.

Socrates: But none that couldn't be answered.

Just as authors sometimes think that they have penetrated the anonymity of reviewers of their manuscripts, readers may be led, by certain accidents of geography, to believe that they have recognised one of the interlocutors here. Wessely and colleagues found that authors are usually mistaken.[6] So are the readers of this chapter. Similarities between the editor of the biomedical journal in this imaginary conversation and any living person are entirely coincidental.

References

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