

Open Review Process

At the time of writing this editorial (February), it is the middle of conference season, which involves a sequence with which I am sure many of you are familiar. The American Control Conference (ACC) and International Conference on Robotics and Automation decisions have just been announced, and final papers are due in a month. In addition, even though the IEEE Conference on Decision and Control (CDC) has just ended, the writing for 2017 submissions is well underway. Needless to say, the process is a long one and, to me as an author, a reviewer, and an associate editor, seemingly never ending. Reflecting on the overall sequence, both in terms of the time scales and the limited data often available for the decision-making process, led me to the question of whether better alternatives exist, especially in this age of fast (perhaps too fast) exchange of information.

One recent study of this issue notes that “there is widespread consensus about the advantages” of the traditional peer-review process, but in the same paragraph indicates that there “is also consensus that current models of peer review are less than ideal” [1]. Some of the perceived objections with the traditional review process, which in the terminology to follow is called “closed,” can be summarized as 1) delay, 2) lack of transparency, 3) lack of reliability, 4) potential of gender (and other) biases, and 5) lack of recognition for the inputs and efforts of the reviewers [1]–[3]. That said, supporting arguments for the closed process are 1) that it should



Jonathan How (center) meeting with Lars Blackmore (left) and Yoshiaki Kuwata at the base of a Falcon 9 rocket in Hawthorne, California. This was the first SpaceX rocket that went to space and landed back on Earth.

lead to more candid reviews, 2) it saves the time of readers by filtering out poor papers, and 3) it safeguards against biases (including gender) [1], [3]. It is

interesting to note that these papers argue that the closed process could both safeguard against gender bias [3] and potentially lead to it [1].

It is important to note that open peer review has several different meanings.

These concerns about the closed-review process have led to numerous discussions about alternatives, especially in the life sciences [2] and, more recently, in computer science conferences [4], [5]. The peer-review process itself dates back to at least 1732 [1], and, historically, using a closed-review process for stringent quality control made sense given the high cost of publishing and distributing papers. However, in this age of rapid and low-cost online publication, some argue that it is an “anachronism” [3]. Regardless, given modern approaches to information dissemination, a key topic of discussion is whether the scientific community can develop new approaches to the review process that increase the rate, efficiency, and transparency, while still addressing the obvious confidentiality/bias concerns.

Much of the discussion on this topic centers around deciding whether the reviews should be single or double blind, single iteration or multiphase

with a rebuttal, and whether to use an open- or closed-review process. In that context, the ACC and CDC are traditional in peer review with the use of a single-blind review (reviewers are anonymous but the authors are not), there is no rebuttal phase, and it is a closed process. Concerns about the length of the process are somewhat mitigated by using preprint servers, such as ArXiv [6], based on the IEEE policy [7]:

Can an author post his manuscript on a preprint server such as ArXiv?

Yes. The IEEE recognizes that many authors share their unpublished manuscripts on public sites. Once manuscripts have been accepted for publication by IEEE, an author is required to post an IEEE copyright notice on his preprint. Upon publication, the author must replace the preprint with either 1) the full citation to the IEEE work with Digital Object Identifiers (DOI) or a link to the paper’s abstract in IEEE *Xplore*,

or 2) the accepted version only (not the IEEE published version), including the IEEE copyright notice and full citation, with a link to the final, published paper in IEEE *Xplore*.

However, I also participate in numerous conferences that are double blind, and most allow a rebuttal period that typically only provides about four days for the authors to respond to the initial reviews with a strict character limit (for example, fewer than 500). The choice between a double- or single-blind process might help avoid implicit biases in the reviews [8], but ensuring author anonymity can be difficult, especially if the articles are posted on ArXiv.

I prefer conferences that allow a rebuttal phase, which at least enables authors to clarify points of misunderstanding in the reviews and indicate which types of changes could be included in a revised version. Choosing to include this process could help reduce the possibility that a simple error or misunderstanding leads to the “incorrect” overall publication decision, thereby addressing reliability concerns. But the counterargument to adding a rebuttal stage is “reviewer fatigue,” the notion that reviewers are busy enough as it is, so could they realistically be expected to do even more by reading the rebuttal as well? In my experience, the answer to this is yes—the rebuttals are by design very short and usually provide me (as a reviewer) with easily digested feedback on whether my observations/criticisms are valid or not and/or easily addressed by the authors.

It is important to note that open peer review has several different meanings. The key difference from the closed process is that the paper and reviews are publicly available. While some argue for completely open (all author and reviewer names are known to all), the more standard format is single blind to retain the ability to write candid reviews. In trials of the process for the 2013 International Conference on Learning Representations (ICLR’13), [3] reports that retaining reviewer anonymity was strongly favored. The argument for an open process is that the review



(From left) Andrew Alleyne, Jonathan How, and Mark Campbell, three IEEE Control Systems Society members who are on the U.S. Air Force Scientific Advisory Board, meeting at the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, California.

process can lead to a lot more interaction (though time windows typically have to be enforced) between the reviewers and authors (and possibly the general public, if allowed). Furthermore, the process is much more transparent because both the reviews and reviewers are subject to public scrutiny, with the hope that this would lead to higher-quality feedback being provided and the avoidance of any “self-serving” behaviors [2]. Given concerns about how candid the public reviews would be, some implementations of this approach have maintained the option of private communications with associate editors, but it appears that these are used infrequently [3]. The feedback from the ICLR’13 experiment was very promising, with comments such as “reviewers cannot ignore rebuttals in this format, and authors cannot ignore errors pointed out by reviewers and commenters” [3].

Reference [3] outlines a framework of options that could be considered for future implementations, and [5] provides infrastructure for implementing the various alternatives. The control community should be aware that there is healthy and active debate on what are the best alternatives to the traditional approaches used in most IEEE Control Systems Society conferences.

As always, I welcome your feedback and look forward to hearing about your experiments with opening up the review process.

That said, it is clear that more experimentation is required to establish the right format for larger conferences such as ACC and CDC. Therefore, I highly recommend that organizers of workshops and smaller conferences consider these alternatives and report back on their feedback in the conference articles in *IEEE Control Systems Magazine*. I am part of a team that will be doing this for a workshop that is planned for the 2017 Robotics: Science and Systems Conference [9].

As always, I welcome your feedback and look forward to hearing about your experiments with opening up the review process.

REFERENCES

[1] R. Walker and P. Rocha da Silva. (2015, May). Emerging trends in peer review—A survey. *Front. Neurosci.*, vol. 9, article 169. [Online]. Available: <http://journal.frontiersin.org/article/10.3389/fnins.2015.00169/full>
 [2] N. Kriegeskorte, A. Walther, and D. Deca, “An emerging consensus for open evaluation: 18 vi-

sions for the future of scientific publishing,” in *Proc. Frontiers in Computational Neuroscience*, Nov. 2012. doi: 10.3389/fncom.2012.00094.
 [3] D. Soergel, A. Saunders, and A. McCallum, “Open scholarship and peer review: A time for experimentation,” in *Proc. 30th Int. Conf. Machine Learning*, 2013.
 [4] International Conference on Learning Representations (ICLR). [Online]. Available: <http://www4.cc/doku.php?id=42017>
 [5] Openreview.net. [Online]. Available: <https://openreview.net/>
 [6] ArXiv e-print server: Systems and control. [Online]. Available: <https://arxiv.org/list/cs.SY/recent>
 [7] An FAQ on intellectual property rights for IEEE authors. [Online]. Available: https://www.ieee.org/documents/author_faq.pdf
 [8] A. Budden, Amber, T. Tregenza, L. Aarssen, J. Koricheva, R. Leimu, and C. Lortie, “Double-blind review favours increased representation of female authors,” *Trends Ecol. Evol.*, vol. 23, no. 1, 2008, pp. 4–6.
 [9] Robot communication in the wild: meeting the challenges of real-world systems. (2017, March). *Proc. Robotics: Science and Systems 2017*. [Online]. Available: <http://rss2017-rcw.mit.edu/>

Jonathan P. How



Convexity—The Third Pillar

There are three great pillars of the theory of inequalities: positivity, monotonicity, and convexity. The notions of positivity and monotonicity are so intrinsic to the subject that they serve us steadily without ever calling attention to themselves, but convexity is different. Convexity expresses a second order effect, and for it to provide assistance we almost always need to make some deliberate preparations.

—J. Michael Steele, *The Cauchy-Schwarz Master Class—An Introduction to the Art of Mathematical Inequalities*, Cambridge University Press, 2008.