

**OPEN CITATIONS AND OPEN PEER REVIEW:
TOWARD A BETTER THRESHER IN SCIENTIFIC LITERATURE**

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ABSTRACT

Open Peer Review and Open Citations need advocates. Open Access recently received significant boosts in organized support (Redalyc announcing AmerliCA; cOAlition-S announcing Plan S). Within a similar timeframe, two other events occurred that need coordinated consideration: the ASAPbio group issued a letter in favor of Open Peer Review (OPR), and a Workshop for Open Citations (OC) was held to educate and discuss OC. While Open Access may be on the horizon, the related issue of research assessment will remain. This article takes the opportunity of these simultaneous events to explore how Open Citation and Open Peer Review could be key components toward reformed evaluative practices.

IMPLICATIONS FOR PRACTICE

1. The push for Open Access in the last year experienced a surge, with European groups (Horizon 2020 and cOAlition-S¹) calling for grant-funded researchers to make their resulting research publications Open Access, and Latin American groups (AmeliCA²) seeking collaborative, sustainable, protected and non-commercial Open Access solutions

¹ <https://web.archive.org/web/20190419215043/https://www.coalition-s.org/about/>

² <https://web.archive.org/web/20190510202230/http://www.amelica.org/en/index.php/que-es-ame/i/>

for Latin America and the Global South. While greater Open Access looks to have a growing chance, the underlying issues that surround research assessment only come into starker relief.

2. A growing number of practitioners are advocating in the areas of Open Peer Review and Open Citations. This article details recent developments on these latter two fronts, including an ASAPbio-led declaration for Open Review comments and an I4OC-led push for publishers to Open Citation data to Crossref. These are discussed, specifically for the opportunity they present to fulfill recommendations of the *San Francisco Declaration On Research Assessment* (DORA) and the *Leiden Manifesto for Research Metrics*, in regard to detoxing scientific literature from the Journal Impact Factor.
3. Considering the timeliness of these movements and the fast-paced acquisitions of scholarly tools by commercial entities, the stakes are high and conversations need to happen immediately. Future advocacy conversations may center on incentivizing researchers to publish with journals that practice not only Open Access, but Open Citation and Open Review. Institutions should more accurately and adequately recognize research labor outside authorship, including (but not limited to) pre- and post-publication Peer Review work.

KEYWORDS: Open access, open peer review, open citations, publons, citation typing ontology, asapbio, i40c, dora, leiden manifesto, journal impact factor, web of science, crossref, altmetrics, citation analysis

INTRODUCTION

Data is not going away. Nor are computers—much less mathematics. Predictive models are, increasingly, the tools we will be relying on to run our institutions, deploy our resources, and manage our lives. But... these models are constructed not just from data but from the choices we make about which data to pay attention to—and which to leave out. Those choices are not just about logistics, profits, and efficiency. They are fundamentally moral. - Cathy O’Neil, *Weapons of Math Destruction* (2016)³

Kent Anderson (founder of The Scholarly Kitchen and former president for the Society of Scholarly Publishing) wrote about the lack of a “Rotten Tomatoes-like experience” to deal with the “intellectual sprawl” introduced by boundary-less digital platforms in the Internet-connected era. The extremely high volume of scientific research now regularly published is “an invitation to filter,” Anderson said, and the problem is that our available filters “aren’t necessarily up to snuff yet (Anderson, 2014)”

Anderson compared altmetrics (bibliometric alternatives to traditional citation-based metrics) with the Hollywood box office charts, in that both measures are “purely quantitative and only qualitative via some questionable inferences (if you believe popularity = quality).”

Anderson is not wrong to call altmetrics an inadequate standalone filter; the same is also true about the citation-based measures that Altmetrics help correct, like the Journal Impact Factor.

So what might it take for a model or mode to serve as a Rotten Tomatoes of research, or a “place to scale up a critical consensus that can help readers understand” an article, and that take

³ O’Neill defines a weapon of math destruction as models with three elements: opacity, scale, and damage.

into account both qualitative and quantitative indicators? A full set of recommendations for implementing a market-ready product is not fully-sketched here, though minimum viable products exist, like Publons (discussed later). One recommendation that *is* certain is working toward comprehensive data (also discussed later).

Who are the readers of academic literature that this article has in mind? Such a tool should aim to be inclusive in whom it imagines to be its beneficiaries, based in part on an assumption that assessment or reading practices of one group will eventually have a spillover effect into another on a long enough timeline.⁴ (Who do we imagine uses Rotten Tomatoes? Audiences, theatres, studios, or citics? All?) Therefore, the readers of research that this article has in mind includes, but is not limited to: researchers keeping up with readings in their areas of interest; writers choosing where to publish next, based on the relevance of previously-published works; research, tenure, promotion, or grant committees considering the work of current or potential candidates; librarians involved in collection development or advising students and faculty; members of the press; and citizens simply curious about the world.

Where Open Access serves to maximize readership, Open Citations and Open Peer Review may serve as crucial ingredients toward maximizing the comprehension and/or contextualization of research, at least in STEM fields, and perhaps beyond. Fecher & Friesike (2014) identified five schools of thought under the Open Science umbrella. One of these, the Public School, has two streams of thought. Scholarly communication librarians concerned with the *accessibility* of research, via Open Access, may be said to operate in the first of these two streams. As Open Access takes on greater acceptance, it is encouraged for greater work be done

⁴ This assumption is informed by a short reading of the history of the Journal Impact Factor, detailed in the following section, titled REFLECTING ON OPEN ACCESS.

by scholarly communication librarians in the second stream of thought, which is concerned with the *comprehensibility* of research.

Before moving directly into how Open Citations and Open Peer Review will aid comprehensibility of research, a moment of reflection on the intertwined histories of the Open Access Movement and metrics is necessary.

REFLECTING ON OPEN ACCESS

The push for Open Access received a jolt on September 2, 2018 when a consortium called cOAlition-S announced Plan S (Science Europe, 2018), a mandate that by 2020 the scientists they fund would “make resulting papers free to read immediately on publication” (Else, 2018). In a similar timeframe, an initiative called AmeliCA was launched to effect change for Latin America and the Global South, with highly-comparable aims as Plan S (Becerril-García, 2019).

The Plan S announcement stirred much deserved conversation and debate for stakeholders in the scholarly publishing landscape, especially since the participant European research organizations collectively fund €7.6 billion in annual research grants, and the process details themselves were not made immediately clear in the plan’s language. A year prior to this upheaval, the publishing landscape was already described by Clifford Lynch (2017) in the pages of *Association of College & Research Libraries* as a “complex, confusing, time-consuming morass of funder mandates, institutional policies, choices about publishing venues, article processing charges.”

Legitimate concerns notwithstanding, the landmark status of Plan S and AmeliCA in the history of the Open Access movement gives appropriate cause to revisit Jean Claude Guédon's extensive white paper, *Open Access: Toward the Internet of Mind* (2017). This work, which was written on the occasion of the 15th anniversary of the 2002 Budapest Open Access Initiative (BOAI), traces the lineage of many of our current fundamental scholarly communication issues back to a handful of major historical changes. One change was the exponential growth of faculty members, post-WWII, who sought publishing outlets for career securement. Commercial publishers scaled up the number of journals they offered to meet this demand. The amount of published research exploded, and the Journal Impact Factor (JIF) was introduced by Eugene Garfield to aid with filtering it all.

Guédon (2017) described the original intent of the impact factor:

“Eugene Garfield's Science Citation Index ... claimed to identify a limited set of journals as 'core' journals, and it proceeded to rank them on the basis of a citation-based metric – the impact factor – that referred to visibility within this limited set of journals, but was too quickly assimilated to quality.”

And how it morphed into something else:

“Librarians, trying to establish value for money, lined themselves up like iron filings within a magnetic field: they began to envision the 'core' journals as 'must have', which led to the emergence of an inelastic journal market. The situation was promptly exploited, first by commercial publishers, and later by the broader community” (Guédon, 2017).

From here begins a “medley of reactions.” Funders and institutions split over Green versus Gold as the best route to deliver Open Access, leaving researchers to navigate through different sets of mandates with each new grant. With Gold Open Access, comes the advent of Article Processing Charges (APC); the APC itself opening the window for predatory publishing practice, often difficult to differentiate from legitimate publishers (Bell, 2017). Finally, Big Deal journal bundles concentrate the power to a few major publishers, putting smaller societies (who do not become part of such a bundle) into situations “regularly encountered by scientific publications in developing or emerging countries,” where they are “regularly ignored in citation indices and bibliographies” (Guédon, 2017).

JIF created an algorithmically-bolstered vision of a *core* set of journals in each field, which not only helped set the table for the serials crisis, but created a general conflation between *high-citation* with *high-quality*, which has not proven to hold a strongest of cases (Brembs, 2018; Paulus, Cruz, & Krach, 2018). Even with the deficiencies of JIF, a new study has found that “40% of doctoral, research-intensive (R-type) institutions and 18% of master’s, or comprehensive (M-type) institutions” still explicitly mention JIF (or 12 closely related terms) in documentation for review, promotion, and tenure (McKiernan, E. C., Schimanski, L. A., Nieves, C. M., Matthias, L., Niles, M. T., & Alperin, J. P., 2019).

Administrators continuing to reward researchers for publishing “where it counts” only helps perpetuate the self-reinforcing cycle of prestige. Journals “that do best in this kind of competition” may expect continued increases in impact factor, which will, Guédon says, “illogically be interpreted as an increase in quality” (Guédon, 2017).

AFTER OPEN ACCESS

With Plan S or AmeliCA (or some other initiative these may inspire), much-widened access to research looks increasingly possible. Even so, two underlying issues that cause harm in the academy will remain:

1. significant numbers of researchers needing to publish, and
2. the need to assess the large numbers of published works.

Regarding 1. There are a lot of researchers who need to publish in order to remain gainfully employed. Possible solutions include decreasing the number of researchers; asking for less formal publication products from researchers; or broadening the type of expected research productivity, beyond authoring articles and books. As ever larger numbers of authors are listed on articles, the number of works an individual is expected to list on their CVs is also inflated. This increase in authors listed on a publication also makes it “increasingly difficult to determine who did what, and who had a particularly pivotal role or contribution, to scholarly published work” (Wilsdon, J., et. al., 2015). Perhaps more granular identification of research roles would be an ideal element toward putting credit where it is due.⁵

Regarding 2. The huge corpus of science literature, and the need to assess it, has resulted in a “profusion of measures” (Noorden, 2010), including a buffet of citation-based metrics and alternative measurements. Each pose limitations which might be generalized into two broad

⁵ See the CASRAI taxonomy of Contributor Roles (E.g. ‘Funding acquisition,’ ‘Writing – original draft’) as one example (CASRAI, n.d.). Perhaps new roles might be considered for addition, like Reviewer, Editor, and Copyeditor.

categories: *inadequate data* and *inadequate context*. A push for a different metric or mode of assessment may seem redundant, but here following, the case will be made for why this would be a worthwhile endeavor, if we addressed more adequate data and context, starting with Open Citations and Open Peer Review.

METRIC AND ASSESSMENT REFORM

Research stakeholders have signed public documents or built task forces calling for reform in light of the prevalent misuse of algorithms like JIF as a factor in research assessment. These notably include The San Francisco Declaration on Research Assessment (DORA); The Leiden Manifesto for Research Metrics (Leiden); The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management (Metric Tide); Humane Metrics Initiative (HuMetricsHSS); and, the European Network for Research Evaluation in the Social Sciences and the Humanities (ENRESSH)

Leiden recommends principles for research assessment, with the first of these stating, “Quantitative evaluation should support qualitative, expert assessment.”. Leiden acknowledges the current environment where research productivity and impact are compared not through a “bespoke” process by peers, but through data evaluators (Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I., 2015). DORA set out recommendations for best practices that seek to seriously decrease the frequent use of JIF “as the primary parameter with which to compare the scientific output of individuals and institutions,” recommending instead that research be assessed “on its own merits” (Way & Ahmad, 2013).

HuMetricsHSS and ENRESSH are more specifically-tailored toward reconsidering research indicators in the humanities and social sciences, but have similar objective to DORA, and Leiden. The ENRESSH working group tasked with ‘Databases and uses of data for understanding SSH research’ operates under the basis of “limitations of the current databases with regard to SSH research”(European Cooperation in Science and Technology, n.d.). While more acute for SSH, STM research is also prone to the limitations of databases. HuMetricsHSS adopts a strategic, values-based approach to more ‘humane indicators’ of a scholar’s progress. There is no necessary factor that would prevent STM researchers from adopting the HuMetricsHSS values of ‘collegiality, quality, equity, openness, and community’ (HuMetricsHSS, n.d.).

Jonathan Adams (director at Clarivate Analytics’ Institute for Scientific Information⁶) seems to respond to the criticisms of JIF in a 2018 editorial about responsible metrics. Adams accurately calls the *h*-index an example of a “not very responsible” index due to its inability to reflect factors, such as the age of papers, given citations take time to accumulate. Adams defends JIF as “a great metric” when used responsibly and as intended by “publishers and librarians” to aid selection purposes, but not when “other research folk” use it “as a substitute for decision-making” (Adams, 2018). The implication being that JIF works just fine when used as prescribed. For the manufacturer in this case, the evidence of widespread and consistent abuse is outmatched by the more heavily-weighted data point of profitability.

Today, the selection process for the Web of Science core collection remains principled upon Garfield’s work. In the 2018 Clarivate pitch for Journal Citation Reports (JCR), James

⁶ Clarivate Analytics is the publicly-traded company that owns Web of Science, EndNote, Publons, Kopernio, among other services. It spun off of Thomson-Reuters in 2016.

Testa (Vice President, Editorial Development & Publisher Relations at Clarivate) states how “millions of scholarly works are published containing tens of millions of citations” annually. A reminder of the challenges in resource selection and research assessment. Testa argues in favor of a selective view of journals, rather than a comprehensive one, because “it has been demonstrated that a relatively small number of journals publish the majority of significant scholarly results” (Testa, 2018). But what is actually being signified?

COMPREHENSIVE OR SELECTIVE INDEXES

A *Nature* feature investigating the amount of papers never cited began with an anecdote about Nobel prizewinner Oliver Smithies. Smithies wrote a paper in 1953 that he believed had never been cited, but in fact, it had been cited nine times within a decade of its publication (Noorden, 2017). Smithies did not receive quick notification that his work was being cited, or read or discussed for that matter, because the technology of 1953 could not enable a comprehensive online citation index. With adequate technology now available, it may be appropriate to revisit the rhetorical question Mr. Testa asks in his JCR essay: Why a selective index?

The JCR essay argues for selective indexing upon the basis that the Clarivate-brand of citation calculus is what can reliably signal impactful work in a field, and therefore, the works worthy of readership. Core collections create a distinct impression that articles published by journals not designated as *core* are practically on a blacklist, by sheer dint of omission. Between core collections, blacklists, and institutions incentivizing scholars to seek JIF in publishing, one

might easily form the view that these tools are our best tools to sort the global web of interconnected scientific thought.

If a farmer one day came to realize that their field of grain had greatly expanded beyond their immediate ability to harvest it, selectively choosing a narrower area to plow would be a wise short-term strategy. But in the long run, it would be a disservice to the entire community, to not seek to develop and deploy a better thresher, with the whole field in mind.

“Unlike *Web of Knowledge* which indexes core journal titles,” write Hitchcock, et al. (2003), “it is possible that open access indexing services founded on open access texts could re-democratise the role of citation indexing, [and] there is no doubt these services will offer qualitatively different services from those provided by [Clarivate Analytics’ Institute for Scientific Information].” If we agree with the view that Open Access scholarly papers dramatically increase the speed “of ideas affecting other researchers' ideas,” then our services should match this speed in scale (Hitchcock, et al., 2002).

OPEN CITATIONS, BETTER INDEXES

A comprehensive view of citations should seem the preferred option for our globally-connected research ecosphere, regardless of the status or stature of the researcher, researcher country, institution, or journal title. When one article cites another, the two works create a link in scholarly discourse. When citation indexing is done insufficiently, conversations become one-sided (López, Salazar , García , & Flores, 2006; Chan, Kirsop, & Arunachalam, 2011), muted, and generally distorted by saturation “in the values and ideals of the white North American and Western European, neoliberal researcher” (Hathcock, 2016). While

comprehensive citation indexes will not necessarily compel a shift in cultural practice, it can at least remove technical impediments of such.

The *Workshop on Open Citations* (WOOC) was held in Bologna, beginning one day after cOAlition-S announced Plan S. At WOOC, “researchers, scholarly publishers, funders, policy makers, and opening citations advocates, interested in the widespread adoption of practises for creation, reuse and improvement of open citation data” were invited to present ideas on how to best reuse the estimated “500 million open bibliographic citations” currently available on the web (Workshop on Open Citations, 2018).

David Shotton (co-director alongside Silvio Peroni of OpenCitations, one of six organizations leading the Initiative for Open Citations [I4OC] advocacy group) demonstrating the need for Open Citations from publishers by presenting the inconsistent citations counts for single works across Web of Science, Scopus, Google Scholar, Microsoft Academic, and Crossref, (Shotton, 2018).

A bibliographic citation could be defined as an Open Citation, said Shotton, “when the data needed to define the citation are freely available, downloadable and reusable,” and that such data must be compliant with I4OC’s SSO Principles, which stands for Structured (“expressed in one or more machine-readable formats”); Separate (“available without the need to access the source bibliographic entity [e.g. the article or book] in which the citation is defined”); and Open (“freely accessible and reusable without restrictions”) (Shotton, 2018).

While all SSO Principles must be met to qualify as an Open Citation, it is imaginable that other bibliographic citations would fall somewhere on a spectrum between closed and open. In this way, defining an Open Citation is similar to defining Open Access, insofar as publishing

entities can accurately claim to be making actionable strides toward openness, by newly partaking in some parts of these definitions, while having no intention of ever becoming truly open.⁷

Even supposing that a comprehensive citation map could become reality, an article citation can still be a dubious marker. Peroni and Shotton described some common motives behind a citation. Perhaps an author, when citing a paper, does so because they gained “background information, ideas, methods or data,” or “because the citing works review, critique or refute previous works” (Peroni & Shotton, 2012). But all of these sorts of distinctions are flattened to a single number of times cited on a web index.

A paper could receive X number of citations, but the meaning behind this number can vary greatly paper by paper. This problem may soon find solutions. Peroni and Shotton (2012) have introduced what they call Citation Typing Ontology (CiTO), a quite extensive list of characterizations of sentiment or context of most citations. And a similar theme was recurrent among the WOOC program lineup (*Semantic Coloring of Academic References*⁸; *Semantics Aware Policy Making for Open Citations*⁹; and *Citation Sentiment*¹⁰) as well as in the ‘Hack Day’ proposals (*Title 4: Sentiment and citation functions use cases*¹¹; *Title 9: Ontology for describing gold standard data about citations data*¹²; and *Title 10: Exploiting citation functions or sentiment*¹³) (Levchenko, 2018). (Bolding mine)

⁷ By the standard of the original BOAI document for Open Access, and the SSO standard for Open Citation.

⁸ Angelo Di Iorio (University of Bologna)

⁹ Gautam Kishore Shahi (University of Trento)

¹⁰ Daniel Ecer (eLife Sciences)

¹¹ Contributed by: Daniel Ecer, Freddy Limpens

¹² Contributed by: Freddy Limpens (DASPLab, Unibo)

¹³ Contributed by: Freddy Limpens (DASPLab, Unibo), Daniel Ecer, Gautam Kishore Shahi

What the **semantic** and **sentiment** themed presentations at WOOC had in common was the idea that bibliographies could be enriched with citation context identification.¹⁴ Already, experimentation has shown that machines can scan simple language from scholarly articles to identify which sentences should contain a citation (Sugiyama, Kumar, Kan, & Tripathi, 2010). Further experimentation has used machines to scan the language of all papers citing a study to indicate how many of these were able to replicate, not replicate, or just mention the original study (Grabitz, Lazebnik, Nicholson, & Rife, 2017). It is not too far a leap to imagine technologies advancing to the point of being able to automate the population of CiTO (or any ontology) for, not only the benefit of readers investigating individual article bibliographies, but to every bibliography of every article available online. That is, wherever both the article and its citation metadata are fully open.

One poster at WOOC was titled *The Semantic Coloring of Academic References (SCAR) Project*, and it describes an attempt “to build a prototype that enriches bibliographies of scientific articles by adding explicit metadata about individual bibliographic entries and to characterize these entries according to multiple criteria” (Semantic Coloring of Academic References, n.d.). Any reader beginning to imagine re-democratization of citation indexing, through comprehensive scope, enriched with citation sentiment ontology, might be disappointed. The SCAR Project on display at WOOC was listed as an ongoing project in collaboration with Elsevier.

The road to Open Citations, much like the road to Open Access, is seeing lesser and “degraded” forms emerge, “sometimes as the result of power plays by powerful actors,

¹⁴ Survey overview of citation context analysis available (Hernández-Alvarez & Gómez, 2016).

sometimes out of compromises proposed by people of goodwill” (Guédon, 2017). Unlike the not-for-profit Crossref, which freely shares their large corpus of citation data, Elsevier (along with American Chemical Society, IEEE, Wolters Kluwer Health, and IOP Publishing) currently does not make their citation data openly available with SSO Principles (Taraborelli, 2018).

Withholding SSO-standard Open Citations would make perfect business sense for a company like Elsevier, which happens to own the abstract and citation database Scopus, which is the largest commercial rival to Web of Science. Such concealed proprietary information as citation data, coupled with sentiment-reading technology, could prove a strongly long-term strategy for Elsevier. Elsevier and Ipsos MORI recently reported that one highly-probable scenario they see forthcoming in the next decade is one in which “State and philanthropic funders align in their goals, approaches and principles, resulting in open science taking off, aided by artificial intelligence-enabled technologies” (Mulligan & Herbert, 2019).

OPEN PEER REVIEW

While a comprehensive, sentiment-enabled citation map could be the start of a better thresher, by no means should a data-driven approach represent the last word. The first Leiden principle (*Quantitative evaluation should support qualitative, expert assessment*) advises that assessors must not “cede decision-making to the numbers,” and that indicators “must not substitute for informed judgement” (Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I., 2015). One area we should reasonably expect that research consistently might receive such informed judgement is behind-the-scenes, at the journal, in the Peer Review process. Peer Review, as summarized by Metric Tide (p. 136-137), is “the least worst form of academic

governance we have, and should continue to be the primary basis for assessing research papers, proposals and individuals, and for national assessments.”

Whole we have thus far considered what more could be done with citation data, we should not forget all of the articles that researchers read for their own research, without ever citing them. Consider, too, all of the articles that a researcher will read during their career as part of Peer Review. Peer Review, which Metric Tide characterized as being able to “deliver more nuanced and detailed understandings of research in the context of research production” (Wilsdon, et al., 2015). This is to say that each published Peer Reviewed article already comes with its own set of expert critiques and commentary that could be used to provide readers an external source of informed judgement. But usually, these reports are never presented to the public.

On August 29, 2018, the Accelerating Science and Publication in biology group (ASAPBio) released an open letter stating their position in favor of the publication of Peer Review reports (ASAPbio, 2018). Jessica Polka (Director of ASAPBio) and colleagues, penned an editorial in *Nature* on the same day calling on fellow journals to sign the “pledge to make reviewers’ anonymous comments part of the official scientific record” (Polka, Kiley, Konforti, Stern, & Vale, 2018).

The letter was in culmination of a meeting held in February 2018, where “around 90 invitees from the life sciences, predominantly from North America and Europe” were invited to help boost Open Review practice grow. The current state seeing “less than 3% of scientific journals allow[ing] peer-reviews to be published;” within that percent include outlets such as

Annals of Anatomy, BMC, BMJ, Copernicus, eLife, EMBO Press, F1000Research, Royal Society Open Science, Nature Communications, and PeerJ (Polka, Kiley, Konforti, Stern, & Vale, 2018).

The ASAPbio letter states recognition that “implementations of published peer-review reports may vary...across different journal policies and fields.” Possible interpretations of what constitutes Open Review is narrowed by Polka, Kiley, Konforti, Stern, & Vale (2018) to three categories: open identities (disclosure of reviewer names), open reports (publishing the review content); journals might choose to publish one, the other, neither or both. The hesitancy for adopting some versions of Open Review may include concern that “published reviews might be used unfairly in subsequent evaluation of the authors for grants, jobs, awards or promotions,” but on the other hand, an open report could allow “more-effective research into how competition and bias affect the process.”

Peer Reviewers are too rarely credited for their labor. Such labors take away time from these researchers who could use that resource to work on their own writings, where it ‘counts,’ in Peer Reviewed outlets, an often slow process. And a common logjam in the publication cycle is, ironically, in securing reviewers—finding those people with that seemingly magical combination of expertise, experience, availability, no conflicts of interest, and being known by the editor. This should be easier than it is currently.

One scholarly resource that is tackling issues surrounding Peer Review is Publons. Publons is a freely-available online service “for academics to track, verify and showcase their peer-review and editorial contributions for academic journals” (contributors, Publons, n.d.). The company mission statement is “to speed up research by harnessing the power of peer-review” (Publons, n.d.). As *The Economist* put it, the hope is that “once scientists can quantify their

reviewing work and boast about it on their CVs, universities and funding bodies will take it into account when handing out promotions or cash” (Economist, 2017). Incentivizing Peer Review, or rather, better recognizing and rewarding these labors, would theoretically have a circular effect, in which more reviewers doing more reviews might speed up the publication process in general.

If the academy better recognized Peer Review labor, professionalized it, even, on par with research authorship, there could be plentiful benefits for the quality of published research, as well as for the work lives of researchers themselves. Now add to this picture the idea that a greater majority of Peer Review were open.¹⁵ The reviews and reviewers might then be able to be undergo metareview. And if it sounds like a bad eventuality that we would begin measuring reviews and reviewers, consider how, if at all, it would differ from studying research and researchers. Reviews could possibly be weaponized; on the other hand, the data produced could provide antidote to that same weaponization.

Consider an analysis of Peer Review data from scholars registered at Publons, in which José Luis Ortega found that men seem to produce more reviews than women(perhaps through greater frequency of invitation), but young women scholars were possibly found to “have the strictest acceptance criteria” and be “more committed to the peer-review process” (Ortega, 2017). Looking at these results, one might conclude that if a more equitable share of women were asked to perform Peer Review, better reviews across the board might occur. This snippet of a finding should be cause for further questions, but further questions will only be answered through the further collection of related data.

¹⁵ Or, if not the first-round Peer Review notes, then perhaps a set of notes meant to be public-facing, written by the reviewers after reading the final manuscript.

Those gathered at the meeting that eventually resulted in the ASAPBio letter for Open Review agreed that the benefits of Open Review may include: 1) increased reviewer and editorial accountability; 2) training opportunities to educate students about the Peer Review process; 3) enhancing readers' understanding of the article in the context of the field; and 4) a pathway to providing credit for Peer Review. Publons and Publons Academy¹⁶ may serve as a proof of concept for how these benefits could be put into practice within the research supply chain.

CONCLUSION

If a better thresher for research assessment consists of both data-driven metrics and qualitative expert assessment, then at a surface level, Publons seems to tick the boxes. Each individual article page contains bibliographic information, and a dedicated spot for metric data. Reviewers can claim and verify pre-publication review activity on articles or journals. Users can rate and write post-publication reviews for articles, which create aggregated user scores for Quality and Significance, as well as pre-pub & post-pub Review Badges. If Publons were updated with badges for soundness of study methodology, and metrics that presented the full context or sentiment of citing papers, drawn from a comprehensive index, what better could resemble a Rotten Tomatoes-like experience for research than that?

Publons launched in 2012, but came to wider attention in 2017 when Clarivate Analytics (the company that now owns Web of Science) acquired it. The acquisition received critique for the perceived commodification of review work (da Silva & Al-Khatib, 2017). In a December 2018 press release, which announced Web of Science integrations into an enhanced version of

¹⁶ A set of training modules to educate students about the Peer Review process.

Publons researcher profiles, Publons pointed toward DORA, Leiden, and Metric Tide in a section titled “optimistic trends in research assessment” (Publons, 2018). Given the history of JIF, would we trust Clarivate to get this right?

The role of for-profit commercial entities role in future large-scale research endeavors is an open debate. In this particular debate, we should consider what it would require for such a project to be profitable. Perhaps a proprietary, non-replicable element that would preclude competition, or maybe just a sizable majority of market share. As for proprietary, does the inclusion of the incomprehensive Web of Science citation-count poison the well from the get-go? As for market share, at the initial time of this writing in September 2018, the Open Access mega-journal *PLOS One* had 32,554 reviews available on Publons (PLOS One, n.d.).

If the academy puts in the work to change the paradigm of Peer Review, so that such practice was properly incentivized and recognized, the benefits would be great. And it may be attractive to put support behind a commercial enterprise like Publons on the basis of its ability to quickly scale. But consider the Open Access funding model for PLOS, which is run on expensive article processing charges. If Open Peer Review were to become a properly-recognized research service, it would take little for a company seen as the standard-bearer in that area to begin charging researchers new fees to publish freely-produced reviews.

We may well assume that if we started our system of scholarly knowledge production today, it would not look as it does, with our in-fighting over payment models, exclusionary practices, and unnecessary vestiges that pertained to the print journal era. We are at the frontier, in terms of rethinking our values, in a post-Open Access environment. As of February 2019, the Initiative for Open Citations website announced that the “fraction of publications with open

references has grown from 1% to 55% out of 43.2 million articles with references deposited with Crossref” (Initiative for Open Citations, n.d.). Over half of the field has become available for harvest. The question is, for whom shall the labor benefit: the laborers or the landowners?

RECOMMENDATIONS FOR ADVOCACY

For librarians and others who wish to advocate for Open Citations and Open Peer Review, the author recommends making it a regular practice to publish in venues that create Open Citations according to SSO principles; to publish in venues that offer the option for some version of Open Peer Review; to advise colleagues to do the same; and to bring the topic up in any committee, board, or group where it might already be imperative to advocate for Open Access.

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