

Surviving the Review Process

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The purpose of this article is to provide some insight into the peer-review process used by many technical journals and to give a bit of advice about revision and resubmission of a paper that was not accepted after the first round of reviews. For young authors, the review process can be mysterious and frustrating. Criticisms conveyed in anonymous reviews may feel like personal attacks, while terse or vague comments may seem to provide little guidance for revision. This article provides a set of practical guidelines that can help you succeed in publishing good research. This includes a brief overview of the review process, as well as some hints about interpreting reviews, and suggestions for preparing a response to the reviews. The opinions below have evolved over several years, through numerous interactions with authors, reviewers, and members of editorial boards. They are meant only to convey practical hints for success and not as value judgments about the process. Finally, they represent only one viewpoint. Newcomers to the process would do well to solicit the advice and opinions of a variety of senior researchers.

The Review Process

Many publications employ a three-tiered editorial board structure, consisting of an editor-in-chief (EiC), a few editors, and many associate editors (AEs). When a paper is submitted, the EiC assigns that paper to an editor, who then assigns it to an appropriate AE. The AE collects reviews from experts in the field, reads and synthesizes those reviews, and recommends a decision to the editor. The editor then looks over the recommendation from the AE, as well as the reviews, before making the final decision, which is communicated to the author along with a rationale for the decision.

The AE and editor play an important role, but it is the reviewers who do most of the work in the review process. Thus, to understand the review process, one must understand reviewers. Most reviewers fall somewhere along a spectrum with two endpoints: 1) the very busy expert, who knows very well the technical material but does not have much time to read your paper in detail, and 2) the relative novice, who has the time to check the technical details of your paper, but who may not have a good sense of the relative importance of the paper's contribution (it is axiomatic that the sum of free time plus experience equals a constant).

Do not assume that it is essential that all reviewers understand all of the technical details of your paper. An advanced graduate student might understand every detail of the mathematical content of your paper, but that graduate student might

also lack perspective on the field and would likely not be competent to give a good assessment of how important your work might be. This reviewer can evaluate correctness but likely not significance. In contrast, a more senior person might not take the time to understand every technical detail but may well be qualified to evaluate the significance of your work. The expert might recommend to reject the paper because the contribution is minor, without finding technical flaws in the paper. At the same time, the graduate student might give high praise for the technical details in the paper, without commenting on the relative significance of the contribution. In such a case, the paper might well be rejected based on the expert's recommendation, although the reviews do not contain many technical criticisms.

Throughout the process, from the first draft to the final revision, it is important to bear in mind that it is your job to convince the reader of your contribution; it is not the responsibility of the reviewers to uncover the contribution of your work. Maintaining this attitude will help you reach the goal of publishing your work.

Understanding the Reviews

It can sometimes be difficult to discern the real intentions of the reviewers. And yet, before one can revise a paper in response to the reviews, it is important to understand what exactly the reviewers had in mind. The following tips may prove helpful.

Not All Criticisms Are Written in the Reviews

Reviewers typically do not like to give a paper more time than it deserves. Therefore, if a reviewer is convinced after reading a few pages that the paper should be rejected, the review will likely contain detailed criticisms only for those first few pages (and possibly the broader impact of the paper). It would be a mistake to conclude that the remaining pages are acceptable merely because the review contains relatively less criticism of those pages. Therefore, addressing the criticisms contained in the reviews should be viewed as a necessary condition for publication but certainly not a sufficient condition. As a general rule, take the harshest criticisms as the baseline for your revision efforts, and revise the entire paper as though it had been uniformly criticized at this level.

Perhaps, the most common example of this is the review that criticizes a paper for lacking a thorough evaluation of the related literature. Authors often conclude that adding a few references to the bibliography will solve this problem, leading to a publishable paper. This strategy rarely works, because this sort of criticism is often meant to convey the harsher (and unwritten)

message that the paper is not significant in the context of existing research. Perhaps, the reviewer feels that the problem is no longer of importance or that the methods presented in the paper are incremental. In these cases, if you have not presented a thorough evaluation of related work, reviewers will essentially send you to do more homework, with the anticipation that you will discover for yourself the conclusion that they are reluctant to explicitly state. As an author, it is important to recognize these kinds of implicit criticisms that the reviews might hold.

Not All Comments Are Communicated to the Author

Reviewers have the option to convey confidential comments in their reviews. These comments are seen by the AE and editor but are not shared with the authors. Sometimes reviewers use the confidential comments to guard their anonymity (e.g., if the comments cite particular related research that would betray the reviewer's identity). Other times, reviewers use the confidential comments for criticisms that are difficult to explain or justify. It is the role of the AE and editor to evaluate these confidential comments and weigh them appropriately when reaching a decision. If the decision letter contains comments that do not appear in the reviews you receive, chances are good that those comments were motivated by a reviewer's confidential remarks.

Within an Individual Review, Not All Comments Are of Equal Importance

Some reviewers feel compelled to balance their criticisms with positive comments. Even if these reviewers feel a paper should be rejected, they will find some good things to say. As a consequence, an author might conclude that the reviews are mixed and that minor revisions will solve the problem. As an author, it is important that you understand the difference between substantive criticism and superficial praise. For example, a review that praises your paper's clarity while pointing out technical flaws in its main theoretical result is a negative review. Flaws in theory significantly outweigh the merit of clear exposition.

It can be helpful to sort reviewer comments into categories of increasing significance. For example, exposition is less important than the quality of the experimental results, which is less important than the theoretical correctness, which is less important than the significance of the work (this ordering is loosely based on the increasing difficulty of fixing the problems). Of course, the exact set of categories and their relative significance depend on both the reviews and the aims of the paper, but this exercise can help you see the key issues raised in the reviews.

Not All Reviews Are of Equal Importance

The review process is not a democracy, and the job of the editor and AE is not to merely tally the votes of the reviewers. The AE and editor know the reviewers, their strengths and weaknesses, and their relative experience. Both the AE and the editor will exercise their own judgment when interpreting the reviews and reaching a final decision about your paper.

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They may choose to discount certain comments from a reviewer with a known bias or to give more credence to a reviewer with deeper expertise. The mere volume of positive versus negative comments is seldom a good indicator of the outcome of the review process. The decision letter will typically give you a good idea of which comments were determinative in the decision process.

Not All Nonacceptance Decisions Are Equal

Most publications employ a set of possible decisions, ranging from outright acceptance to outright rejection. Unless your paper is accepted (unconditionally), which is extremely rare for a first version, revisions will be required. It is important to understand the decision categories, and what each implies in terms of the expectations for your revised manuscript.

- ◆ *Conditional Acceptance:* When your paper is conditionally accepted, the required revisions will be minor. Furthermore, there is typically no doubt about what revisions are required, and whether you will be able to complete them. In this case, your job is straightforward: implement the requested revisions and submit your proof soon to be the published paper.
- ◆ *Revise and Resubmit:* Most journals employ some version of this decision, which indicates to the authors that major revisions will be required before the paper can be published. There is no guarantee that your revised paper will be accepted; the burden of proof rests with you, in the revision, and in your response to the reviewers.

In this case, the required revisions can be open ended. The editor may not even be able to predict if you will be able to successfully revise the paper. For example, if the reviewers note a technical error in a proof, conditions for accepting a revised paper would include correcting the proof, although the editor may not be able to predict whether the proof can be corrected.

- ◆ *Rejection:* If your paper is rejected, with no encouragement to submit a revised version, it is generally not productive to resubmit the paper to the same journal. In this case, the paper may simply be unpublishable (e.g., if the result is already known or if there are deep technical errors in the paper). If you feel the paper is salvageable, your best option is to revise the paper as though you would send it to the same reviewers (i.e., you should take the reviewers very seriously, although they may not see the revised version), and to submit the revision to another journal, along with a note to the editor of that

It is your responsibility to choose a journal that is appropriate for your research.

journal explaining the paper's history. It is not acceptable to "journal shop" (i.e., to merely send the same paper to journal after journal, in the hope that eventually someone will publish it).

Responding to the Reviews

After you revise your paper, you will write a response to the reviewers in which you describe how you have responded to their criticisms. When reviewers are asked to consider a revised version, most will turn first to this response to see how you have addressed their specific concerns.

The Tone of Your Response Will Affect the Way It Is Received by the Reviewers

When you write the response, treat the reviewers like colleagues, or even collaborators. They have spent time reading your work and giving you their feedback. Assume that they have done so in good faith. Respond to them as if you truly believe that they are intelligent people, with good intentions, who have spent time working for you by reviewing your paper. On rare occasions, a paper may not be well matched to an AE or to reviewers, but these people do a service for the community by participating in the review process (from the editor to the reviewer). It is unacceptable to insult either the competence or the motives of any of the participants in the review process and doing so will not further your goal of having your paper published. No matter how offended you might feel by the reviews, your response should be gracious, humble, and constructive.

If a Reviewer Does Not Understand Your Paper, Take Responsibility

It may frustrate you if it seems that the reviewers have not understood your paper, but if reviewers do not understand a concept, the responsibility for that rests with you. Revise your paper so that they cannot fail to understand it, or, if a particular journal is unable to find reviewers that can understand your work, consider a different journal (it is your responsibility to choose a journal that is appropriate for your research). Use the response to explain concepts that a reviewer did not seem to understand. Instead of saying, "You don't understand, and therefore you don't have a right to criticize my work," educate the reviewer, either by adding explanation to the revised paper, by including a brief explanation of the concept in the response, or by giving pointers to published papers in which the concept is developed. In all cases, your response should explain your ideas, rather than attack the competence of the reviewers.

Address Every Concern Raised in the Reviews

Your response should include a description of how you have revised the paper to address each criticism in the reviews. In general, all criticisms merit some sort of revision to your paper. Of course, you have the option of using your response to argue that no revision is required for a particular criticism, but you are likely to lose this argument. More often, your attitude will appear arrogant to the reviewer, who will dig in to defend the original criticism, and your paper will risk being rejected. A more effective strategy is to improve your paper in response to the criticism (even if you do not agree with the criticism itself) and to describe this improvement in your response. For example, if a reviewer notes a technical error in a proof but you are certain that the proof is correct, you should revise the proof to clarify the point in question. In the response to this reviewer, concede that the original proof was not clearly written, and explain how you have rewritten the proof with increased clarity. You could also include a more detailed version of the proof in the response, to further clarify any misunderstanding.

Make the Reviewer's Job Easy

Your response should be structured so that it is easy to see how you have addressed each reviewer's concerns. Begin with a brief introduction that summarizes the major changes you have made to the paper. Include here any revisions that you have made specifically in response to the editor's comments in the decision letter. Follow this with distinct sections in which you respond specifically to the concerns raised in the individual reviews. There may be redundancy in these sections (typically multiple reviewers will raise similar objections), but this is not a bad thing, since many reviewers read only the responses to their reviews. Feel free to include small verbatim sections of text from your revised paper. This will save the reviewer the trouble of searching for the specific revisions that you have described. It may also be helpful to adopt a convention for the use of fonts in your response. For example, you might use bold font when quoting from reviews, plain font for your reply to the reviewer, and italics when quoting text from the revised paper. By making it easy for the reviewers to see what you have done to address their concerns, you make it easier for the reviewers to recommend accepting your paper.

Stay Objective

The review process can provoke a variety of emotions—joy, anger, frustration, depression, and confusion. Remember, your emotions will never improve the chance of your paper being accepted. When writing your response, remain objective and professional, and to the extent possible, emotionally detached from the process. Assume that participants in the review process have acted in good faith and respond accordingly. In the end, the shared goal of all participants in the process, from reviewer to author, is to publish high-quality research.