

## Philosopher's Corner

# Open Science, Open Access, and the Democratization of Knowledge

Science bills itself as working for the common good, but a growing number of scientists, policy-makers, and the social scientists who study them argue that science is too isolated from society to fulfill this promise. They advocate for what they call Open Science—an effort to close the gap between science and society by democratizing scientific knowledge. We can see one aspect of Open Science in efforts to facilitate open access (OA) to research results. According to what has now become the accepted definition of OA, open access requires making scholarly publications (and other products, including data) freely available for anyone with an internet connection to read, download, and reuse for any purpose that accords with community standards.

Expanding access to the scholarly literature has been a goal shared by many researchers and knowledge managers since at least the late 1950s, when the Department of Education began developing the Education Resources Information Center to disseminate the vast amounts of federally funded research on education to state departments of education, as well as to the public. The National Library of Medicine launched MEDLINE, an online bibliographic database of biomedical research, around the same time. In 1969, the Department of Defense's ARPANET—the precursor of the internet—began linking US universities to each other. On July 4, 1971, Michael Hart, then a student at the University

of Illinois, typed the full text of the Declaration of Independence and emailed instructions to allow others to download it. Hart's Project Gutenberg, which aimed to distribute as many books as possible to as many people as possible, had begun.

The principle driving these efforts was the desire to democratize knowledge. By the time the World Wide Web became widely available in the 1990s, researchers and knowledge managers had already been considering its possibilities for knowledge dissemination. These considerations, coupled with rising costs for academic library subscriptions to scholarly journals and growing realization of the inequity of restricting access to knowledge to a select few who could afford it, led to the rise of the OA movement.

Despite the steady progress that has been made over the decades, many OA advocates have become frustrated by its glacial pace and pin the blame for the delay on scholarly publishers. They argue that although technology has dramatically reduced the cost of dissemination, scholarly publishers continue to insist on both the value of traditional publications and the high cost of “quality” publishing. Publishers have also remained a step ahead of policy-makers by inventing new ways to take advantage of the push for OA. For instance, publishers developed a hybrid model that allowed the same journal to provide access to articles via the traditional subscription route, as

well as via article processing charges (APCs) that would, if paid by the authors, make certain articles in the journal available OA. This hybrid model essentially enables publishers to double-dip, charging the subscriber and the author for OA articles. Policy-makers are now trying to turn the tables on publishers by putting funding agencies in charge.

To spur the pace of progress, in September 2018 a partnership of 15 European and one US-based research funding agencies formed cOAlition S and developed Plan S to make all research funded by their agencies immediately available for free for anyone to read and reuse. Slated to into effect by January 2020, Plan S could be a game-changer. But in order for it to succeed, funders beyond Europe—especially those from China and the United States—will have to join cOAlition S. China has announced its “support” for the plan but has not officially joined the coalition. In February 2019, India announced its intention to join, and Plan S architects are actively recruiting more members.

Plan S has set a lofty goal and a frenetic pace, but we would do well to remember that open access to the

and use creative knowledge. The CC BY license stipulates that authors must grant permission for their work to be reused by anyone in virtually any way, as long as it is attributed to them. This mandate effectively removes the power of copyright not only from publishers, but also from authors.

Although researchers have reacted in various ways to these demands, these technical details are not at the center of the discussion. Instead, the emerging Open Science ideal undergirds most of the arguments surrounding Plan S.

Advocates describe the Open Science ideal simply as science done right, as a public good that should be practiced in connection with society and societal values. Science done right, in this context, includes considerations of social justice and international human rights. The Open Science ideal requires researchers to pay at least as much attention to scientific responsibility as to scientific freedom. Part of that responsibility is to make the scientific literature freely available to all; but Open Science is more than open access. And although Plan S promotes OA, it

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literature is not the ultimate aim. We should keep our eyes on the real prize—the democratization of knowledge pushed for by the champions of Open Science. OA alone is insufficient to change the practice of science to make it more responsive to society’s needs.

Plan S could also spell trouble for researchers. *Nature* and *Science* have cited separate studies suggesting that fewer than 15% of existing journals currently comply with Plan S requirements. That puts real limits on where researchers can publish their work. Plan S declares all hybrid journals noncompliant; yet many of these hybrid journals are the publications of choice in various fields of research.

Plan S also includes other requirements that have caught authors in the middle of the struggle between cOAlition S funders and publishers. It mandates that authors retain the copyright to the manuscripts they submit to journals, a move that could empower authors while disempowering journals that typically require authors to sign over their rights to the publisher. Yet it also requires the use of a CC BY license issued by Creative Commons, a global nonprofit organization that attempts to simplify and standardize public permissions to share

might actually interfere with achieving the Open Science ideal because, in its basic design, Plan S amounts to an incremental technical improvement on Vannevar Bush’s linear model of knowledge production.

At the close of World War II, Bush, a respected engineer and even more famous science administrator and adviser, argued that scientists needed both public funding and autonomy to perform the research they felt was most valuable. The research would undergo peer review, after which the results would be stored in a reservoir of scientific knowledge from which society could draw when needs arose. Once they passed their work through peer review and published it in a scientific journal, the scientists had met their responsibilities. It was up to society to find the knowledge and apply it. The linear model was never supposed to describe how research actually happens; it was a rhetorical move designed to secure a place (and funding) for researchers to pursue the science they wanted to, safe from societal demands.

By charging for subscriptions to gain access to this knowledge, scientific journals erected an additional

barrier between science and society that fit nicely into Bush's design to keep science autonomous from society. Plan S will expand access to the results of research by removing the subscription paywall, but it will not make scientists any more responsive to society's needs. Plan S might be a benefit to the science system but not necessarily to society. It might also be a bane to scientists.

Plan S hopes to flatten the hierarchy of scientific journals that drives researchers to seek publication in a handful of highly prestigious journals. Researchers care about where they publish, we are told by Plan S advocates, only because they are evaluated on the basis of the Journal Impact Factor (JIF). Plan S promises to eliminate the JIF, and because everything will be available for free, it will not matter where researchers publish. The current gap that separates more and less prestigious journals will disappear, and all knowledge will become part of one big commons, openly available to everyone. This is democratization of a sort, but it falls short of the real democratization of knowledge as outlined by the Open Science ideal. Real democratization would require connecting the supply of knowledge with the demand for knowledge. Instead, under Plan S, researchers will have met their responsibilities once they publish their papers in a compliant journal or repository.

At this time, the list of compliant journals is quite small and is dominated by those that charge APCs to make articles OA. The list of compliant repositories, which would allow compliance without forcing researchers to pay to publish, is even smaller. Plan S suggests that once the publishers flip to OA, there will be enough money in the system—presumably savings on subscription fees—to cover these APCs. In the meantime, it is unclear whether researchers without funding will be able to afford to publish under Plan S. This potential difficulty is not the concern of cOAlition S, however. Plan S is top-down, forcing researchers and publishers to comply with funder mandates.

Contrast the cOAlition S approach with that put forward by another organization, AmeliCA, coming from Latin America and the Global South. Launched as the result of a UNESCO special forum on the democratization of academic knowledge, AmeliCA is bottom-up, stemming from the experiences of academics who are trying to both engage society and engage in a worldwide scholarly conversation. According to Arianna Becerril García, president of AmeliCA, founder of the Network of Scientific Journals of Latin America and the Caribbean, Spain, and Portugal (Redalyc), and professor of computer science at the Autonomous University of the State of Mexico, the Latin American scholarly ecosystem regards publishing as a community commons, not an industry. In fact, much of the scholarly publishing in

Latin America takes place across OA platforms such as Redalyc, and also including SciELO and Latindex, which were created and led by researchers with support from their universities or national funding agencies. The focus of these platforms is twofold: to provide a place for national or regional journals that focus on publishing research relevant to those areas, and to raise the profile of such journals so that the authors who publish there can contribute to the worldwide scholarly conversation. These platforms aim to contribute to the democratization of knowledge by making relevant research openly available, as well as by opening up the international scholarly conversation to include researchers from Latin America and the Global South.

AmeliCA has not only its own proposals for how Open Science should be achieved, but also a message to cOAlition S and others who may have abandoned the Open Science Ideal. “From the Global South,” says a post on AmeliCA's blog, “it is seen with concern that a model is being established that again opposes the South and the North, instead of seeking the construction of common platforms that use technologies that prevent, from now on, the possibility of simply being controlled.”

As opposed to funder mandates that push researchers toward paying fees to make their articles immediately available in compliant venues, a requirement that would favor researchers with more money, AmeliCA advocates enhancing the infrastructure for Open Science at academic institutions. Instead of control from above, AmeliCA suggests that academic researchers and academic institutions should retain control of academic knowledge production. In the Latin American context, this sort of autonomy is meant to guarantee that scientists can connect their research to regional, national, or local needs; it is very different from autonomy in Bush's sense. In place of the desire to achieve OA above all else, AmeliCA holds that the societal impact of science is the justification for OA. Instead of insisting that technology has determined our policy decisions, AmeliCA suggests that we make policies to use technology as a tool to realize the democratization of knowledge.

Plan S may yet succeed in achieving immediate OA for publications supported by cOAlition S funders, but its ultimate impact will depend in large part on who else joins. As written, Plan S focuses on achieving OA, rather than using OA as a means to achieve the Open Science ideal. It is possible that Plan S supporters simply equate OA with democratizing knowledge. If so, we have not advanced very far since the heyday of the linear model.

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