RESEARCH QUALITY

Service Offers to Reproduce Results for a Fee

Spotting a business opportunity and a chance to change the culture of science, a breast cancer biologist is hoping to persuade researchers to have their work replicated for a fee. They would accept the risk of failure but also have a shot at quick validation.

The Reproducibility Initiative, launched earlier this month by Elizabeth Iorns in Palo Alto, California, invites biomedical scientists to submit critical experiments to an advisory board, which matches those experiments with a research facility equipped to repeat them. The original author—and hopefully everyone else—can learn in a short time whether new research holds up. The journal *PLoS ONE* has pledged to publish any work that comes out of the Reproducibility Initiative.

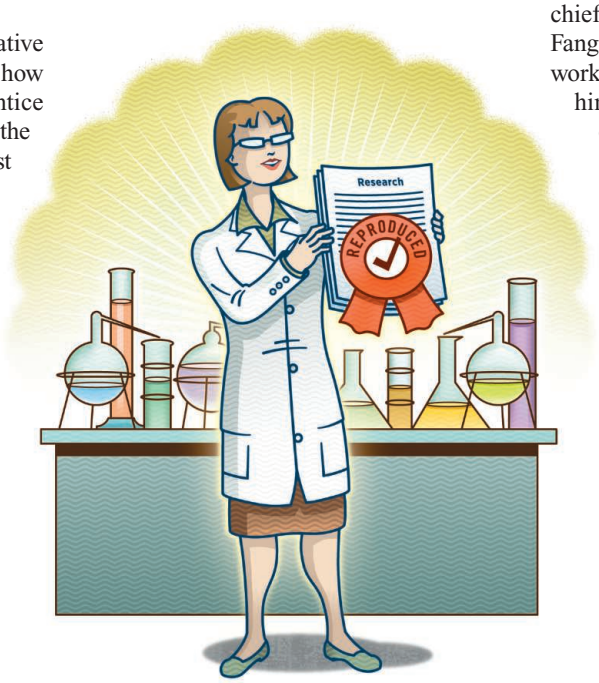
As with any novel venture, the initiative comes with looming questions. One is how many will participate. The ability to entice scientists will depend partly on cost. For the moment, applicants must cough up the cost of replication, estimated at about 10% of their original study, which could easily run into the thousands of dollars. (The initiative takes a 5% cut of that payment.) Iorns's group has received three applications so far.

Cost and the difficulty of getting a publishable paper from repeating experiments often make replication impractical for scientists. "People are really very poorly incentivized to check out whether other people's work is right," says Hal Pashler, a cognitive psychologist at the University of California, San Diego. In January, Pashler set up PsychFileDrawer, a mechanism whereby psychologists can post replications. Despite plenty of visitors curious to see whether a colleague's work has been thrown into question, the site lists only about 13 experiments.

Because the Reproducibility Initiative is asking scientists to put their own and not others' work to the test, it's taking pains not to alienate potential applicants. Its focus, Iorns says, is on celebrating research that is successfully reproduced. Work that's not replicated the first time can be sent to another lab for a second round. Iorns chooses her words carefully when describing what a double failure means. "It doesn't necessarily invalidate the experiment," she says. "It indicates you have a robustness problem."

The results go back to the scientist, who will be a co-author of a paper reporting the replication, even though he or she did not conduct those experiments. The original author also decides whether to publish what the replicators produced. *PLoS ONE* will peer-review the studies, but because the journal accepts all papers that are technically sound, Iorns can't imagine it would turn down one from the initiative.

Iorns considers the 10% estimate realistic because only a subset of the original study will be repeated. Submitters provide their methods and results; those overseeing the Reproducibility Initiative home in on the experiments that seem most germane to the paper's conclusion, minimizing the number of animals needed, for example.



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Cost is unquestionably a hurdle. "Many people would not be able to afford" what's charged, or "would choose not to spend their money that way," Pashler says. Iorns says some funders "have committed to funding the replications of their researchers," but she can't share yet who they are. Industry money is also an option. "We'll need capital to scale, and that capital has to probably come from the industry side of the equation," says Bruce Booth, a member of the initiative's advisory board. Booth is a partner at Atlas Venture, a venture capital firm in Cambridge, Massachusetts.

Another question is whether most biomedical research can or even should be replicated by Iorns's system. She plans to have the labor done through Science Exchange, a matchmaking service she founded last year as a way to outsource certain types of research, such as gene sequencing. Industry or academic researchers pay a fee to one of more than 1000 "Core Facilities," mainly in universities, who do the work for them. Replicators will not be told the outcome of the original experiment to guard against bias, although in theory they could look up the publication they're tasked with replicating.

"Not any laboratory could turn around and do something that you've been spending most of your career learning," says Ferric Fang, a microbiologist at the University of Washington, Seattle, and editor-in-chief of the journal *Infection and Immunity*. Fang is finishing a paper now that he's been working on for 12 years and says it's hard for him to imagine many scientists with the expertise to repeat those experiments.

At the same time, Fang acknowledges that Iorns is putting her finger on a problem: The scientific literature is replete with studies that don't hold up. In March, a paper in *Nature* reported that Amgen scientists had attempted to replicate 53 important cancer experiments and only six had panned out.

Iorns's effort comes as the reproducibility problem is gaining traction at various levels. In June, the Association for Psychological Science and the U.S. National Institutes of Health held a meeting to discuss replication of behavioral research; Pashler attended, as did social psychologist Brian Nosek of the University of Virginia in Charlottesville. Nosek, who is also an adviser to the Reproducibility Initiative, has recruited 72 of his colleagues so far to try to replicate dozens of studies from papers published in 2008—a random sampling that aims to assess the reproducibility of psychological science. Most of the studies are inexpensive to repeat, and labs are paying for them out of their own pocket. Iorns hopes that her initiative will accomplish something similar despite high hurdles. "If you're an academic researcher … and you want to stand out, you want to say, 'I'm not part of the problem' " of research that can't be replicated, she says. That, she believes, will bring people her way.

–JENNIFER COUZIN-FRANKEL

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