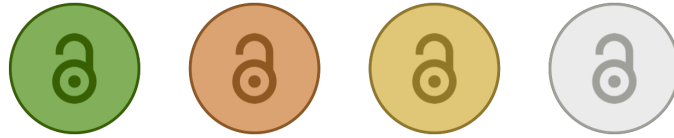


Open Access Colors: An Opinionated Guide



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A central academic norm is the idea that knowledge should be free and accessible to all. Yet much of the academic literature is still held behind paywalls placed by commercial publishing houses. The open-access movement was born as a reaction to this state of affairs. At a meeting held December 2001 in Budapest, a diverse group of people including researchers, librarians, publishers, and others, launched the [Budapest Open Access Initiative \(BOAI\)](#). Its goal was to define principles for free access to research articles on the internet across all academic fields. More than 20 years later, what is the landscape of open access?

Beyond gratis to libre

In his book “Open Access,” philosopher Peter Suber (a leading participant of the Budapest OA Initiative) gives us a simple definition:

Open access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions.

The word “most” is doing a lot of work here. It encompasses the principles in the Budapest statement that users shall be permitted to “read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.” As Suber highlighted, these principles go beyond removing cost barriers (gratis), to removing permission barriers (libre).

The distinction between gratis and libre access is just one aspect of the complex landscape of Open Access publishing. OA lies on a spectrum, with various models and implementations that have emerged as researchers, institutions, and publishers navigate the challenges and opportunities of making scholarly work freely available. These models are often categorized using a color-coded system, as described below.

OA is not black and white

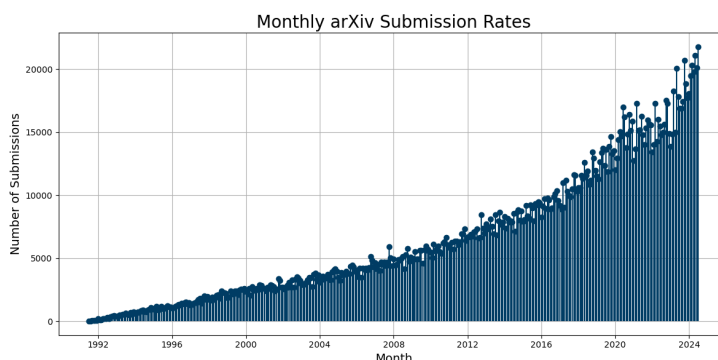
Open Access isn't a simple yes-or-no proposition. It's a sometimes confusing array of options that are labeled with a color code including “green” and “gold.” Each color represents a different approach to making research freely available, and each comes with its own set of implications for you as a researcher, for your institution, and for the broader academic community.

This post aims to demystify the colorful schema of Open Access publishing models, and discuss how different OA approaches can impact both the academic publishing ecosystem and how you contribute to the global knowledge commons.

Green OA: the DIY solution

Green open access refers to the various forms of self-archiving. It's the do-it-yourself solution where researchers deposit their work in the form of a preprint on a public repository. In some fields, preprints are a way of life. Mathematicians, physicists, astronomers, and computer scientists alike hardly ever skip posting a preprint on [arXiv](#) when they are finished writing a manuscript. They will submit it to a journal for peer review soon after, and after making revisions, post the updated preprint. Submissions to arXiv have been growing exponentially since its founding, as shown in the figure.

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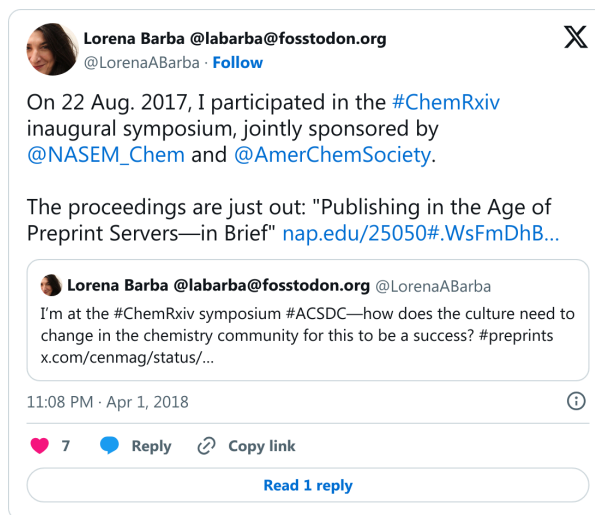
arXiv has seen exponential growth in submissions since its founding ([data from the arXiv stats page](#)).

Early in my career, I made the decision to always post a preprint on arXiv at the time our manuscript is ready to submit to a journal. This meant that I had to choose journals that had a preprint-friendly policy, but fortunately this did not pose a serious constraint. Most journals allow preprints and don't consider them "prior publication." You can find a [list of academic publishers by preprint policy](#) in Wikipedia.



<https://x.com/LorenaABarba/status/386558024191840256>

Some fields have been late to embrace preprints. Several years ago (as I shared in an [interview with GW Libraries Vision Magazine](#)), I had collaborators in the field of biology who strongly opposed the idea of posting a preprint of a manuscript before it had undergone peer review. I also remember that chemistry journals generally disallowed preprints then, particularly the American Chemical Society (ACS) journals. Both of these things have changed. Researchers in the life sciences now have their own disciplinary repository: [bioRxiv](#), operated by Cold Spring Harbor Laboratory. This repository played an important role in the rapid dissemination of research related to the COVID-19 pandemic. And the ACS co-sponsored the launch of [ChemRxiv](#), although broad adoption has been slow-moving—I participated in the ChemRxiv inaugural symposium in 2017 and noted in my remarks that ACS policy remained vague on the issue of preprints.



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Beyond disciplinary or generalist repositories, authors may also deposit their articles in institutional repositories, operated by university libraries, and funder repositories, like [NSF-PAR](#) and [PubMed Central](#). These repositories, however, may not offer the same level of reuse freedoms as full open-access solutions. They typically make research articles freely available to read, but they may not grant permissions for reuse, redistribution, or modification.

For example, the NSF requires that articles be deposited in the NSF-PAR where they are freely available to read, but are not automatically applied an open license that allows reuse rights. Similarly, while PubMed Central provides free access to biomedical and life sciences literature, the reuse rights can vary depending on the publisher's policies and the specific agreements in place. Without a clear open license, these articles may fall more into the "Bronze" classification, where they are free to read but lack explicit permissions for reuse.

Bronze OA: a half-measure

Bronze open access is a term used to describe articles freely available to read on publishers' websites, but without an explicit open license. It might seem like a step in the right direction—after all, isn't free access the goal? Upon closer inspection, Bronze OA reveals itself as a half-measure that falls short of true open-access principles.

For advocates of open access, Bronze OA is a frustrating compromise. Yes, readers can access and read the content without hitting a paywall, but they're often restricted from sharing, adapting, or building upon the work. This is at odds with the Budapest Open Access Initiative's vision of unrestricted use and reuse of scholarly literature.

The reuse-rights conundrum is this: without a clear, permissive license (like Creative Commons licenses), users are left in a legal gray area. Can they use a figure in their presentation? Translate portions of the article? Use it for a meta-analysis? The answers are often unclear, potentially stifling collaborations or building on prior knowledge.

Bronze OA also comes with strings attached. Publishers might make articles freely available for a limited time, or they might reserve the right to revoke access at any point. This creates a problematic situation where today's open content could be tomorrow's paywalled article. In contrast, true OA promises perpetual, reliable access.

For example, in 2020 several publishers made pledges to give full access to their content on COVID-19 research for a limited time—[Elsevier's press release](#) said "for as long as needed while the public health emergency is ongoing." They later announced that content published up until July 2023 would remain available for reading and text mining. The Association for Computing Machinery (ACM) [granted free access to its Digital Library to all](#) "for the next three months," to support researchers working remotely in the early months of the pandemic. [JSTOR](#) did the same.

Bronze OA could also inadvertently and insidiously be propping up traditional publishing models. By offering this halfway solution, publishers can claim they're embracing openness while still maintaining control over content. It allows them to reap the PR benefits of "open" access without changing their business models or fully committing to the principles of OA.

While Bronze OA offers accessibility, it lacks the full spectrum of freedoms that define true open access. Peter Suber might say: Bronze OA is better than closed access, but it falls short. We need to push for true open access that removes both price and permission barriers. Anything less is a compromise that shortchanges the potential of scholarly communication.

If Bronze OA falls short of true open access, the Gold OA model fulfills it by providing immediate, permanent, and licensed open access to scholarly articles. However, this comes at a steep price.

Gold OA: a gilded cage

Gold open access is a journal-centered solution that provides immediate free access to research articles under open licenses. It achieves this by significantly shifting the cost structure of academic publishing. Instead of readers (or their institutions) paying for access via subscriptions, authors now have to pay Article Processing Charges (APCs). These fees, often running into thousands of dollars, are meant to cover the costs of publication and distribution. However, for many traditional publishers, APCs have become a lucrative new revenue stream rather than a mere cost recovery mechanism. Under this model, researchers face difficult dilemmas: "Should I publish open access or fund a graduate student's conference trip?"

The APC model has also given rise to a troubling phenomenon: predatory publishing. Unscrupulous actors have seized on the Gold OA model as an opportunity to profit from researchers' desperation to publish. These predatory journals often have minimal or non-existent peer review processes and poor editorial standards. They prey on early-career researchers or those from regions where the pressure to publish in international journals is high. The result is a flood of low-quality publications that undermines the credibility of open access as a whole.

Gold OA, in its current form, perpetuates and potentially exacerbates inequalities in academic publishing. Researchers from well-funded institutions in wealthy countries can more easily afford APCs, while those from less affluent regions or institutions are often priced out. Many publishers advertise APC waivers for researchers from lower-income countries. Yet, these waivers are denied to researchers in middle-income countries like Brazil, for whom the fees are still exorbitant (see Brainard, 2024).

Some features of Gold OA give it an upper hand. As a journal-centered model, articles undergo peer review, and readers have immediate access to the version of record. In contrast, Green OA is a repository-centered model, and the version that is shared is typically the author manuscript, before peer review—although best practice is to update the preprint post peer review. Some repositories also allow authors to set an embargo period, further delaying access to the article.

The irresistible feature of Gold OA, however, is its association with prestige: the ambition of most researchers is to publish in the top journals of the field, which often charge high fees. This creates a paradoxical situation where the desire for prestige and impact drives researchers to participate in a system that can be exploitative, exclusionary, and very costly. By a recent estimate, global expenditure on APCs paid to six publishers between 2019 and 2023 amounted to \$9 billion in 2023 US dollars (Haustein et al., 2024).

Removing the burden on authors and perverse incentives of APCs leads to Diamond OA, which we explore next.

Diamond OA: researchers' best friend

Diamond (a.k.a. Platinum) OA provides immediate, permanent, and licensed open access free of charge for authors and readers. Instead, Diamond OA journals are funded by institutions, consortia, grants from government or foundations, allowing them to operate without relying on APCs or subscriptions.

The Diamond model is a researcher's best friend for several reasons. It removes financial barriers for authors, ensuring that everyone can publish their work regardless of their institution's budget or personal finances. This is particularly important for researchers from less affluent regions or institutions who may struggle to afford the high APCs associated with Gold OA. The lack of APCs also removes the motivation for predatory publishers, who have plagued the Gold OA model.

Diamond OA journals maintain the quality control and prestige associated with traditional publishing models. Articles still undergo rigorous peer review and editorial oversight, ensuring that only high-quality research is published.

The challenge is of course ensuring funding for these journals, as they rely on the continued support of institutions or granting agencies. Despite this, the Diamond model has been gaining traction in recent years. Initiatives like the [Open Library of Humanities](#), which publishes Diamond OA journals in the humanities and social sciences, have demonstrated the viability of this approach. The Journal of Open Source Software (of which I was a founding editor and associate editor-in-chief until 2021) showed that a Diamond OA journal could be run at [minimal costs](#) using available infrastructure and open source tools. It also has developed a set of open-source technology for editorial management and handling common tasks like generating the article PDF, creating the metadata for making a Crossref deposit, and more. The Open Library of Humanities also has developed their own open-source publishing platform. Perhaps open-source software is a key element in ensuring an open access future.

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Arguably, Diamond OA is the least-understood model, yet by favoring it, we not only ensure that research is freely accessible to all but also help to build a publishing ecosystem that prioritizes the dissemination of knowledge over profit. Diamond OA realizes the vision of the Budapest Open Access Initiative: a world in which all research is freely available to anyone, anywhere, without barriers or restrictions.

A case for channeling public funds to Diamond OA

Let's now consider the impact of US federal policy on this landscape of scholarly publishing. The 2013 Holdren memo required public access to all articles resulting from federally funded research, allowing for a 12-month embargo period. This policy led federal agencies to create public access repositories, while traditional subscription-based journals continued to dominate the publishing ecosystem.

The updated policy took a more assertive stance via the 2022 Nelson memo, mandating immediate public access without any embargo period. Meantime, publishers are increasingly directing manuscripts subject to zero-embargo mandates to Gold OA pathways.

As Gold OA becomes more prevalent, a concerning scenario emerges. Federal agencies and institutions are already heavily investing in infrastructure for repositories, while authors face growing APC burdens, often funded through grants. In essence, the public is paying twice for access to the same research: once through the support of agency repositories and again through APCs (Hinchliffe, 2023).

Moreover, many institutions maintain their own repositories, adding a potential third cost stream to the mix. This begs the question: if public funds are already being channeled into repository infrastructure and APCs, wouldn't it be more sensible to redirect this support towards Diamond OA journals?

By supporting broad Diamond OA, federal agencies and institutions can ensure that publicly funded research is immediately and permanently accessible without barriers on authors or readers. This approach would eliminate the need for multiple, overlapping payment streams and create a more straightforward and equitable publishing ecosystem. It would also bring greater control over the use of public resources. Rather than indirectly supporting commercial publishers through APCs (OSTP, 2024), public institutions could strategically invest in non-profit, community-driven publishing initiatives that prioritize the dissemination of knowledge over commercial interests.

Transitioning to a full Diamond OA model sounds like a radical proposition: it implies decoupling scholarly communication from commercial publishing houses. Developing sustainable funding models for Diamond OA journals might involve redirecting funds, negotiating with academic societies with a publishing branch, and organizing communities of editors, reviewers and authors, with support from libraries and IT staff to deploy open-source platforms. It is certainly daunting, but at least worth debating.

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