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Four Attributes of an Excellent Peer Review

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Four Attributes of an Excellent Peer Review

A couple of weeks ago, I had an interesting conversation with a colleague, Dan LeMaster, about manuscript reviews. Dan recently volunteered to serve as a guest editor for our upcoming special section on “Long Range Imaging,” and wanted to consult with me on a manuscript decision. His predicament was that he received two conflicting reviews on a manuscript, and neither provided much explanation for the basis of their opinions on the submitted paper. Like most good editors do when confronted with this situation, Dan reviewed the paper himself to make a well-founded manuscript decision. He contacted me just to confirm the appropriateness of his approach. I could tell, however, that he was underwhelmed with the reviews he received and curious whether this was unusual.

The conversation prompted me to reflect on the variance I have seen in *Optical Engineering* manuscript reviews. Dan is an excellent reviewer, so his point of comparison is a high standard. Unfortunately, some reviews fall short of this standard. In those cases, I wonder whether this is reflective of an actual lack of thoroughness in performing the review, or perhaps just insufficient attention to thoroughly communicating the reviewers’ impressions. Irrespective of the reasons, cursory reviews limit editors in making sound manuscript decisions and fail to provide authors substantive feedback. This editorial outlines a few key attributes of excellent peer reviews that serve the needs of editors and authors.

Several editors for this and other journals have already done an outstanding job of detailing reviewer expectations and best practices. In particular, I would like to call your attention to two editorials on this subject written by Chris Mack, the editor for the SPIE *Journal of Micro/Nanolithography, MEMS, and MOEMS*. In his July 2015 editorial,¹ Chris outlines the review process, including responsibilities for authors, editors, and peer reviewers. He provides further detail on best practices for excellent scientific reviews in his April 2015 editorial,² including a reviewer checklist. If you serve as a reviewer for *Optical Engineering*, I encourage you to use these resources.

Instead of duplicating the thorough guidance provided by Chris and others, I would simply like to accentuate four attributes that are essential to a high-quality peer review.

1 Originality and Significance

It is well understood that originality and significance are key attributes of any manuscript meriting publication in an archival journal. Peer reviewers are specifically selected based on their expected awareness of the state-of-the-art in the scientific field addressed by the prospective publication, and should be well positioned to assess these attributes. The literature review provided by the authors should serve as the benchmark for this assessment, and the presented work should represent both a novel and substantive advance to that reported in the prior literature. A thorough review will identify any deficiencies in the authors’ literature review, any prior work addressing the same or essentially similar technical approaches, and specific concerns with or limitations of the potential impact of the work. That is, it will provide an answer to whether the manuscript is likely to be read and cited by the *Optical Engineering* readership and provide a basis for that answer.

2 Scientific Correctness

Peer reviewers also act as an independent party to scrutinize the technical approach adopted by the authors. An in-depth review will include a rigorous, step-by-step assessment of the theoretical and experimental methods to ensure that there are no apparent errors or inconsistencies in the logical development. Reviewers should assess whether the authors have clearly and thoroughly disclosed how the work was performed to the level where the experiments or design could be reproduced. Major flaws in the technical approach or deficiencies in the description should be identified for correction.

3 Substantiated Conclusions

Whether in the form of theoretical assertions, experimental observations, or design characteristics and performance, all *Optical Engineering* manuscripts will provide some form of results and draw conclusions from them. A thoughtful review will assess plausibility by testing whether conclusions drawn by the authors logically flow from the results, whether they are significant from a statistical or other perspective, and whether they support the purported significance of the work. If not, flaws in logic, alternative explanations for the results, or major uncertainties precluding confidence in the stated conclusions should be identified.

4 Detailed Basis of Recommendations

When a scientific review is performed, no matter how well founded or thorough it is, its value is limited by the verbosity of what the reviewer actually provides in terms of comments to the authors and editor. An excellent review will not only state the reviewer’s observations, impressions, and recommendations, especially with respect to the three issues described above, but also detail his or her basis for all recommendations. Unfortunately, this is where many reviewers fall short, and it becomes problematic for both editors and authors. For editors, it is not uncommon to receive conflicting reviews, which they resolve through a careful assessment of the basis of the recommendations made by the conflicting reviewers and possibly the invitation of a third reviewer. When such a basis is not adequately detailed, they have insufficient insight to do this. For authors, detailed feedback is required to

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make constructive changes to improve their manuscripts in response to the concerns raised.

As I stated in prior editorials, reviewers are the unsung heroes of scientific journals like *Optical Engineering*, and I hope that all of you regularly volunteer for this important professional society service. I know that it can take a fair amount of time to thoroughly review manuscripts, and I certainly appreciate your service to SPIE and the optics community. As a valued reviewer, please consider these four important aspects of an excellent review, as your attention to them will ensure that the result of your efforts will be

most valuable to the colleagues that you serve—editors and authors alike.

Michael T. Eismann
Editor-in-Chief

References

1. C. Mack, "The editorial review process," *J. Micro/Nanolith. MEMS MOEMS* **14**(3), 130101 (2015).
2. C. Mack, "How to write a good scientific paper: a reviewer's checklist," *J. Micro/Nanolith. MEMS MOEMS* **14**(2), 020101 (2015).