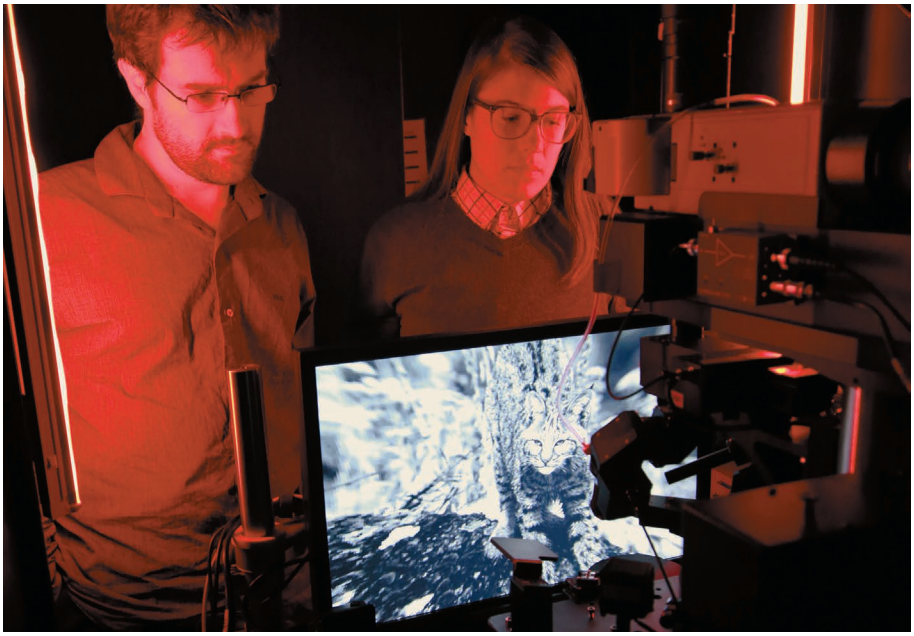


ALLEN INST.

Researchers monitored mice's brain activity while the animals viewed images such as this cat.

Other labs have collected similar data, but on a much smaller scale, with fewer animals or fewer neurons. This information has been difficult to merge and compare, as a result of differences in the species, techniques or brain regions examined. And most data remain in the hands of individual labs.

To create the unusually extensive Allen data set, more than 100 researchers developed and used standardized equipment and protocols for every stage of the experiment. This allowed them to repeatedly and systematically sample the same populations of neurons across many animals and sessions.

Now, Allen Institute researchers plan to monitor activity while the mice carry out behavioural tasks. The scientists also want to use more recording techniques, and to extend their sampling across the entire mouse visual cortex and beyond. Christof Koch, president of the Allen Institute, hopes that over the next 3–4 years, the project will evolve into a true observatory, with researchers able to request certain experiments — the results of which will be made publicly available.

The project's neural-activity map could help to fill out a picture of what cell types live in the brain and how they work together. Ultimately, the Allen Institute wants its own researchers and others to be able to use the massive data set to help to uncover the fundamental computational principles that underlie cognition. This lofty goal is shared by the US government's Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, which was launched in 2013 with the Allen Institute among its private partners. But whereas the BRAIN Initiative has largely supported individuals and small groups of investigators with conventional grants, the Allen Institute has concentrated personnel and money on a small number of large projects. It aims to create public research tools that would be unfeasible for individual labs to produce.

Armed with a sweeping survey of neural activity, Koch says, theoreticians will be able to design more accurate models of brain function, and find better ways to test the validity of existing models. But he is also realistic about the challenges ahead. "We're under no illusions that now we have all this data that the solution will jump out at us," says Koch.

The Allen Brain Observatory's impact will depend in part on whether the neuroscience field embraces this experiment in communal research. Early reactions suggest that researchers are eager to participate. Churchland says that the in-depth information about how different visual areas respond to stimuli could help to guide and fine-tune her experiments. The data could also help labs that lack access to highly specialized imaging equipment, she adds.

Theoreticians, too, are looking forward to delving into the data. "This is basically a bonanza," says computational neuroscientist Steven Zucker at Yale University in New Haven, Connecticut. "It's as if somebody opened the door into the world's biggest neuroscience lab for theoreticians around the world and said, 'Come on in and play with our data.'" ■

BIBLIOMETRICS

Publishing elite turns against impact factor

Senior staff at societies and leading journals want to end inappropriate use of the measure.

BY EWEN CALLAWAY

The tide is turning against the impact factor — one of the publishing industry's most contentious metrics — and its outsized impact on science.

Calculated by various companies and promoted by publishers, journal impact factors (JIFs) are a measure of the average number of citations that articles published by a journal in the previous two years have received in the current year.

They were designed to indicate the quality of journals, but researchers often use the metrics to assess the quality of individual papers — and even, in some cases, their authors.

Now, a paper posted on the preprint server bioRxiv on 5 July, authored by senior employees at several leading science publishers (including *Nature*'s owner, Springer Nature), calls on journals to downplay the figure in favour of a metric that captures the range of citations that a journal's articles attract (V. Lariviere *et al.* Preprint at bioRxiv http://doi.org/bmc2; 2016).

And in an editorial that will appear on 11 July in eight of its journals, the American Society for Microbiology (ASM) in Washington DC will announce plans to remove the impact factor from its journals and website, as well as from

marketing and advertising.

"To me, what's essential is to purge the conversation of the impact factor," says ASM chief executive Stefano Bertuzzi, a prominent critic of the metric. "We want to make it so tacky that people will be embarrassed just to mention it."

Bertuzzi was formerly the executive director of the American Society for Cell Biology, which banned the mention of impact factors from its annual meeting.

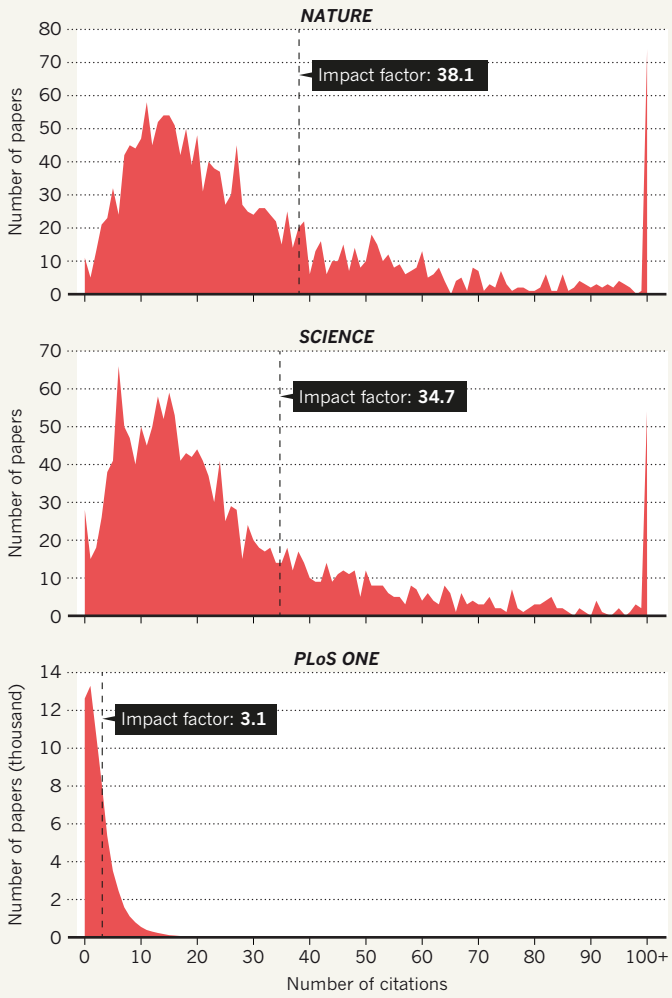
BRACE FOR IMPACT

Heidi Siegel, a spokesperson for London-based business-analytics firm Thomson Reuters, the major publisher of the JIF, says that the measure is a broad-brush indicator of a journal's output — and should not be used as a proxy for the quality of any single paper or its authors. "We believe it is important to have a measure of the impact of the journal as a whole, and this is what the JIF does," says Siegel.

But many scientists, funders and journals do not use it that way, notes Stephen Curry, a structural biologist at Imperial College London who is lead author of the latest paper. Many researchers evaluate papers by the impact factor of the journals in which they appear, he says, and the metric can also influence decisions made by university hiring committees and funding agencies.

THE IMPACT FACTOR'S LONG TAIL

Journal impact factors are influenced heavily by a small number of highly cited papers. For all journals analysed, most papers published in 2013–14 garnered many fewer citations than indicated by the impact factor.



SOURCE: FIG. 1 IN LARIVIERE *ET AL.*

Past research suggests that such uses are inappropriate. To emphasize some limitations of the JIF, Curry's team plotted the distribution of citations for articles published in 2013–14 in 11 journals, including *Science*, *Nature*, *eLife* and 3 Public Library of Science (PLoS) journals (see 'The impact factor's long tail'). These citations are used to calculate the 2015 impact factors.

Curry's co-authors include senior employees at Springer Nature, eLife, PLoS, the Royal Society (which publishes several journals) and EMBO Press, as well as Marcia McNutt, who stepped down on 1 July from her role as editor-in-chief of *Science*.

Most of the papers garnered fewer citations than the impact factor for their journal: 74.8% of *Nature* articles were cited below its impact factor of 38.1, and 75.5% of *Science* papers were cited fewer than 35 times in 2 years (its impact factor was 34.7). *PLoS Genetics* had the lowest proportion of papers with fewer citations than its impact factor of 6.7, at 65.3%.

Highly cited papers explain this disconnect. *Nature*'s most cited paper in the analysis was referenced 905 times and *Science*'s 694 times. *PLoS ONE*'s biggest paper accrued 114 citations, compared with its impact factor of 3.1.

Some journals, such as those published by the Royal Society and EMBO Press, already publicize citation distribution. Curry and his fellow authors explictly recommend that other publishers play down their impact factors, and, instead, emphasize citation-distribution curves, such as those that the team generated, because they provide a more informative snapshot of a journal's standing. The preprint includes step-by-step instructions for journals to calculate their own distributions.

A MEASURE OF CHANGE

A spokesperson for *Nature* says that the journal will soon update its websites "to cover a broader range of metrics", and a representative of *Science* has stated that the journal will consider the proposal once the preprint article is published in a peer-reviewed journal.

Ludo Waltman, a bibliometrics researcher at Leiden University in the Netherlands, says that citation distributions are more relevant than impact factors for high-stakes decisions, such as hiring and promotion. But he is wary of doing away with impact factors entirely; they can be useful for researchers who are trying to decide which among a pile of papers to read, for instance.

"Denying the value of impact factors in this situation essentially means that we deny the value of the entire journal publishing system and of all the work done by journal editors and peer reviewers to carry out quality control," Waltman says. "To me, this doesn't make sense."

Anti-impact-factor crusaders say that it will take time to diminish the influence of the figure, let alone exile it. "This is a cultural thing," says Bertuzzi, "and it takes pressure from multiple points to change behaviour". ■

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