June 2004

Peer Review in the Internet Age: Five (5) Easy Pieces

Gerry McKiernan
GMCKIERN@gwgate.libiastate.edu

Follow this and additional works at: https://docs.lib.purdue.edu/atg

Recommended Citation
DOI: https://doi.org/10.7771/2380-176X.4345
call for disinterestedness. We need to look beyond whatever field we’re tending and think about the health of the entire ecology of knowledge. Because ultimately, when we treat the work that academics are expected to do to fulfill their contract with society as mere intellectual property, rather than as a contribution to a public resource, we run the risk that contract will not be renewed.

A bill recently introduced in Congress by Martin Saba, the “Public Access to Science Act,” takes a breathtakingly simple approach to this — it would remove copyright protection from works arising out of federally funded research. Why should the public pay for it twice? This solution, while bold and apparently sensible, is problematic because even those frustrated by the current system don’t want their work to be subject to alteration or reuse without attribution — actions that could harm the research record and won’t serve the public interest in the long run. We can negotiate better ways to retain sufficient incentives for authors and publishers while honoring the benefits of public knowledge.

All it will take is a little imagination and a better understanding of the intersecting but crucially different perspectives of academic authors, publishers, and the public.

We have a republic — if we can keep it. Can we strike the right balance? That’s not just an academic question.

Peer Review in the Internet Age: Five (5) Easy Pieces
by Gerry McKiernan <GMCKIERN@gwgate.lib.iastate.edu>

“...[In] the digital world, the evaluation process stands ready to be reinvented in a clear, rational way by the relevant research communities themselves.”

— Jean-Claude Guédon

Purpose of Peer Review
In general, peer review can be defined as “the assessment by an expert of material submitted for publication.” Specifically, its purpose is to ensure that published research is important, internally-consistent, original, technically-reliable, timely, well-presented, and most importantly, benefiting from guidance by experts. Overall, “the underlying strength of editorial peer review is the concerted effort by large numbers of researchers and scholars who work to assure that valuable and valuable works are published, and conversely to assure that invalid or non-values works are not published.”

Problems with Classical Peer Review
While established peer review has its supporters, it has long been criticized as “...slow, expensive, profligate of academic time, highly subjective, prone to bias, easily abused, poor at detecting gross defects, and almost useless in detecting fraud.” In a recent review article on the peer review process, Rowland analyzes and briefly characterizes many of the deficiencies of classic peer review as follows:

- **Subjectivity**
  Summary rejections by editor without sending the paper to referees; choice of referees by the editor (choosing for example, a known harsh referee for a paper the editor wishes to see rejected);

- **Bias**
  Discrimination against authors because of their nationality, native language, gender or host institution; situations where author and referee are competitors in some sense, or belong to competing schools of thought;

- **Abuse**
  Too many articles out of one piece of research, or duplicate publication; intellectual theft: omission or downgrading of junior staff by senior authors; plagiarism (stealing others yet unpublished work that has been sent for review), delaying publication of potentially competing research;

- **Detecting Defects**
  Identification of factual errors within submission

- **Fraud Misconduct**
  Fabrication of results, falsification of data false claim of authorship for results.

continued on page 32

<http://www.against-the-grain.com>
Among the most common complaints about peer review is the long delay associated with the review process. As observed by Stevan Harnad, an active proponent of author-self-archiving and institutional repositories, “[t]here is much muttering about publication delay, a real enough problem, especially in paper publication, but peer review itself is often responsible for as much of the delay as the paper publication and distribution process itself.”

**Scientific Publishing as Rhetoric**

For some, the fundamental problems of peer review are inherent in the peer review process itself as it is currently implemented. As noted by Sosteric, “the traditional mode of peer review obscures the problems of reference and the rhetorical dimension of science. The rhetorical process [...] is at the heart of science and peer review: it conveniently disappears with the final publication of the manuscript. In its place is an ideal typical representation (the scientific paper) of the realist assumptions about empirical reference. All the academic worlds sees is the polished manuscript where the personal involvement of the researcher and reviewers has been systematically eliminated.”

As an alternative to conventional peer review, Sosteric, Gross, and others, propose the framework of the “ideal speech situation,” a “rhetorical construct that describes the ideal type of interpersonal interaction that should exist in a rhetorical situation” and developed by Jürgen Habermas, the noted German philosopher and sociologist. Drawing upon Habermas, Gross describes the ideal speech situation in the following terms: 1) the ideal speech situation permits each interlocutor an equal opportunity to initiate speech; 2) there is mutual understanding between interlocutors; 3) there is space for clarification; 4) all interlocutors are equally free to use any speech act; and 5) there is equal power over the exchange.

As applied in the context of peer review, Gross notes that ideally “scientific peer review would permit unimpeded authorial initiative, endless rounds of give and take, [and] unchecked openness among authors, editors, and referees.”

“... The Times They Are A-Changin’”

In 2001, CERN, the European Organisation for Nuclear Research, in Geneva, Switzerland, served as the venue for the First Open Archives Initiative (OAI). Focused on OAI and “Peer Review Journals in Europe,” the purpose of this workshop was to “mobilise a group of European scientists and librarians who want to play an active role in organising a self-managed system for electronic scholarly communication as a means to address the serials crisis. Such a system should be compliant to the technical standards proposed by the Open Archives Initiative (OAI).”

Two years after the workshop, a policy briefing of the European Science Foundation was published. The publication not only profiled the variety of issues relating to Open Access and the OAI, but also summarized the themes of the first OAI workshop and the second held at CERN in mid-October 2002, as well. In addition, the briefing included consensus recommendations from each workshop. While the “participants [at the first workshop] were unanimous in their belief that the certification of scholarly work remains a fundamental part of the scholarly communication system,” they also “believed that the electronic environment allows for novel approaches to accord a stamp of quality to scholarly works.” The suggested “new metrics” that could be extracted from a fully electronic communication system include the discussion level generated by a paper submitted to a publication system with open peer review and peer commentary features; automated citation indexing beyond the standard Institute for Scientific Information (ISI) print-focused service; and access statistics.

**LAMPS: Lots of Alternative Models Provide Sensible Solutions**

[1] **Open Peer Review**

During much of its recent history, conventional peer review has been wholly or partially anonymous. In the former arrangement, neither reviewer nor the author is known to each other; in the latter, the author is identified. Until five years ago, the British Medical Journal (BMJ), the high-impact, general medical journal of the British Medical Association, had used a closed system of peer review, where the authors do not know who has reviewed their papers ... but the reviewers do, however, know the names of the authors.” In announcing a change in its editorial policy, Richard Smith, the BMJ editor further observes that “[m]ost medical journals use the same system, ... based on custom and not evidence. Now we plan to let authors know the identity of reviewers. Soon we are likely to open up the whole system so that anybody interested can see the whole process on the World Wide Web. The change is based on evidence and an ethical argument.”

He further notes that “the primary argument against closed peer review is that it seems wrong for somebody making an important judgment on the work of others to do so in secret.” In a supportive argument, Smith quotes Drummond Rennie, a deputy editor of JAMA: The Journal of the American Medical Association, stating that identifying the reviewer links “privilege and duty, by reminding the reviewer that with power comes responsibility: that the scientist invested with the mantle of the judge cannot be arbitrary in his or her judgment and must be a constructive critic.”

Journals that have implemented open peer review include not only the British Medical Journal (www.bmj.com), but also select journals published by BioMed Central (www.biomedcentral.com), as well as Internet Health: Journal of Research, Application, Communication & Ethics (www.virtualmed.net/journals/internethlth), among others.

**Commentary-Based**

A journal that offers a novel form of “open review” as well as conventional peer review is continued on page 53

---

**Endnotes**


3. Ibid.


10. “interactive Peer Review”


15. Ibid.


17. “Opening Up BMJ Peer Review”


19. Ibid.

20. Ibid.

Peer Review in the Internet Age: from page 52

the Electronic Transactions on Artificial Intelligence (ETAI) (www.etai.org). “The ETAI is an electronic journal that uses the Internet medium to the fullest extent for scientific communication: not merely for distributing the articles, but also for the review procedure, for bibliographic infrastructure, and other applications.” With respect to reviewing, “it...use[s] a novel, two-stage procedure where the first review phase is open and allows the peer community to ask questions to the author, and to create a discussion about the contribution. The second phase — called refereeing in the ETAI — is like conventional journal refereeing except that the major part of the required feedback is supposed to have occurred already in the first, review phase.” After refereeing, accepted articles are published in the ETAI journal in both a paper edition and an electronic edition where the latter is available free of charge, and contains a variety of other information, including past discussions.

Launched in September 1996, the Journal of Interactive Media in Education (JIME) (www.jime.open.ac.uk), a borne-digital e-journal has incorporated one of the most varied forms of peer interaction and review. Its review environment provides an “opportunity to redesign the conventional journal review model to be more open, responsive and dynamic.” In the JIME review model “authors have the right of reply,” “reviewers are named and accountable for their comments, and their contribution acknowledged,” and the wider research community has the chance to shape a submission before [formal] publication. Specifically, “articles submitted to JIME are first reviewed by three reviewers who are named, and acknowledged for their contribution to a review. They post their reviews as threaded comments to a private [Web] site. Reviewers have the option of posting anonymously, but usually...[they] are happy to be...named...[In turn], authors are encouraged to respond to [reviewer] comments. This [particular part of the process] takes place during an agreed period when authors and reviewers are able to respond in a timely manner.”

On the basis of this interaction, if the assigned editor deems that the manuscript is of acceptable quality based on this discussion, the submission “will be published will then be published as a preprint for public open peer review, and announced to relevant communities to invite their participation.” This second phase of the JIME open review is open for a month after formal posting. After public review and comment, the assigned JIME editor will “post to the discussion an editorial report summarising the most significant issues, and specifying change requirements to the authors.” After formal acceptance and publication, JIME continues to support discussion about the revised, published article. In addition, the most interesting review comments/exchanges are published with the final version of the revised submission, “providing readers with insight into the issues that arose during review, and enabling them to build on those discussions.”

Within JIME, authors can “post links to publications to point to subsequent work. Readers can post comments and links to point to work which has not been referenced, or did not exist when the article was written. In addition, [a]uthors, reviewers and anyone else who has subscribed to the article will receive email alerts to new postings to its discussion forum.”

[3] Community Based

Paul Ginsparg, the creator and developer of arXiv.org, the physics e-print service originally based at the Los Alamos National Laboratory, has proposed a tier-based hybrid review system that offers enhanced conventional review in conjunction with open submission and alternative assessment. In his model, any and all submissions are accepted after a cursory examination or other post form certification and assigned to a ‘standard’ tier. This phase of the review process would be “minimally labor-intensive, perhaps relying primarily on an automated check of author institutional affiliation, prior publication record, research grant status, or other related background; and involve human labo: primarily to adjudicate incomplete or ambiguous results of an automated pass.”

“At some later point (which could vary from article to article, perhaps with no time limit), a much smaller set of articles would be selected for the full peer review process [and assigned to an upper tier]. The initial selection criteria for this smaller set could be any of a variety of impact measures, to be determined, and based explicitly on their prior widespread and systematic availability and citability: e.g., reader nomination or rating, citation impact, usage statistics, editorial selection, ...”

It is expected that this approach would lead to an overall efficiency in the review process by expediting “community intellectual resources” on submissions that are “most likely to be archival useful, and hence merit the enhanced editorial treatment for upgrade into the upper tier, including, for example, text clarifications and other improvements.” Upper tier enhancements could also include continued on page 54
anything from a thorough blind refereeing to open professional annotation and comment. The upper tier could also combine commentary on many related papers at once. The point is that it’s possible to provide more signal of various sorts to users on a smaller subset of articles, without worry about fairness issues of limited dissemination for the rest, and this can be done at lower overall cost than the current system, both in time spent by editors and in elective time spent by referees.29,30

As noted by Ginsparg, “the standard tier would provide a rapid distribution system only marginally less elite than much of the current publication system, and enormously useful to readers and authors,” particularly in fields “in which the time to publication is perceived to be too long.” In addition, “the standard tier availability could also be used to collect confidential commentary from interested readers so that eventual referees would have access to a wealth of currently inaccessible information held by the community...” 31

More than five years ago, David Stern, Director of Science Libraries and Information Services at Yale University, proposed a model with many of the components of the Ginsparg approach. Stern envisioned a system that would allow “the widest range of scientific manuscripts to be archived, searched, and distributed electronically at the lowest possible cost.” As Stern notes, “this would be accomplished through very minimal filtering and subsequent placement of eprints on a non-commercial archival server by a subject-specific Moderator appointed by a society (or consortia of societies). A society-appointed Editorial Board (with double-blind peer review approved by the non-profit Peer Review Inc. organization) would then identify the most important materials from among these archived items, and the stamp of approval for these items would be included in a secondary Virtual Collection.” 32

In the Stern model, there are no direct submissions to the Editorial Board, instead manuscripts would be directed to the Editorial Board in one of three ways: 1) nominated by the eprint Moderator upon receipt for the archival server; 2) notification sent to the Editorial Board when a threshold number of hits are generated by any one manuscript on the archive server; or 3) nominated by readers of material from the archive; this process requires a letter of support outlining the importance of the work to the Editorial Board.”33-35

[4] Usage-based

As noted several alternative peer review models recommend a metric that uses access statistics as an indicator of significance. While the European Science Foundation policy briefing observes that “new metrics” could include the discussion level generated by a paper, as well as access statistics. Finally, the Ginsparg model, recommends that second tier review candidates might be selected on “a variety of impact measures, that would include reader nomination or rating, or usage statistics.” In the Stern model, candidates for review for an editorial board would be identified “when a threshold number of hits are generated by any one manuscript on the archive server.” More recently, Harnad, notes that “a new potential measure of on-line impact, not available in the on-paper era, is usage in the form of hits.” This measure is noisy [in that it can be inflated by automated Webcrawlers, short-changed by intermediate caches, abused by deliberate self-hits from authors, and undiscriminating between non-specific site-browsing and item-specific reading], but it seems to have some signal-value too, partly correlated with and partly independent of citation impact.” 36

[5] Citation-based

More than fifty years ago Eugene Garfield developed and applied a method of citation indexing to enhance access to the scholarly scientific journal literature.37 In October 1999, the Open Citation Project: Reference Linking and Citation Analysis for Open Archives (http://opac.epirnts.org/) was officially inaugurated. One of its most notable outcomes was the creation of Citebase (http://citebase.epirnts.org/cgi-bin/search), a Web-based citation index for Web scholarship and “Google for the refereed research literature.”38

Among its various functionalities, Citebase can provide several of the established scientometric measures of research impact, notably citation counts for a Web-based article, citation counts for the researcher, as well as co-citation analyses. In addition, it has enabled the creation, development, and implementation of new measures of “impact,” notably citation counts for the preprint phase of a publication, usage measures (“hits”) for preprints and postprints, time-course analyses, and usage/citation correlations and predictors. Using Citebase, pre- and post-publication citations for individual papers can be measured against usage for the first time.39

More recently in February 2004, the Institute for Scientific Information (ISI) — the producer of the Web of Science and numerous specialized print and electronic citation indexes covering a variety of disciplines and subjects, announced a new initiative to create, test, and provide a “Web Citation Index” for Web scholarship. In addition to tracking online publications, the new index will also document citations to print works by online sources.40

The new service will utilize the NEC Citeseer technology (http://citeseerist.psu.edu/cis/), which includes “extraction of bibliographic citations, autonomous citation indexing, calculating citation statistics and related documents, reference linking to cited articles, citation context display, automatic notification based on user profiles, correlation of related documents, full-text indexing, query-sensitive summaries of the context of search terms in an article, citation graph analysis, and targeted Web crawling.”40

New Opportunities

“Let us be imaginative in exploring the remarkable possibilities of this brave new medium.”41 — Stevan Harnad

As observed by Harnad, “the Net ...[not only] offers the possibility of implementing peer review more efficiently and equitably ...” but more significantly, provides a “real revolutionary dimension” with such features as “open peer continued on page 53
Listen to me and you shall hear, news hath not been this thousand year:
Since Herod, Caesar, and many more, you never heard the like before.
Holy-dayes are despis’d, new fashions are devise’d.
Old Christmas is kick’t out of Town.
Yet let’s be content, and the times lament, you see the world turn’d upside down.
[Popular ballade from English Civil War c. 1640s]

So legend has it was the song played when
the defeated British surrendered to Washington
at Yorktown at the conclusion of
the revolutionary war on October 19th 1781.
The current hubbub in journal publishing,
in favour of a drastic revolution from a reader-pays
to an author-pays business model, is not yet a
victory or defeat parade but could legitimately
be viewed as a “World Turned Upside Down”
moment — in all senses of that phrase. However,
the inversion of who pays may turn out to
be less of a panacea and more of a poison to the
many delicate relationships involved in the jour-
nal publishing process, not least the efficacy of
peer review as a guarantee of quality.

I have worked in scholarly publishing for
nearly 25 years. In that time, the journal — like
Mark Twain — has frequently been declared
dead only to be discovered to be still alive and
kicking, while its much vaunted replacements
wither on the vine. Proponents of these alter-
avative futures almost universally overlook the
importance of the journal system to the intel-
llectual and personal requirements of scholars,
past, present and future. Whether digital or on
paper, as a means of registering, validating, dis-
sseminating and archiving scholarly articles, the
journal is still very much alive.

The latest challenge comes from the Open
Access movement. It is not an attack on the
principles of the journal system per se but an
attempt to create an entirely different approach
to its philosophy and economics: at its heart lies
a pay-to-publish rather than a pay-to-read busi-
ness model. The fundamental creed of Open
Access is that all information should be free at
the point of use, that the internet should be a
universal library free for all mankind. Such al-
trustic ideals are difficult to disagree with (and
as some commentators have ruefully remarked,
contrary views in this debate are too often re-
garded as heretical rather than critical), never-
theless I believe that this dream, like so many
other utopias, could lead to a nightmare out-
come for authors, readers, librarians and pub-
lisbers.

The drivers behind the pay-to-publish move-
ment are clear if confused. There has been and
continues to be a crisis of funding affecting uni-
versity libraries. In real terms the proportion of
university spending devoted to the library has
been allowed to fall at the same time as the schol-
arly literature has grown, both in terms of jour-
nal titles and papers.13 Although not widely discussed, the pay-to-
publish model does have one major advantage among its many
downside: it automatically links research activity to literature pro-
vision through the mechanism of charging authors to publish.
In this respect, if no other, it goes to the heart of the library-funding
crisis, or it would if a realistic economic model prevailed
among its proponents. In addi-
tion, the digital transition — still
far from complete — continues
to redefine the roles and funda-
mental processes of all players in the informa-
tion chain. All these factors play their part in
creating a generalised dissatisfaction with the status quo and Open Access has acted like a
lightning rod for all these discontent. It is a
symptom, not a cure.

The principal goal of Open Access is simple:
access for all. The means to achieve it is the
pay-to-publish model and it is frequently as-
serted that such models are automatically go-
ing to be cheaper and save libraries money.

At the heart of these arguments lies the idea
that if something is non-corporal then it must
be free, or at the very least substantially cheaper.
While there are some savings in a fully elec-
tronic world, we are far from that position; a
significant proportion of journal customers still
expect paper versions of journals as well as elec-
tronic ones. Even in a fully electronic world, it
appears that any savings are not likely to be
nearly as great as many hope and electronic
delivery introduces some new costs not present
in the paper world. At its core, the fundamen-
tals of the publishing process remain unaltered
by the digital transition: journal editors still have
to be found, and they and their editorial offices
supported in the acquisition and peer review of
journal content; that content, albeit supplied in
electronic form, still has to be unified and made
consistent with addition of tags and other ele-
ments that allow it to be fully functional electronically.

Going electronic simplifies reproduction and distribution
but there still has to be a mas-
ter file or “first copy” from
which both the digital and the
print versions derive. The eco-
nomics of these core processes
have been extensively studied: first copy costs per article are
reckoned by Odlyzko and
Tenopir and King (and most
recently John Cox Associates)
at $3000 to $4000.4 The eco-
nomic challenge for the pay-to-
publish model is to devise a method that yields
revenues at this level without putting authors
off, otherwise the future viability of their alter-
native is in doubt. Yet pay-to-publish publish-
ers are currently charging authors only $500 to
$1500, a shortfall of $2500 to $3500 per article.
These publication charges assume that every
published author can and does pay; and if the proportion that doesn’t pay rises so will the av-
verage charge.

Anticipating these criticisms, Open Access advocates suggest that novel revenue-rais-
ing approaches are available to supplement publi-
cation payments and that these are not fully ex-
posed. They believe advertising, sponsorship
and charitable donations can supplement low
article charges and allow all barriers to access
to be removed. The scale of subsidy required
to do this should not be underestimated. Each year
about 1.2-1.4 million articles are published:
given the shortfalls per article above, are an-
ual fees from advertising or sponsorships or
donations of the order of $2.3 billion available?
continued on page 56

Peer Review in the Internet Age:
from page 54

Commentary on published and ongoing work.” In
addition, the Net provides “room ... for unrefereed
discussion too, [notably] in high-level discussion
forums ...” Such enhancements to conventional peer review need not, however, be limited
to features that some may view as simple extensions of the traditional model. In addition to “ideal
conversations, metrics such as access statistics, as well as citing and linking, can also offer impartial indicators of valid and significant scholarship in all its forms, at any and all stages.

Column Editor’s Note: This article is based on “Alternative Peer Review: Quality Management for 21st Century Scholarship,” an invited presentation delivered at the Workshop on Peer Review in the Age of Open Archives held May 23-24, 2003 at the International School for Advanced Studies (SISSA), Trieste, Italy. A copy of the corrected and revised PowerPoint presentation is available at http://www.public.iastate.edu/~germynn/ APR.ppt.