

Half of All Papers Now Free in Some Form, Study Claims

Efforts to give the public free access to peer-reviewed papers have reached a milestone: One-half of all papers are now freely available within a year or two of publication, concludes a new study sponsored by the European Commission. That means so-called open-access publishing has reached a “tipping point” and will now accelerate, suggests Éric Archambault, the lead author of the study and president of Science-Metrix Inc. in Montreal, Canada. “Things are likely to move much faster now.” But some open-access observers have been quick to criticize the study, which yielded a number twice as high as other analyses.

The findings come as open access is set to expand: This week, U.S. science agencies were due to send the White House draft plans describing how they will make government-funded research papers freely available, generally within 12 months of publication. And the European Commission will soon require that most articles it funds be free within 6 months. The new “findings underline that open access is here to stay,” said Máire Geoghegan-Quinn, European commissioner for research, innovation, and science, in a statement.

The open-access movement took off more than a decade ago when some scientists began pushing to make full-text papers free. Today, some papers are published in journals that make papers immediately free upon publication and cover costs by charging authors a fee. Some other papers, published in traditional subscription-based journals, are made freely available on an author's website or through an institutional or government archive, often after a 6- or 12-month “embargo” imposed by the publisher to protect subscription revenue. (Papers in *Science* are free with registration after 12 months, and authors can post copies sooner.) Like other analysts, Archambault defines papers published in immediately free journals as the “gold” version of open access, and those posted in archives, sometimes after a delay, as “green”; other forms his team dubbed “hybrid.”

To find out how many gold, green,

and hybrid papers are now available, Archambault and his colleagues randomly sampled 320,000 papers published between 2004 and 2011 drawn from Scopus, a database. They then built a software robot that scoured the Internet and online archives in April 2013 for the full text. Unlike some other analysts, they included papers that are only temporarily free (such as a journal's sample issue). As a check, they also manually searched for 500 papers, revealing that the robot had missed a few. After correcting for this error, the Science-Metrix group concluded that open access reached a 50% “tipping point” in 2011, meaning that one-half

number of open-access papers has been growing by about 2% a year, and the absolute total jumps each year as journals and authors make batches of old papers free.

Archambault's group also broke the results down by field and country. Biomedical research leads with 61% of papers freely available. Open access is well over 50% in a few countries (defined by author's country), including Macedonia (67%), the Netherlands (58%), and the United States (56%).

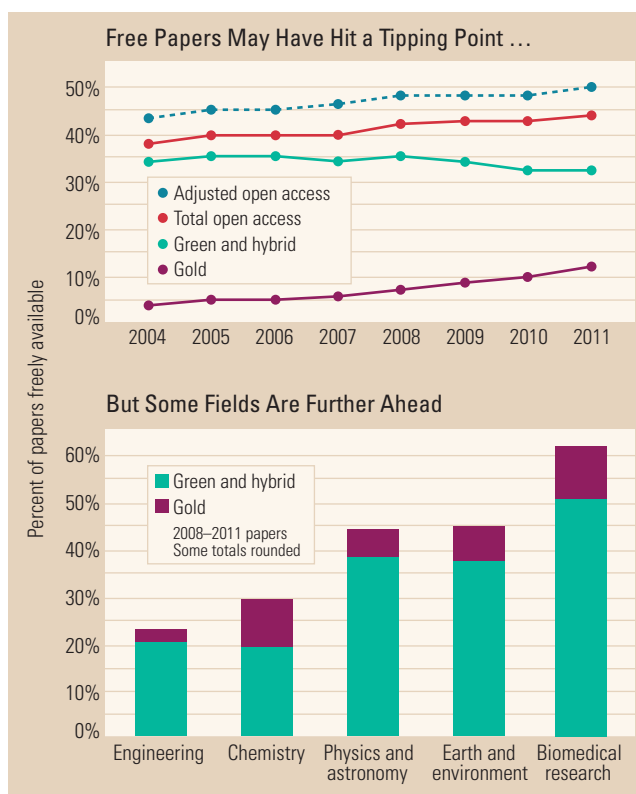
Such numbers haven't persuaded other analysts that open access is making a historic transition. “Eric has given us good news about access, not open access,”

says Stevan Harnad of the University of Quebec in Montreal, who thinks that delayed access shouldn't count. Bo-Christer Björk of the Hanken School of Economics in Helsinki, who's calculated a smaller number, says that for methodological reasons he's “not fully convinced” that the 50% figure is valid. However, he says the study is “important” and will be influential—but not necessarily in the way the authors hope: It may prompt subscription publishers to lengthen embargoes and tighten enforcement.

One publisher says that even if the 50% number is real, publishing hasn't necessarily reached a tipping point. Fred Dylla, executive director of the American Institute of Physics in College Park, Maryland, argues that open access is expanding because it's being driven by public policy mandates, not favorable economics. For that reason, “I don't see us reaching the top of a hill and now rushing to the bottom. It's more like the slope is getting smaller,” he says.

However imperfect, the Archambault analysis is welcome, says open-access advocate Peter Suber, director of Harvard University's Office for Scholarly Communication. It shows that open access “has entered the mainstream,” he says. “When we're on a long journey, we have a right to celebrate when the odometer rolls over at some round number of miles, even if we're perfectly aware that the round number is somewhat arbitrary.”

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Gaining ground. More papers are available in free-to-read journals (gold open access) or in “green” online archives and “hybrid” journals.

of the papers published that year are now freely available.

The team also found that the proportion of gold papers grew from about 4% of all papers in 2004 to 12% in 2011 (see graph). Over the same period, the share of green and hybrid papers hovered around 34% then fell to about 32%. That decline probably reflects the fact that more recently published papers hadn't yet come out from under embargo, Archambault says. Overall, he notes, the