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## Academic Publishing: Tradition, Change, and Opportunities

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# Academic Publishing: Tradition, Change, and Opportunities

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The publication of the first academic journal in the mid-1600s introduced a new way for academics to engage in scholarly discourse and started a trend that grew exponentially over the years. **Michael Mabe** estimates that “from 1900 to 1940 the number of active journal titles grew at an annual rate of 3.23%, a doubling time of 22 years.”<sup>1</sup> Over the next quarter of a century **Mabe** estimated the journal growth rate at 4.35%, and for the last quarter of the twentieth century he placed the growth rate at 3.26%.<sup>2</sup> Recent research performed by **Ware** and **Mabe** found that “there were about 28,100 active scholarly peer-reviewed journals in mid-2012, collectively publishing about 1.8-1.9 million articles a year.”<sup>3</sup>

While this rapid expansion ensured that scholars had extensive options for sharing their scholarly works, it also created a problem for scholars: the overwhelming amount of new research published in disparate titles meant that staying current became a job in and of itself. Additionally, for those doing research outside of their area of expertise, it could be difficult to determine which articles were the most informative or influential. In an effort to help researchers assess the quality or importance of a given article, measurements of the article’s or journal’s use — bibliometrics — were utilized to convey the value or impact of scholarship. For much of the twentieth century, citation counts and journal-level analyses of these counts were the dominant measures of impact. Perhaps the most well-known and criticized metric is journal impact factors. Developed by **Eugene Garfield** in the 1960s, the initial purpose of impact factors was to identify important journals regardless of their size and raw citation counts. The problem with impact factors, and the heart of most critiques of the measure, developed when they started to be used as a proxy to convey the impact, not of a journal brand, but of the specific articles within it. High journal impact factor does not guarantee high citation counts for each article within it. Likewise, low (or no) impact factor journal articles may be highly influential, and thus highly cited.

Toward the end of the twentieth century, a major change occurred that greatly impacted both the publication of scholarly journals and bibliometrics. In the 1990s, journals published in an electronic format began to gain popularity and, as technology improved over the next decade, electronic journals, or e-journals, soon became the desired subscription format. The widespread expansion of public access to the Internet at the start of the twenty-first century

not only helped support the emergence and popularization of e-journals, but also gave rise to an idea that scholarly information should be made free online to all around the globe. This idea evolved into the Open Access (OA) movement, which championed literature that is “digital, online, free of charge, and free of most copyright and licensing restrictions.”<sup>4</sup> OA journal publication has seen the same exponential growth over the past decade that traditional journal publishing experienced throughout the twentieth century. The **Directory of Open Access Journals (DOAJ)**, a Website that seeks to “increase the visibility and ease of use of open access scientific and scholarly journals,”<sup>5</sup> was launched in 2003 with 300 OA journals on record. Currently it indexes “more than 10,000 open access journals covering all areas of science, technology, medicine, social science and humanities.”<sup>6</sup>

This digital revolution in journal publishing also transformed bibliometrics. Just as iTunes unbundled music albums in a digital age, the emergence of online publication and digital databases unbundled journals and rendered journal-level metrics meaningless. It was now possible to easily track discrete articles rather than focusing on the entire journal. Online publishing also made it possible to track pieces of articles, like data sets and software, in a way that was impossible with traditional, subscription journals. Article level metrics removed the challenges of journal-level evaluation tools by providing data specific to the work regardless of the container of that work.

Perhaps the greatest change digital publication has brought to bibliometrics is the dramatic increase in the types of metrics available. Social media has completely changed the way that we discover, share, and discuss information, including new research. Conversations that once happened in a hallway or through email are now posted online. Research that we once saved in a desk drawer is now saved in the cloud of reference management software. And with the right software and tools most of this activity can be tracked. These new metrics are often referred to as altmetrics, a term fittingly coined in a tweet by Jason Priem, to emphasize the variety of both the types of scholarship produced and the ways in which their impact can be measured.

Most metrics are tracked via the digital object identifier (DOI). DOIs are a unique alphanumeric string assigned to a digital object that enables consistent reference linking and tracking. Because DOIs can be applied to any digital object, the linking and tracking benefits are available to any type of digital

scholarship. With a DOI in place, the types of metrics and sources of those metrics are vast (see Table 1). “Views,” “saves,” and “downloads” reveal article impact that may not yet have been published or may not be appropriate for citation, but that still influences other research. Shares or discussions highlight the social conversation that has always existed around research, but had not previously been discoverable. Altmetrics also enables academic scholarship and the discussion around it to be more accessible to the public. Certain metric sources are highly academic, such as **Mendeley** and **FigShare**. Other sources, such as **Twitter**, **Facebook**, and **Wikipedia**, are more heavily trafficked by the general public. The scholar/public aspect of sources adds more nuance to the data. And there is still value in traditional metrics, such as times cited. A major change for this specific metric is that this information was once only available through expensive subscription databases such as **Web of Science** and **Scopus**. Now that data is available in publicly accessible sources, such as **Google Scholar**, and the raw counts from **Web of Science** and **Scopus** can be accessed without a subscription. Given the wide range of altmetrics and data sources, a number of service providers have developed aggregate metrics associated with a particular article or author. Examples include **ImpactStory**, **Altmeter**, and **Plum Analytics**.

With thousands of digital, online scholarly journals in existence that allow authors to reach a worldwide audience and altmetrics providing authors with new and unique ways in which to gauge the impact of their published works, one would think that the scholars are living in a publishing utopia, but that is not the reality. Scholars, especially those seeking tenure, often have difficulty choosing between traditional academic journals and OA journals, as both models have their advantages and disadvantages.

Under the centuries-old, traditional publication model, authors provide their manuscript to journal publishers free-of-charge and, except in rare circumstances, receive no remuneration from any profits the publisher derives from its publication. Publishers place articles behind a paywall, requiring individuals wishing to access them to purchase a personal subscription to the publication, to purchase access to articles on a title-by-title basis, or to belong to an academic institution or scholarly organization that subscribes to the publication on their behalf. This pay-for-access model can

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limit the impact of an article as it can only be accessed, downloaded, and cited by those who can afford to pay for it.

In addition to obtaining manuscripts free-of-charge, many traditional publishers require authors to assign copyright to them as a condition of publication. It is also not unusual for these publication agreements to prevent the author from reusing text, images, charts and graphs developed for publication. These types of copyright transfers can inhibit a scholar's ability to reuse text and graphics in subsequent writings on a topic or to publish follow-up studies on their original research. It is also not unusual for publication agreements to prohibit or restrict the author's ability to provide colleagues or students with copies of their work, which limits their ability to promote their own scholarship or create interest in their field of study. Journal publishers defend this publication model by citing the services they provide to authors, such as administration of the peer-review process, copyediting, formatting the manuscript for publication, and promotion of the work. They also argue that publication in prestigious titles affords authors a certain level of esteem that can further their career and help them obtain tenure and promotion. While these are all potential benefits of publication, many argue that they are extremely limited, especially when compared to those the publisher receives. **Robert Darnton, Pforzheimer University Professor and Harvard University Librarian**, states that the "commercial interests" of these publishers "have taken over the communication of knowledge, and we academics have to fight back."<sup>77</sup>

**Craig Lambert** continues this call by stating that "Open Access is a major weapon"<sup>78</sup> in the fight against the commercialization of scholarly journal publication. Most OA journals use the same peer-review process that traditional journals use to help ensure the quality of the scholarly articles they publish. Then, in support of the principles of OA, these journal publishers make articles freely available online, often under a **Creative Commons** license. OA journals generally allow authors to retain almost all of their copyright in the article, which allows them to freely reuse text, images, charts, and graphs in future works as well as distribute copies to others who are interested in their work through channels that altmetrics can track including social media, blogs, an online repository, or a personal Webpage. Supporters of the OA movement have been among the first to implement altmetrics for researchers. The **Public Library of Science (PLoS)** and other OA publishers provide article level metrics for each article they publish. Institutional repositories provide data on downloads and views for their content, and some have contracted with aggregators to provide even more altmetric data to their scholars. When OA supporters and publishers provide DOIs for their publications, they expand the ease of obtaining altmetric data from their platforms.

**Table 1**

Type of Metrics	Description	Possible Sources
Times Cited	Citations as a reference in other academic sources	Web of Science, Scopus, Google Scholar
Views	Times the HTML full-text has been accessed	Publisher, Institutional Repository, SlideShare, GitHub, FigShare
Shares or Discussions	Posted on a social media site	Facebook, Twitter, Google+, YouTube, Blogs, Wikipedia, GitHub
Saves	Saved to a social reference manager or bookmarking site	Mendeley, CiteULike, GitHub
Downloads	Download of PDF or native file type	Publisher, Institutional Repository, SlideShare, GitHub, FigShare

A growing body of research continues to show that OA articles are more highly cited than toll-access articles, regardless of academic field, in what has become known as the open access citation advantage. Recent research by **Wang, Liu, Mao, and Fang** confirmed the open access citation advantage and also found that the open access advantage extended to altmetrics.<sup>9</sup> OA articles received more shares on **Facebook** and **Twitter**, more average page views, and more citations on average than toll-access articles published in the same journal at the same time. Additionally, they found that OA articles also maintained steady page view growth over time, compared to toll articles which leveled off after an initial 30-day spike. This investigation confirms the complementary nature of OA and altmetrics as an agent for change in scholarly publishing.

OA publishing does present a few challenges to authors. Despite evidence attesting to the quality and impact of OA publications, many scholars are still wary of the movement. Some scholars who are seeking tenure shy away from OA journals out of a fear that publishing in newer titles or ones that may not have a sustained reputation will hurt their chances for promotion. Another problem can be the Article Processing Charge (APC) that many OA journals require. Because OA journals do not charge subscription fees, they need to find alternate ways of covering their operating expenses which may include platform hosting fees, DOI fees, and marketing expenses. Some OA publishers acquire grants or receive funds from scholarly societies to cover these expenses. Others assess authors publishing in their journal an APC fee to help cover publication costs. These fees can range from a few hundred dollars to several thousand dollars, depending on the level of financial support the journal receives from the society or organization that publishes it. Some authors may be able to pay APCs through grant funds, but authors with limited support may be unable to afford the charges, even if they are on the lower end of the APC cost spectrum. While most reputable OA publishers are willing to negotiate or even waive APC charges for authors who are unable to afford them, some authors view APCs distastefully as a "pay-to-publish" business model and choose to forgo OA publishing altogether.

While there is much debate about the future of scholarly journal publishing, one certainty is that neither the traditional publication model nor OA publishing will be eliminated anytime soon. Both are too embedded in our scholarly culture to be eliminated entirely. Rather, both models will need to find ways to grow and evolve to ensure they stay relevant. Perhaps the biggest challenge facing the traditional journal publication model is the commercial interests of many publishers who have raised subscription rates "at triple the rate of inflation for the past three decades."<sup>10</sup> These increases have been levied despite the fact that 80% of their subscription revenue comes from academic libraries,<sup>11</sup> many of which have stagnant budgets or are facing budget cuts. While subscription price reductions are unlikely, many traditional commercial publishers have responded to the success of the OA movement by making journal backfiles free to read after embargo periods and offer OA titles with APC charges to shift the revenue stream from reader to author. OA publishers continue to promote the benefits their publication model affords authors and users, and their efforts have been supported by funding agencies. Some government agencies and private foundations now require that data and publications that derive from funded research must be made freely available to the public.

Some scholars are choosing to forgo the formal publishing model entirely, making their scholarship freely available through blogs or repositories. Others are experimenting with new models like **Peer J**, which offers open peer review. As with the rise of the OA movement, these alternate methods of publishing are not likely to replace traditional journal publications, but rather expand and enhance the ways in which scholars communicate. Altmetrics can provide guidance to both publishers and authors as to the best way for sharing scholarship that promotes public discussion and inspires new research. Scholarly communication is a fluctuating landscape with options spanning from centuries-old tradition to radical new opportunities. It will take exploration and understanding from all stakeholders — publishers, authors, libraries, and readers — to find the best ways forward. 🌱

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