

## TECHNOLOGY

# Free Access to Science Research Doesn't Benefit Everyone

There is a lot of promise in open access. But there are a lot of problems too.

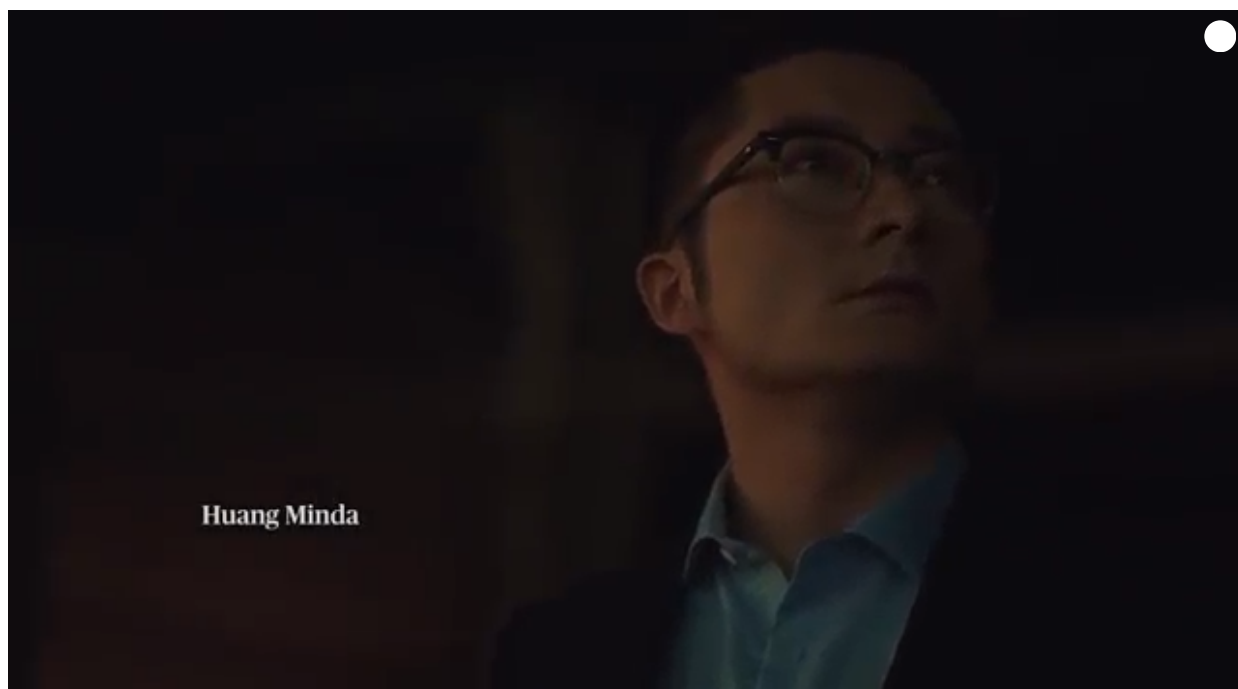
ROSE EVELETH DEC 22, 2014



[RUPERT GANZER/FLICKR](#)

Open is better than closed. That rule applies for a lot of things: presents, beer, restaurants. And, many argue, science.

The open-science movement has a lot of interlocking parts. *Open-access* publishing advocates want papers to be available to anybody, *open-data* supporters want data to be downloadable, and those arguing for *open source* want the software scientists use to be shared with everyone. The idea is simple: The more people who have access to papers, data, and software, the better it is for the world.



And the drumbeat of openness is getting louder. Last month, CERN opened up its vast datasets to the public and the Bill & Melinda Gates Foundation announced that any research it funded would have to be published only in journals that offer open access. “We believe that published research resulting from our funding should be promptly and broadly disseminated,” they wrote in their policy statement.

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Making something open isn’t a simple check box or button—it takes work, money, and time. Often those pushing for open access aren’t the ones who will have to implement it. And for those building their careers, and particularly for underrepresented groups who already face barriers in academia, being open isn’t necessarily the right choice.

Take open-science software, for example. Making code open source isn’t as simple as plopping it onto the internet somewhere, says Dan Gezelter, a chemist at University of Notre Dame and the founder of the Open Science project. To do it right requires documenting how to use the code, and explaining how it works. “It’s only scientists who are relatively secure who can spend the time, and it does take extra time to make sure that their stuff is released correctly,” he said. “I’ve got tenure, I’m pretty secure, so I don’t really have any problems releasing all my stuff

as open source. But I haven't felt really secure in telling say junior faculty or even grad students, 'oh spend a lot of time cleaning up your code for release.'"

That goes for open-source publishing as well. Melissa Bates, a physiology researcher at the University of Iowa, says that when it comes to making papers open access, it's not fair to ask graduate students and early career scientists to bear the brunt of the responsibility. "There's this idea that open access is this ethical and moral thing, that it's a morally and ethically grounded movement, and I can appreciate in a sense that it is," she said. "But there's also a business model to how science is done."

That business model isn't all that different in science publishing than it is in any other kind of print publishing. Putting out a journal costs money. And someone, whether it's the university, the scientists, the government, the public, or some benevolent billionaire, has to pay for it. Much scientific research is funded by taxpayers. But the editorial process—the printing, the hosting, and the rest of it—is not. "In principle, Open Access is what I call doing the right thing," said Alan Leshner, the executive publisher of *Science*, a journal that keeps its papers closed for the first year after they're published, and then opens them up to the public. "It would be great if we could afford open access to everything we publish immediately. The problem is it costs \$50 million a year to publish *Science*." Somebody has to foot that bill, he says.

When a paper is accepted to a journal that isn't automatically open access, in some cases scientists can pay a certain amount of money to release it to the world. Those publishing fees can be thousands of dollars for each paper. Open-access advocates argue that it's worth the money to put the work out there, but Bates points out that often grants will have a limit to how much someone can spend on publishing fees. Gezelter says that that economic tension is a big one in labs. "Would you rather publish these 10 papers open access or would you rather hire a grad student for a year?" he asks. "It leaves individual scientists in an ethical quandary," Bates said. "The answer for me is always going to be: I'm going to pay a person."

Bates isn't opposed to open access—she's published work in and reviewed papers for open-access journals. But she's also realistic about the perception that surrounds open access when it comes to advancing her career. At a time when the job market in science is extremely competitive, the institutions coming over

resumes aren't looking for someone's commitment to the open-access cause, they're looking at their potential for big research. And in many cases that potential is measured through publication in so-called "glamour" journals like *Science* and *Nature* and the *British Medical Journal*.

Here's one way to understand the perceived distinction in journal status. Many people use something called an Impact Factor to measure how influential a journal is. The Impact Factor is a simple calculation: Take the number of times articles were cited the year after they were published, and divide that by the total number of articles the journal published in the same year. Based on that ratio, *Nature's* impact factor was 42 in 2013. The open-access journal *Public Library of Science, One* had an impact factor of 3.5 that year. Impact Factor has been heavily criticized, methodologically, and many have called for institutions and funding agencies to completely ignore it. But the fact is that they don't. More than that, some universities don't allow scientists to put any paper on their tenure application that was published in a journal with an impact factor below five.

So for someone focused on building a career, it makes sense to try and go for the closed publication. "If I'm not going to publish it in a glamour publication, sure, I'll publish in a good open-access journal," said Bates. "But given the opportunity to publish in one of those five glamour publications I'm going to put it there every time, because having something quantifiable matters."

Virginia Barbour has worked at the Public Library of Science—one of the groups at the forefront of the open access battle—for 10 years now. She says that the perception of which journals are most valuable is changing. "Alongside the growth of open access has been an increased understanding that measuring the journal that way isn't really working anymore."

Gezelter and Bates don't agree. "No, I think it's getting more entrenched," Gezelter told me. "The people reviewing us aren't necessarily reading our papers but they can count, so they're counting our papers. This problem is actually not being helped." Bates agreed: "I think it's getting worse, and I think in some cases it's getting much worse."

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In some ways, the struggle here is to be expected, because what we're really talking about is changing a culture. Science has not, traditionally, been an open discipline. In some fields that's because work can be turned profitable. In other fields, it's simply tradition. Culture change is hard, and it takes work—work that is often done by the younger generation.

“There's a generation of scientists who are running labs and running tenure committees who were brought up on a very different system” said Barbour. “I have huge hopes on the generation that's coming up, because they're a generation built on openness and availability, and for a lot of things we're talking about it may well take a generational change. It may not be until those people are in positions of authority that things will really change,” she said. Bates also pointed out that it's the younger crop of scientists who might be taken by the moral argument. But that's not necessarily a good thing, she said, because those scientists are more likely to take a career hit for their idealism. “Framing it in an ethical and moral context, I think is more likely to hit some of the more idealistic among us. I think young people are often very motivated to try and change things, so they're most likely to be cannon fodder.”

It is often those at the bottom who work to change a culture. But in the case of opening up science it shouldn't have to be. Barbour points to ways universities and funding agencies could change things: by offering to pay publication fees, by offering incentives to those who publish open access, and by considering things other than metrics when evaluating a candidate. But pushing for those changes should be the job of the established, not the beginners.

And it will also take a new form of publishing, a new way of keeping journals afloat and of paying for the work they do. “I don't see *Science* becoming open access in the near future,” Leshner said. “My view is that 10 years from now the business model of scientific publishing will be neither open access or the circulation model. I don't know what it will be, but it will be something else. And I'm right, because nobody can afford for governments or grants to support open access on a full-scale basis.”

Gezelter, for his part, said he's going to start doing what he can on the publishing front. “I've never published in *PLOS*, but this year I'm going to send something there because it's time to put my money where my mouth is.”

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