Does Peer Review Identify the Best Papers?

A Simulation Study of Editors, Reviewers, and the Social Scientific Publication Process*

Justin Esarey
Assistant Professor
Department of Political Science
Rice University
justin@justinesarey.com

September 2, 2017

Abstract: How does the structure of the peer review process, which can vary from journal to journal, influence the quality of papers published in that journal? In this paper, I study multiple systems of peer review using computational simulation. I find that, under any system I study, a majority of accepted papers will be evaluated by the average reader as not meeting the standards of the journal. Moreover, all systems allow random chance to play a strong role in the acceptance decision. Heterogeneous reviewer and reader standards for scientific quality drive both results. A peer review system with an active editor (who uses desk rejection before review and does not rely strictly on reviewer votes to make decisions) can mitigate some of these effects.

* I thank Cliff Morgan, Jane Lawrence Sumner, Rick Wilson, Samuel Esarey, Andrew Gelman, and Jeffrey Lax for helpful comments and suggestions on prior drafts. This article includes some ideas first articulated (in a much simpler form) in "How Tough Should Reviewers Be?" in *The Political Methodologist*, URL: http://thepoliticalmethodologist.com/2014/12/18/how-tough-should-reviewers-be/. Replication files are available at http://dx.doi.org/10.7910/DVN/TT17NY.

Introduction

Peer review "makes the publishing world go around," (Djupe 2015, 350), improves the quality of manuscripts that go through the process (Goodman et al. 1994), and can help to identify the most impactful contributions to science (Li and Agha 2015). But peer review *also* frequently misses major errors in submitted papers (Schroter et al. 2008; Schroter et al. 2004; Nylenna, Riis, and Karlsson 1994), allows chance to strongly influence whether a paper will be published (Mayo et al. 2006; Baxt et al. 1998; Cole, Cole, and Simon 1981), and is subject to confirmatory biases by peer reviewers (Mahoney 1977). Given the mixed blessings of peer review, and researchers' equally mixed feelings about it (Sweitzer and Cullen 1994; Weber et al. 2002; Smith 2006; Mulligan, Hall, and Raphael 2013), it is natural to inquire whether the structure of the process influences its outcomes. Journal editors using peer review can choose the number of reviews they solicit, which reviewers they choose, how they convert reviews into decisions, and many other aspects of the process. Do these choices matter, and if so, how?

The question is of interest to political scientists because there is considerable variance in how journals in our discipline implement peer review. Most obviously, some journals accept a greater proportion of submissions than others. But a difference in acceptance rates can obscure subtler differences in journal peer review practices. For example, *International Studies Quarterly* (ISQ) conducts a relatively thorough editorial review of papers on a substantive and scientific basis, desk rejecting any papers found wanting, before soliciting anonymous peer reviewers (Nexon 2014a; Nexon 2014b). Consequently, ISQ desk rejects a high proportion of papers that it receives, 46.2% of submissions in 2014 (Nexon 2014c). Other journals desk reject far fewer papers; for example, the *American Journal of Political Science* (AJPS) only desk-rejected 20.7% of its submissions in 2014 (Jacoby et al. 2015). Thus, although the overall 9.6% acceptance rate of the AJPS is comparable to the 8.9% rate of ISQ, the manner in which these rates are achieved is quite different—with potentially substantial implications for which papers get published. Desk rejection practices are only one of the many "degrees of freedom" available to an editor:

as another example, editors almost certainly do not convert the anonymous reviews they solicit into a final decision in identical ways. Unfortunately, these procedures are rarely documented (and probably not totally formulaic). It would be helpful for editors and authors in political science to know which practices—if any—improve a journal's quality, where I define the "quality" of a single publication as the average reader's holistic ranking relative to the distribution of other papers (and the quality of the journal as the average quality of the papers it publishes).

In this paper, I computationally simulate several idealized archetypes of the peer review process in order to investigate how they influence the character of articles accepted by a journal. The goal is *not* to precisely mirror the editorial process of any extant journal, but to explore the implications of pure forms of the systems they might choose to use. Simulation has already proven a valuable method of studying the peer review process; for example, a prior simulation study revealed that some subjectivity in the review process is a helpful antidote to premature scientific convergence on a false conclusion via "herding" behavior (Park, Peacey, and Munafo 2014). Simulation also allows me to expand on analytical studies that use considerably simplified models of peer review (Somerville 2016), tempering some earlier conclusions and drawing some new ones.

In my simulations, I find that the preference heterogeneity of a journal's readership (and reviewer pool) is the most important influence on the character of its published work, regardless of the structure of peer review. When reviewers and readers have very heterogeneous ideas about scientific importance and quality (as I would expect for general interest journals like the *American Political Science Review*, *Perspectives on Politics*, and the *American Journal of Political Science*), a majority of papers accepted via peer review will be evaluated by the average reader as not meeting the standards of the journal under any review system that I study. Relatedly, all of these systems allow luck to exert a very strong influence on which papers get published; although a paper's merit is associated with receiving sufficiently favorable reviews for publication, reviewer heterogeneity creates a "luck of the draw" that no system I study can effectively counteract. Prior empirical studies have shown low levels of agreement among reviewers in their evaluations of a paper (Bornmann, Mutz, and Daniel 2010; Schroter et al. 2008; Mayo et al. 2006; Nylenna, Riis, and Karlsson 1994; Goodman et al. 1994; Mahoney 1977); this may explain why empirical studies (Cole, Cole, and Simon 1981) and the reports of editors themselves (Smith 2006) have observed that peer review decisions are subject to the whims of chance. The upshot is that readers and authors in political science may wish to rethink how specialized and general interest journals compare as outlets for high-quality research and how these journals rank in the prestige hierarchy of publications (Garand and Giles 2003; Giles and Garand 2007); I explore some possible implications in the conclusion.

Although the influences of the peer review process are dominated by the effect of reviewer heterogeneity, two important lessons for editors and reviewers about the structure of the peer review process emerge from the simulations. First, systems with active editorial control over decision making tend to result in more consistently high-quality publications compared to systems that rely primarily on reviewer voting. For example, using the reviewers' written commentary (which presumably contains a direct assessment of the paper's quality) to inform an editor's unilateral decision results in fewer low-quality publications compared to reviewer approval voting; desk rejection by editors prior to review also has a salutary effect. Concordantly, the simulations indicate that reviewers should focus on maximizing the informational content of their written review rather than on voting; this is consistent with the advice of Miller et al. (2013). Second, when asked to submit up-or-down votes, reviewers and editors must apply a comparatively lenient standard for choosing to approve papers in order to avoid undershooting a rigorous acceptance target. If reviewers recommend acceptance[1] at a rate matching the journal's overall acceptance target, as encouraged by some editors (Coronel and Opthof 1999), then far too few papers

[1] I presume that recommendations to revise-and-resubmit typically lead to acceptance and therefore can be subsumed under recommendations to accept without loss of generality.

will be accepted because the reviewers too often disagree. The structure of the peer review process can reduce the severity of this problem, but it is ultimately a product of reviewer heterogeneity.

Theoretical Assumptions

I begin by laying out a framework of assumptions about the review process upon which I base my analysis. I assume that there exists a population of potentially publishable papers, some of which will be submitted to a journal; I assume that submitted papers are representative of the overall population.[2] The journal's editor seeks to publish papers that are in the top $p^{\star}$ percentile of papers in the population in terms of quality. When the editor receives a paper, I assume that s/he solicits three blind reviews; I later relax this assumption to allow editors to desk reject papers before review. I further assume that editors assign papers to reviewers at random, conditional on expertise, and that any refusals to review are unrelated to paper quality; this rules out the possibility that editors selectively choose reviewers in anticipation of the review that they believe they will receive, or that reviewers self-select out of bad (or good) reviews.[3]

Each reviewer $i \in \{1,2,3\}$ and the editor $i = 4$ forms an opinion about paper j's overall quality, $p_{ij} \in [0,1]$, where p_{ij} corresponds to the proportional rank of the paper's holistic quality relative to the population of papers. For example, $p_{ij} = 0.8$ means that reviewer *i* believes that paper j is better than 80% of the other papers in the population. If papers are randomly assigned to reviewers (conditional on expertise), then approximately p proportion of the papers assigned to a reviewer will have quality less than or equal to p for every value of $p \in [0,1]$. As a result, every reviewer's marginal distribution of reviews $f_i(p)$ should be uniform. Reviewers have partially dissimilar preferences, limited time to review

[2] I could instead assume that authors "self-censor" and send only their best work to a particular journal for publication. However, the implications of this assumption are isomorphic to the implications of my original theory; in the next sentence, I would say that the journal's editor seeks to publish papers that are in the top $p^{\star}$ percentile of papers in the population of articles submitted to the journal.

[3] Breuning et al. (2015) show that the most frequent reason that reviewers give for declining to review is that they are "too busy" or have "too many other review invitations." The quality of the paper is not on the list of reasons that scholars gave for declining a review (in Table 5 on p. 599), but 28.3% of reviewers declined for no reason at all; it is conceivable that at least some of these refusals to review are related to the perceived quality of the paper.

a paper, the possibility of making errors, and cannot influence one another's opinion prior to forming their judgment. For all these reasons, I assume that reviewers' judgments of a paper are imperfectly associated with one another; this is consistent with the findings of a long empirical literature (Bornmann, Mutz, and Daniel 2010; Schroter et al. 2008; Mayo et al. 2006; Nylenna, Riis, and Karlsson 1994; Goodman et al. 1994; Mahoney 1977). Functionally, I presume that the three reviewers' opinions and the editor's are drawn from a normal copula with correlation $\rho \in [0,1]$. I intend that higher values of ρ model the behavior of reviewers for journals with narrower topical and methodological coverage (such as *Legislative Studies Quarterly* or *Political Analysis*), while lower values of ρ model the behavior of reviewers for general interest journals (like the *American Political Science Review*). In practice, editors could exert some control over ρ by choosing more or less like-minded reviewers, but (consistent with prior assumptions) ρ is fixed and not chosen by the editor in this model.

Each reviewer *i* submits a vote about paper *j* to the editor, $v_{ij} \in \{A, R\}$, based on paper *j*'s quality. I assume that reviewers recommend the best papers to the editors for publication; thus, the reviewers compare p_{ij} to an internal threshold for quality p' and submit a vote of A if $p_{ij} \geq p'$ and a vote of R otherwise. Given the uniform distribution of quality, this implies that the probability that a reviewer returns a positive review (of $v_{ij} = A$) is equal to p'. One particularly interesting threshold to investigate is $p' = p^{\star}$, where the reviewers set their internal threshold equal to the journal's target acceptance rate.[4] Reviewers also submit a qualitative written report to the editor that contains p_{ij}; this allows a more finely grained evaluation of papers.[5]

I assume that each reviewer sincerely reports their v_{ij} to the editor. The editor then uses his or her own opinion about paper *j*'s quality (p_{4j}), his or her holistic judgment about the paper ($v_{4j} = A$ if

[4] This corresponds to the "optimistic decision rule" of Somerville (2016).

[5] Note that separating votes into multiple categories, such as "conditional acceptance," "minor revision," "major revision," and "reject" constitutes a middle ground between the initial up-or-down voting system and the direct observation of p_{ij} via reviewer reports; it is a more coarsely-grained quality ranking.

$p_{4j} \geq p'$, and $= R$ otherwise), the reviewers qualitative reports (p_{ij}), and the reviewer's votes to decide whether to accept or reject the paper. I consider four possible editorial regimes for converting reviews into decisions:

- unanimity approval voting by the reviewers, excluding the editor
- simple majority voting by the reviewers, excluding the editor
- majority voting with the editor's vote included (i.e. a paper must achieve support from all three reviewers *or* two reviewers and the editor to be accepted)
- unilateral editor decision-making based on the average report $\bar{p}_j = \frac{1}{4}\sum_{i=1}^{4} p_{ij}$, with the paper accepted if, $\bar{p}_j \geq p'$ and reviewers' votes ignored.

The final regime acknowledges that editors try to follow the advice of the reviewers whose participation they solicit, but may choose not to follow the reviewers' up-or-down recommendation. This regime is analogous to a system under which an editor reads reviewers' written reports in order to collect information about the paper's quality that will influence their decision, but either does not request or simply ignores the reviewers' actual vote to accept or reject.

The model I propose is substantially more complex than another model recently proposed by Somerville (2016). In Somerville's model, the quality of a journal article is binary, good (G) or bad (B) and the review process is abstracted into a single probability of accepting an article based on its quality ($\Pr(A|G)$ and $\Pr(A|B)$). The goal of his study is to use Bayes' rule to calculate the probability of an article's being good conditional on its being accepted ($\Pr(G|A)$). By comparison, my model explicitly includes multiple reviewers with competing (but correlated) opinions of continuous paper quality, an editor with decision making authority, and institutional rules that can be systematically changed and studied. I compare our results in the summary of my findings below.

Acceptance Targets and Reviewer Standards

I begin by investigating the simple relationship between each editorial system (unanimity approval voting, majority approval voting, majority approval voting with editor participation, and unilateral editor decision making based on reviewer reports) and the journal's final acceptance rate. For every value of the degree of correlation in reviewer reports $\rho \in [0.02, 0.98]$ in increments of 0.02, I simulate 2000 papers out of the population distribution and three reviews for each paper, plus the editor's personal opinion (for a total of four reviews). I then apply the specified decision rule for acceptance to each paper and determine the acceptance rate. I then plot the overall journal acceptance rate as a function of ρ and examine the relationship for $p' = 0.90$, a reviewer/editor acceptance rate of 10%. All simulations are conducted using R 3.2.5 (R Core Team 2015) with the `copula` package (Kojadinovic and Yan 2010).

The simulation results are shown in Figure 1. As the figure indicates, the probability of a manuscript being accepted is always considerably less than any individual reviewer's probability of submitting a positive review unless $\rho \approx 1$. The systems vary in the disparity between the individual acceptance threshold p' and the journal's overall acceptance rate, but all of them undershoot the target. In order for a journal to accept 10% of its submissions, reviewers and editors must recommend papers that they perceive to be considerably below the top 10%.

[Place Figure 1 About Here]

The Effect of the Peer Review System on the Quality of the Published Literature

Will peer review accept the papers that the discipline views as the best, despite heterogeneity in reviewer opinions? To what extent will quality and chance determine the outcomes of peer review? To answer these questions, I conduct another simulation similar to the one above but with a much larger population of 50,000 papers and 500 readers. I assume that readers' opinions are correlated at $\rho = 0.5$, perhaps consistent with a flagship journal; this is actually a greater degree of reviewer correlation than empirical studies typically find (Bornmann, Mutz, and Daniel 2010). The first three simulated readers are selected as reviewers and the fourth as the editor; these opinions serve as the basis for editorial decisions in each of the four systems examined. I choose an acceptance threshold p' based on initial simulations in order to produce an overall journal acceptance rate of $\approx 10\%$.[6] I then compute the average reader value of p for all 500 readers for the papers that were accepted for publication according to the system and plotted the distribution of these average values for all 50,000 papers.

I ran this simulation twice: once for every review system as previously described, and again under a system where the editor desk rejects a certain proportion of papers before sending them out for review. I simulated the process of desk rejection by having the editor refuse to publish any paper for which $p_{4j} < 0.5$; that is, the editor desk rejects any paper that s/he believes is worse than the median paper in the population. Figure 2 presents kernel density estimates for the results with and without desk rejection.

The figure indicates that *all* the systems produce distributions of published papers that are centered on a mean reader evaluation near 0.8. Under every peer review system, a majority of papers are perceived by readers as not being in the top 10% of quality despite the journal's acceptance rate of 10%. Furthermore, a substantial proportion of the published papers have surprisingly low mean reader evaluations under every system. For example, 11.7% of papers published under the majority voting system without desk rejection have reader evaluations of less than 0.65. The average reader believes that such a paper is worse than 35% of other papers in the population of papers, many of which are not published by the journal. This result is surprisingly consistent with what political scientists actually report about the

[6] Without desk rejection, I use an acceptance threshold p' of 0.8 for the strong editor system, 0.7 for unanimity voting, 0.8 for majority voting with an active editor, and 0.85 for majority voting by reviewers only. With desk rejection, I use an acceptance threshold of 0.87 for the strong editor system, 0.79 for unanimity voting, 0.85 for majority voting with an active editor, and 0.91 for majority voting by reviewers only.

American Political Science Review, a highly selective journal with a very heterogeneous readership: although the best-known journal among political scientists by a considerable margin, it is ranked only 17th in quality (Garand and Giles 2003). It also complements the earlier findings of Somerville (2016, 35), who concludes that "if the rate of accepting bad papers is 10% then a journal that has space for 10% of submissions may not gain much additional quality from the review process." The peer review systems that I study all improve on the baseline expectation of quality without review (a mean evaluation near 0.5), but they do not serve as a perfect filter.

There *are* some meaningful differences among the reviewing systems: only 5.6% of papers published under the unilateral editor decision system without desk rejection have reader evaluations of less than 0.65, the best-performing system in the simulation. If editors desk reject 50% of papers under the unilateral editor decision system, this proportion falls to 1.4%.[7] These better-performing systems are analogous to ones in which reviewers provide a qualitative written evaluation of the paper's quality to the editor, but no up-or-down vote to accept the paper (or where that vote is ignored by the editor).

It is important to note that the simulated peer review systems tend to accept papers that are better (on average) than the rejected papers, consistent with the empirical evidence of Lee et al. (2002) that journal selectivity is associated with higher average methodological quality of publications. But luck still plays a strong role in determining which papers are published under any system. Both of these findings are shown in Figure 3, which plots the average reader evaluation of a simulated paper against its loess predicted probability of acceptance. In all systems, the highest quality papers are the most likely to be published; however, a paper that the average reader evaluates as being near the 80th percentile of quality (or 85th percentile when desk rejection is used) has a chance of being accepted similar to a coin flip.

[7] This finding provides evidence in favor of an untested speculation in Somerville (2016, 35), who says that "pre-screening may yield worthwhile benefits, by reducing the full set of submissions into a subsample drawn largely from the right-hand tail of the distribution of quality."

The Structure of Preferences and its Effect on Peer Reviewed Publication Quality

The structure of preferences in the underlying population of a journal's readership (and reviewer pool) is powerfully associated with how the quality of publications that survive the peer review system is perceived in the simulations. This structure incorporates the overall degree to which opinion is correlated in the population of a journal's readers and reviewers, but also includes the degree to which scientists in a discipline are organized into subfields within which opinions about scientific importance and merit are comparatively more homogeneous. I find that journals with a more homogenous readership, or with disparate but internally homogenous subfields, will tend to publish more consistently high-quality papers (as defined by the judgment of its readers) than journals with a heterogeneous readership.

To demonstrate this point, I repeat the simulation of 50,000 papers (using unilateral editor decision making) under three conditions: (a) reader and reviewer opinions correlated at 0.5, to represent a flagship journal in a heterogeneous field (like the *American Political Science Review*); (b) reader and reviewer opinions correlated at 0.75, to represent a journal in a more homogenous field (like *Political Analysis*);[8] and (c) readers and reviewers organized into two equally-sized subfields of 250 people each, within which opinions are correlated at 0.9 but between which opinions are correlated at 0.1 (for an average correlation of 0.5).[9] When subfields exist, reviewers are chosen so that two reviewers are from one subfield and the final reviewer and editor are from the other. These subfields may represent different topical specialties or different methodological approaches within a discipline, such as qualitative area specialists and quantitative large-N comparativists who both read a comparative politics journal.

[8] For the condition where $\rho = 0.75$, I set $p' = 0.85$ without desk rejection and `$p' = 0.91$ with desk rejection to achieve an overall acceptance rate close to 10%.

[9] For the two subfield condition, I set $p' = 0.78$ without desk rejection and $p' = 0.85$ with desk rejection to achieve an overall acceptance rate close to 10%.

The results are shown in Figure 4. As the figure shows, the organization of scientists by subfield has a dramatic impact on the perceived quality of publications in the journal. Specifically, the simulation with two highly correlated but disparate subfields produces very few papers whose overall quality is less than 0.8, with an average quality of 0.85 (without desk rejection) or 0.90 (with desk rejection). By comparison, the subfield-free simulation with low correlation (0.5) indicates that many more low-quality papers are published under this condition. The subfield-free simulation with high correlation (0.75) produces papers with high average quality (0.88 without desk rejection, 0.92 with desk rejection), but still has a substantial tail of lower-quality papers.

Conclusion

This simulation study indicates that heterogeneity of reviewer opinion is a key influence on journal outcomes. When readers and reviewers have heterogeneous standards for scientific importance and quality, as one might expect for a general interest journal serving an entire discipline like the *American Political Science Review* or *American Journal of Political Science*, chance will strongly determine publication outcomes and even highly selective journals will not necessarily publish the work that its readership perceives to be the best in the field. However, we may expect a system with greater editorial involvement and discretion to publish papers that are better-regarded and more consistent compared to other peer review systems. In particular, we find that a system where editors accept papers based on the quality reports of reviewers—but *not* their up-or-down judgment to accept the paper—after an initial round of desk rejection tends to produce fewer low-quality published papers compared to the other systems we examine. Our finding suggests that reviewers should focus on providing informative, high-quality reports to editors that they can use to make a judgment about final publication (and not focus on their vote to accept or reject the paper). When a journal does solicit up-or-down recommendations, a reviewer should typically recommend R&R or acceptance for a substantially greater proportion of papers than the journal's overall acceptance target in order to actually meet that target.

The strong relationship between reader/reviewer heterogeneity and journal quality suggests that political scientists may want to reconsider their attitudes about the prestige and importance of general interest journal publications relative to those in topically and/or methodologically specialized journals. As noted above, the *American Political Science Review* (APSR) was ranked 17th in quality by political scientists in a survey—yet those same survey respondents *also* ranked the APSR as the journal to which they would most prefer to submit a high-quality manuscript! Moreover, APSR was the only journal ranked in the top three most-preferred submission targets by all four subfields of political science they studied (Garand and Giles 2003).

The reason for this apparent contradiction is easy to explain:

> The *American Political Science Review*, *American Journal of Political Science*, and *Journal of Politics* continue to rank among the top three journals in terms of their impact on the political science discipline, as measured to take into account both scholars' evaluation of the quality of work reported in these journals and their familiarity with these journals. …Ultimately, publication in these journals represent a feather in one's proverbial hat or, in this case, in one's vitae. (Garand and Giles 2003, 306–7)

There are immense rewards for publishing in any of these journals precisely because they are quite selective and are viewed by a huge and heterogeneous audience. Unfortunately, the simulation evidence presented in this paper suggests that any career benefit is at odds with the proffered justification for that benefit:

> Articles published in the most highly regarded journals presumably go through a rigorous process of peer review and a competition for scarce space that results in high rejection rates and a high likelihood of quality. Articles published in these journals pass a difficult test on the road to publication and are likely to be seen by broad audiences of interested readers. Other journals publish research findings that are of interest to political scientists, to be sure, but articles published in these journals either pass a less rigorous test or are targeted to narrower audiences. (Garand and Giles 2003, 293)

It would be premature to radically reconsider our judgments about journal prestige (and the tenure and promotion decisions that are based on these judgments) because of one simulation study. But perhaps one study *is* enough to begin asking whether our judgments are truly consistent with our scholarly and scientific standards, particularly when some evidence suggests that underrepresented groups in the discipline are systematically disadvantaged by how we think about the journal hierarchy (Breuning and Sanders 2007).

Works Cited

Baxt, William G., Joseph F. Waeckerle, Jesse A. Berlin, and Michael L. Callaham. 1998. “Who Reviews the Reviewers? Feasibility of Using a Fictitious Mansucript to Evaluate Reviewer Performance.” *Annals of Emergency Medicine* 32 (3): 310–17.

Bornmann, Lutz, Rudiger Mutz, and Hans-Dieter Daniel. 2010. “A Reliability-Generalization Study of Journal Peer Reviews: A Multilevel Meta-Analysis of Inter-Rater Reliability and Its Determinants.” *PLoS One* 5 (12): e14331. doi:10.1371/journal.pone.0014331.

Breuning, Marijke, Jeremy Backstrom, Jeremy Brannon, Benjamin Isaak Gross, and Michael Widmeier. 2015. “Reviewer Fatigue? Why Scholars Decline to Review Their Peers’ Work.” *PS: Political Science & Politics* 48 (4): 595–600. doi:10.1017/S1049096515000827.

Breuning, Marijke, and Kathryn Sanders. 2007. “Gender and Journal Authorship in Eight Prestigious Political Science Journals.” *Political Science and Politics* null (2): 347–351. doi:10.1017/S1049096507070564.

Cole, Stephen, Jonathan R. Cole, and Gary A. Simon. 1981. “Chance and Consensus in Peer Review.” *Science* 214 (4523): 881–86.

Coronel, Ruben, and Tobias Opthof. 1999. “The Role of the Reviewer in Editorial Decison-Making.” *Cardiovascular Research* 43: 261–64.

Djupe, Paul. 2015. “Peer Reviewing in Political Science: New Survey Results.” *PS: Political Science & Politics* April: 346–51.

Garand, James C., and Micheal W. Giles. 2003. “Journals in the Discipline: A Report on a New Survey of American Political Scientists.” *PS: Political Science and Politics* 36 (2): 293–308.

Giles, Micheal W., and James C. Garand. 2007. “Ranking Political Science Journals: Reputational and Citational Approaches.” *PS: Political Science and Politics* 40 (4): 741–51.

Goodman, Steven N., Jesse Berlin, Suzanne W. Fletcher, and Robert H. Fletcher. 1994. “Manuscript Quality before and after Peer Review and Editing at Annals of Internal Medicine.” *Annals of Internal Medicine* 121: 11–21.

Jacoby, William G., Robert N. Lupton, Miles T. Armaly, and Marina Carabellese. 2015. “American Journal of Political Science Report to the Editorial Board and the Midwest Political Science Association Executive Council.” April. https://ajpsblogging.files.wordpress.com/2015/04/ajps-editors-report-on-2014.pdf.

Kojadinovic, Ivan, and Jun Yan. 2010. “Modeling Multivariate Distributions with Continuous Margins Using the Copula R Package.” *Journal of Statistical Software* 34 (9): 1–20.

Lee, Kirby P., Marieka Schotland, Peter Bacchetti, and Lisa A. Bero. 2002. “Association of Journal Quality Indicators with Methodological Quality of Clinical Research Articles.” *Journal of the American Medical Association* 287 (21): 2805–8.

Li, Danielle, and Leila Agha. 2015. “Big Names or Big Ideas: Do Peer-Review Panels Select the Best Science Proposals?” *Science* 348 (6233): 434–38.

Mahoney, Michael J. 1977. “Publication Prejudices: An Experimental Study of Confirmatory Bias in the Peer Review System.” *Cognitive Therapy and Research* 1 (2): 161–75.

Mayo, Nancy E., James Brophy, Mark S. Goldberg, Marina B. Klein, Sydney Miller, Robert W. Platt, and Judith Ritchie. 2006. “Peering at Peer Review Revealed High Degree of Chance Associated with Funding of Grant Applications.” *Journal of Clinical Epidemiology* 59: 842–48.

Miller, Beth, Jon Pevehouse, Ron Rogowski, Dustin Tingley, and Rick Wilson. 2013. “How To Be a Peer Reviewer: A Guide for Recent and Soon-to-Be PhDs.” *PS: Political Science & Politics* January: 120–23.

Mulligan, Adrian, Louise Hall, and Ellen Raphael. 2013. “Peer Review in a Changing World: An International Study Measuring the Attitudes of Researchers.” *Journal of the American Society for Information Science and Technology* 64 (1): 132–61.

Nexon, Daniel H. 2014a. “Ask the Editors: Desk Rejections (Part I) > International Studies Association.” May 5. http://www.isanet.org/Publications/ISQ/Posts/ID/1377/Ask-the-Editors-Desk-Rejections-Part-I.

———. 2014b. “Ask the Editors: Desk Rejections (Part II) > International Studies Association.” July 7. http://www.isanet.org/Publications/ISQ/Posts/ID/1427/Ask-the-Editors-Desk-Rejections-Part-II.

———. 2014c. “ISQ Annual Report, 2014.” December 5. http://www.isanet.org/Portals/0/Documents/ISQ/ISQ%202014%20Annual%20Report.pdf.

Nylenna, Magne, Povi Riis, and Yngve Karlsson. 1994. “Multiple Blinded Reviews of the Same Two Manuscripts: Effects of Referee Characteristics and Publication Language.” *Journal of the American Medical Association* 272 (2): 149–51.

Park, In-Uck, Mike W. Peacey, and Marcus R. Munafo. 2014. “Modelling the Effects of Subjective and Objective Decision Making in Scientific Peer Review.” *Nature* 506 (February): 93–96.

R Core Team. 2015. *R: A Language and Environment for Statistical Computing* (version 3.2.5). Vienna, Austria. http://www.R-project.org.

Schroter, Sara, Nick Black, Stephen Evans, James Carpenter, Fiona Godlee, and Richard Smith. 2004. “Effects of Training on Quality of Peer Review: Randomised Controlled Trial.” *BMJ* 328: 673–78.

Schroter, Sara, Nick Black, Stephen Evans, Fiona Godlee, Lyda Osorio, and Richard Smith. 2008. “What Errors Do Peer Reviewers Detect, and Does Training Improve Their Ability to Detect Them?” *Journal of the Royal Society of Medicine* 101: 507–14.

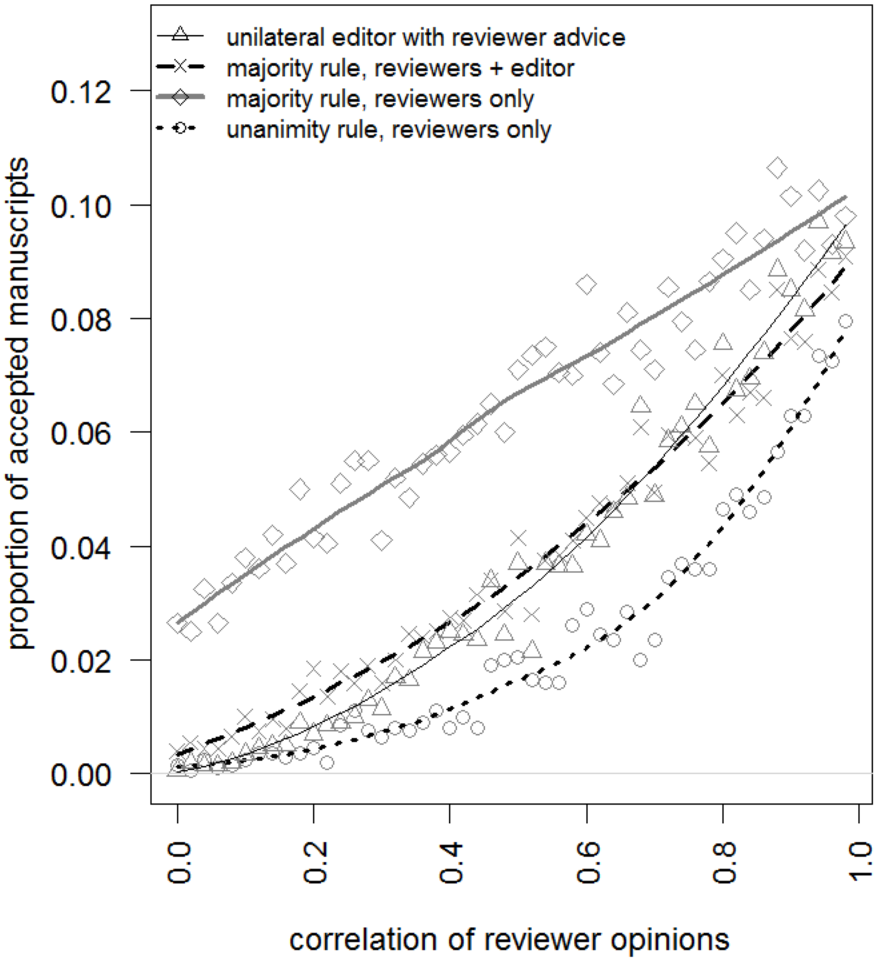
Smith, Richard. 2006. “Peer Review: A Flawed Process at the Heart of Science and Journals.” *Journal of the Royal Society of Medicine* 99: 178–82.

Somerville, Andrew. 2016. “A Bayesian Analysis of Peer Reviewing.” *Significance* 13 (1): 32–37. doi:10.1111/j.1740-9713.2016.00881.x.

Sweitzer, Bobbie Jean, and David J. Cullen. 1994. “How Well Does a Journal’s Peer Review Process Function? A Survey of Authors’ Opinions.” *Journal of the American Medical Association* 272 (2): 152–53.

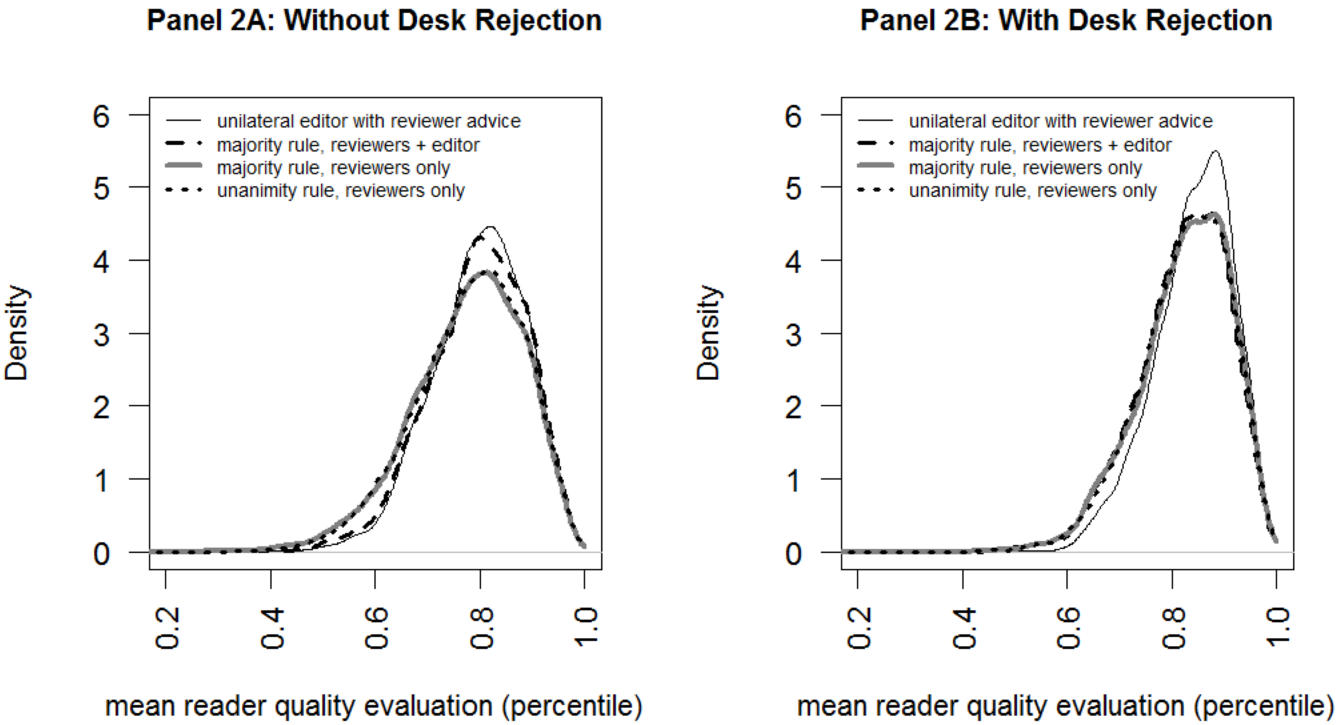
Weber, Ellen J., Patricia P. Katz, Joseph F. Waeckerle, and Michael L. Callaham. 2002. “Author Perception of Peer Review.” *Journal of the American Medical Association* 287 (21): 2790–93.

Figure 1: Simulated Outcomes of Peer Review under Various Peer Review Systems*



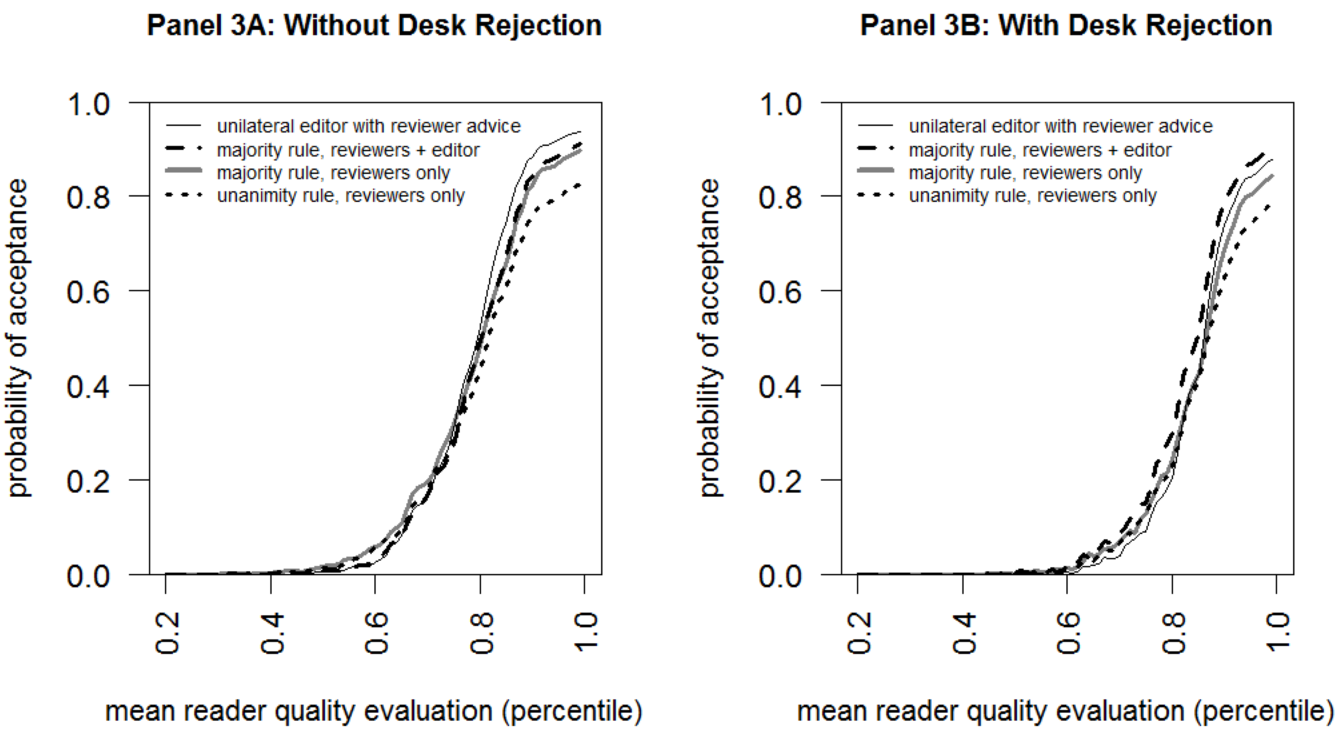
* Points indicate the proportion of 2,000 simulated manuscripts under the peer review system indicated; lines are predictions from a local linear regression of the data using `loess` in R. Reviewer acceptance thresholds $p' = 0.90$ (i.e., a reviewer recommends the top 10% of papers for acceptance) for all systems.

Figure 2: Discipline-wide Evaluation of Papers Published under Various Peer Review Systems, Reader and Reviewer Opinion Correlation $\rho = 0.5$*



*Plots indicate kernel density estimates (using `density` in R) of 500 simulated readers' average evaluation (p) for the subset of 50,000 simulated papers that were accepted under the peer review system indicated in the legend. Reviewer acceptance thresholds p' were chosen to set acceptance rates $\approx 10\%$. The acceptance rate w/o desk rejection was 10.58% for the unilateral editor system, 10.01% under unanimity voting, 10.05% under majority rule including the editor, and 11.1% under majority rule excluding the editor. The acceptance rate w/ desk rejection was 9.64% for the unilateral editor system, 9.96% under unanimity voting, 12.5% under majority rule including the editor, and 10.5% under majority rule excluding the editor.

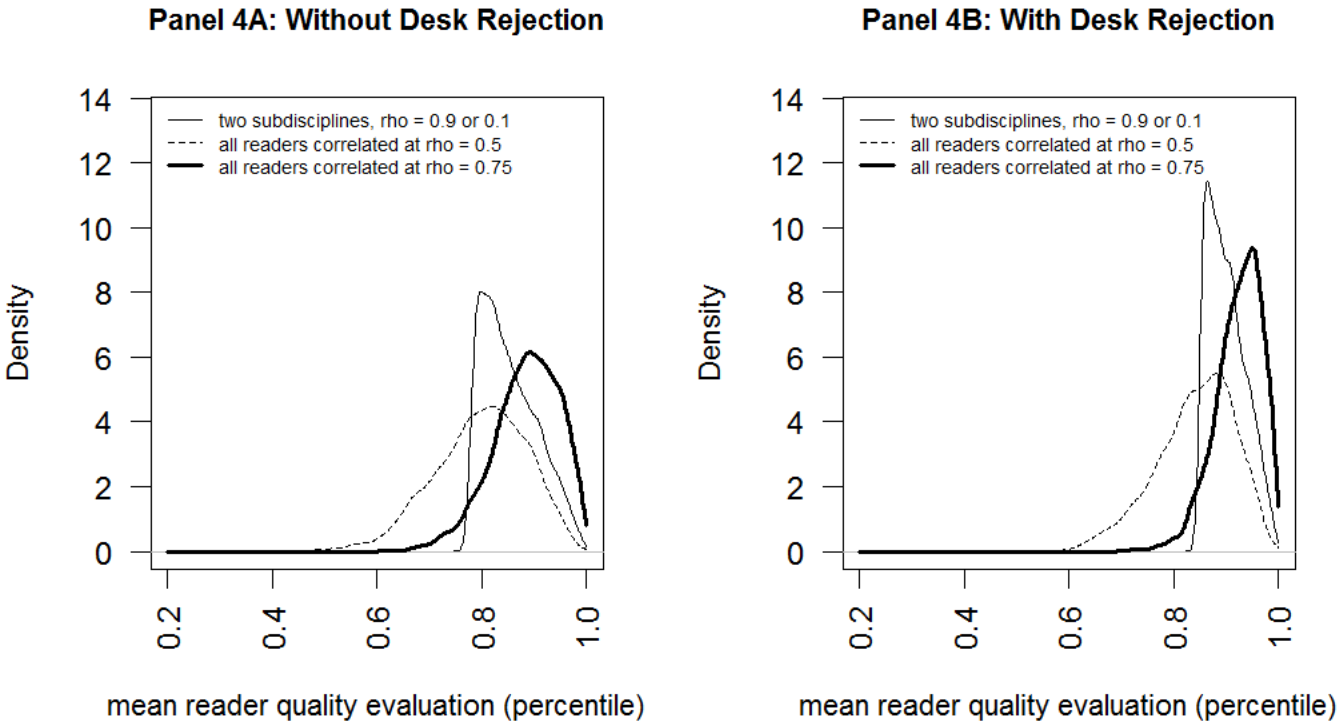
Figure 3: The Role of Chance in Publication under Various Peer Review Systems,
Reader and Reviewer Opinion Correlation $\rho = 0.5$*


Panel 3A: Without Desk Rejection

Panel 3B: With Desk Rejection

*Plots indicate zeroth-degree local regression estimates (using `loess` in R) of the empirical probability of acceptance for 50,000 simulated papers under the peer review system indicated in the legend as a function of 500 simulated readers' average evaluation (p). Reviewer acceptance thresholds p' were chosen to set acceptance rates $\approx 10\%$. The acceptance rate w/o desk rejection was 10.58% for the unilateral editor system, 10.01% under unanimity voting, 10.05% under majority rule including the editor, and 11.1% under majority rule excluding the editor. The acceptance rate w/ desk rejection was 9.64% for the unilateral editor system, 9.96% under unanimity voting, 12.5% under majority rule including the editor, and 10.5% under majority rule excluding the editor.

Figure 4: Average Discipline-wide Evaluation of Papers Published under a Unilateral Editor Approval System informed by Submitted Reviewer Reports with Varying Structure of Opinion*



* Plots indicate kernel density estimates (using `density` in R) of 500 simulated readers' average evaluation (p) for the subset of 50,000 simulated papers that were accepted under the unilateral editor review system for the structure of reader and reviewer opinion correlation indicated in the legend. Reviewer acceptance thresholds p' were chosen to set acceptance rates $\approx 10\%$. The acceptance rate for all readers correlated at 0.5 was 10.58% w/o desk rejection and 9.65% w/ desk rejection. The acceptance rate for all readers correlated at 0.75 was 10.50% w/o desk rejection and 10.23% w/ desk rejection. The acceptance rate for the two-subfield discipline was 10.16% w/o desk rejection and 9.46% w/ desk rejection.