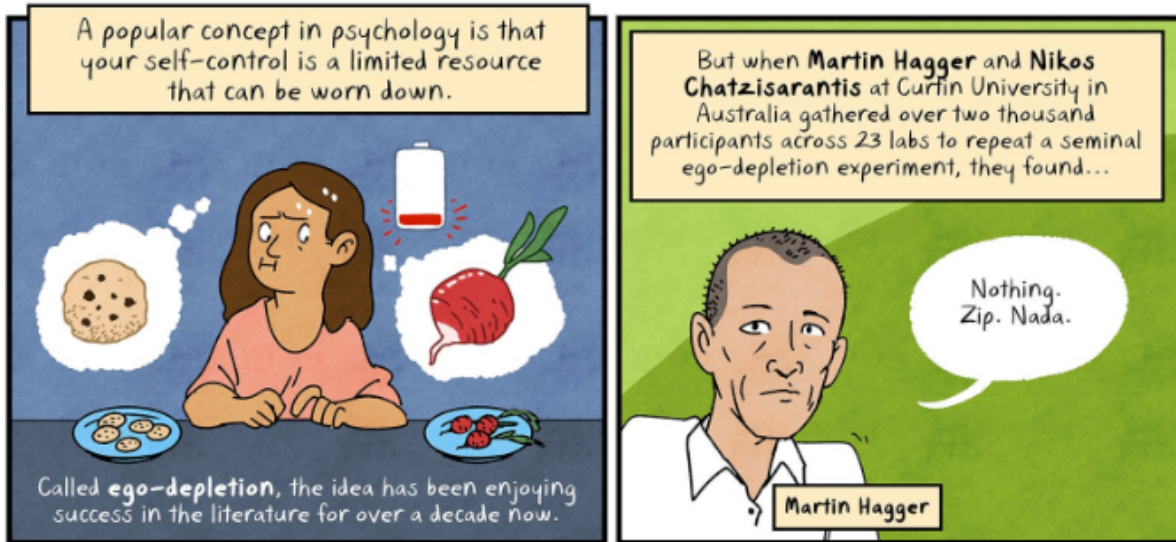


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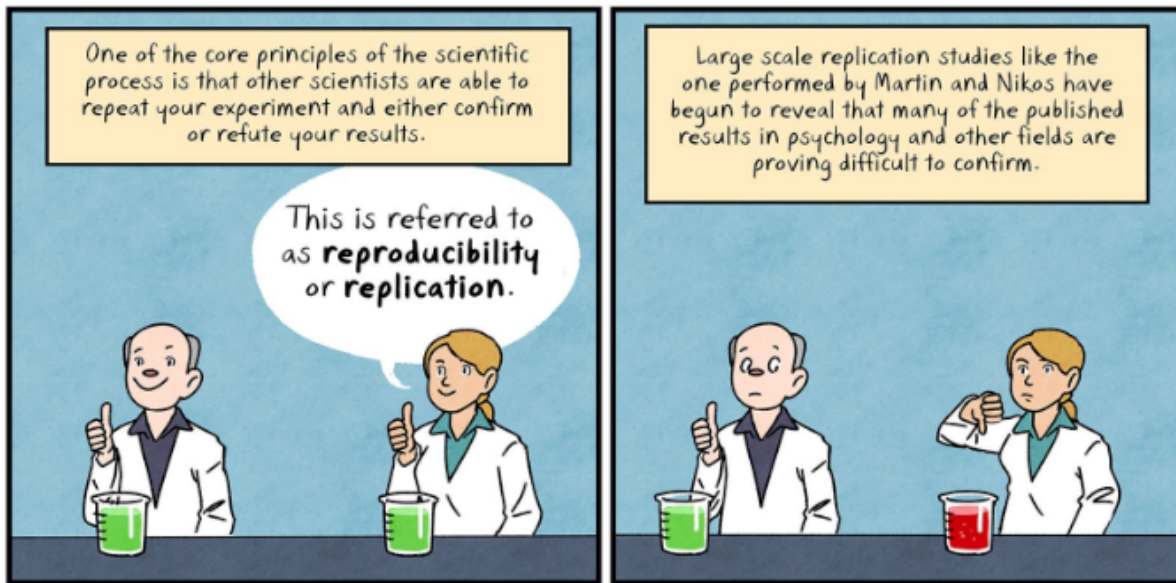
Why can't anyone replicate the scientific studies from those eye-grabbing headlines?

by [Maki Naro](#)

Posted October 6th, 2016



PSYCHOLOGY'S REPRODUCIBILITY PROBLEM



TEXT ONLY:

[Repeat After Me](#) Why can't anyone replicate the scientific studies from those eye-grabbing headlines? by [Maki Naro](#)
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A popular concept in psychology is that your self-control is a limited resource that can be worn down. Called ego-depletion, the idea has been enjoying success in the literature for over a decade now. But when Martin Hagger and Nikos Chatzisarantis at Curtin University in Australia gathered over two thousand participants across 23 labs to repeat a seminal ego-depletion experiment they found ... Nothing. Zip. Nada

One of the core principles of the scientific process is that other scientists are able to repeat your experiment and either confirm or refute your results. This is referred to as **reproducibility** or **replication**. Large scale replication studies like the one performed by Martin and Nikos have begun to reveal that many of the published results in psychology and other fields are providing difficult to confirm.



But only a **third** of the attempts led to the same statistically significant result as found in the original study.



TEXT ONLY:

In one of the most disappointing examples ... 270 authors set out to repeat 100 studies ... in a collaboration called The Reproducibility Project: Psychology.

But only a third of the attempts led to the same statistically significant result as found in the original study.

Psychologists have come to refer to this phenomenon as ... "Replication Crisis."

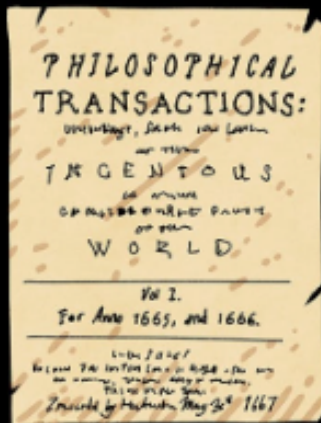
In order to try to understand how such an important step in the scientific process is slipping through the cracks, we have to go back to the thing that made replication possible: Scientific Journals.

Before the advent of journals, early scientists often conducted their research in secret, out of fear that a competitor would steal their work.



Galileo famously resorted to publishing his research in code.

It wasn't until 1665, that the **Royal Society** began collecting research and publishing it in journals.



In the beginning members would actually go out to examine lab equipment and experiments first-hand.



To this day, the Society's motto is "**nullius in verba**" or "**take nobody's word for it**".

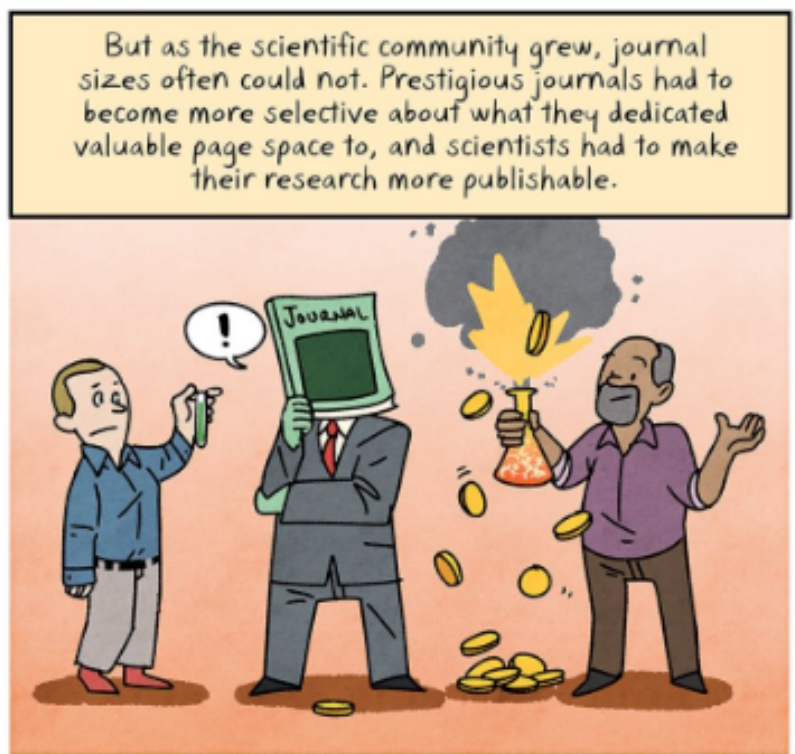
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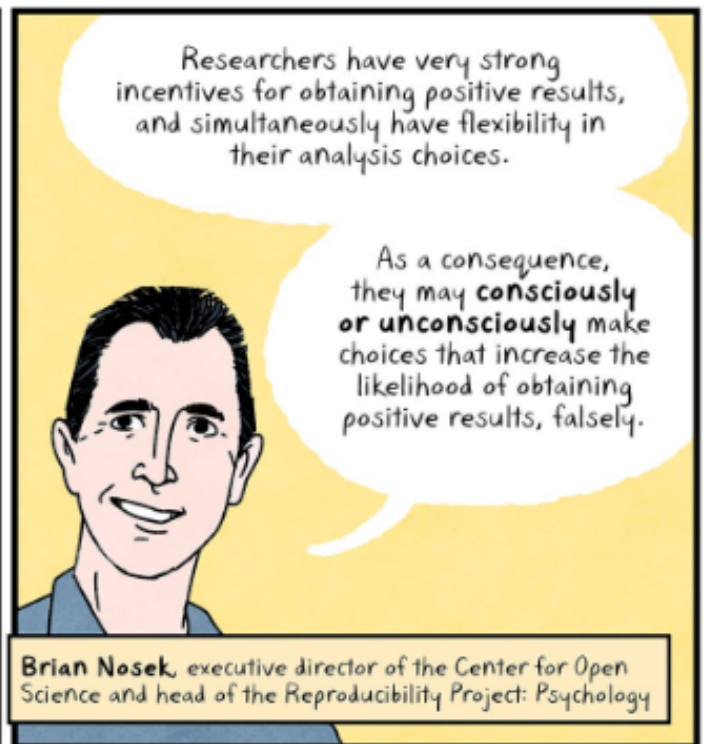
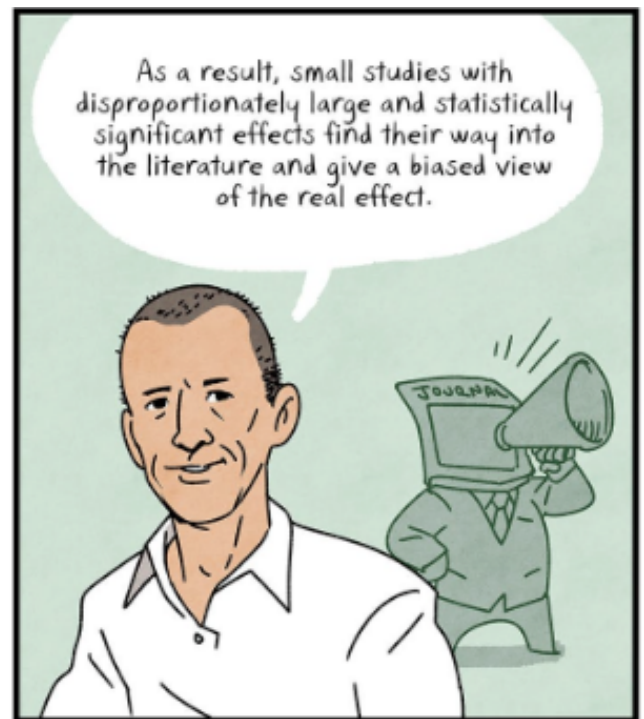
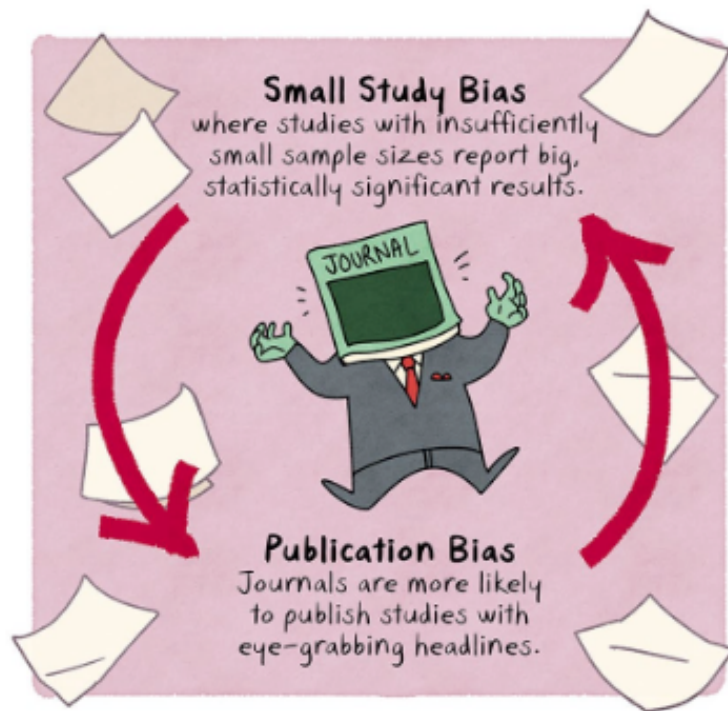
In his replication study, Martin described how this tendency can lead to the publication of studies with insufficient sample sizes:

TEXT ONLY: The idea was that an independent researcher could read about your work and repeat the experiment for themselves. In a way all those experiments you do in school are exercises in reproducibility.

But as the scientific community grew, journal sizes often could not. Prestigious journals had to become more selective about what they dedicated valuable page space to, and scientists had to make their research more publishable.

Simine Vazire, editor of several scientific journals and founder of the Society for the Improvement of Psychological Science, [says] "Scientists are human, and they respond to rewards. We are rewarded for publishing many papers, in top journals. The top journals pretty much only publish results that are statistically significant and that tell a good story.

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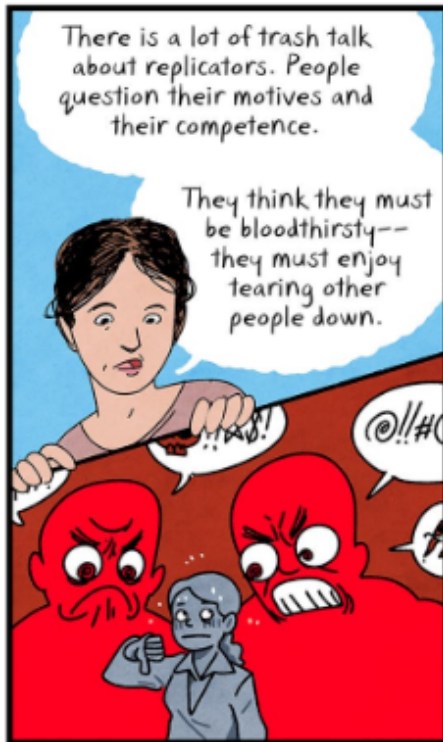
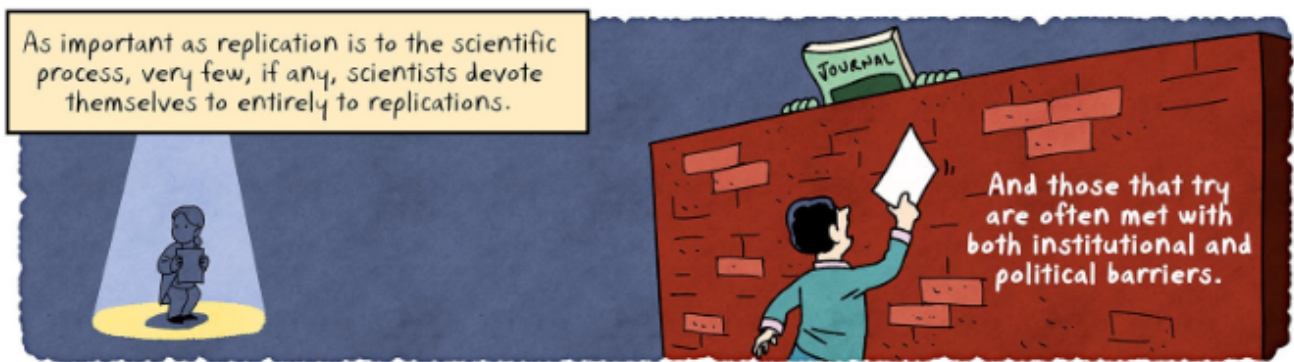


TEXT ONLY: **Small Study Bias**, where studies with insufficiently small sample sizes report big statistically significant results. **Publication Bias**, where journals are more likely to publish studies with eye-grabbing headlines.

As a result, small studies with disproportionately large and statistically significant effects find their way into the literature and give a biased view of the real effect.

Scientists may also unknowingly do things like "**p-hacking**" or "**HARKing**" (Hypothesis After Results Known). P-Hacking is the process of running data through many different statistical analyses with the goal of finding the desired result.

Brian Nosek, executive director of the Center for Open Science and head of the Reproducibility Project: psychology, [says] Researchers have very strong incentives for obtaining positive results, and simultaneously have flexibility in their analysis choices. As a consequence, they may consciously or unconsciously make choices that increase the likelihood of obtaining positive results, falsely."

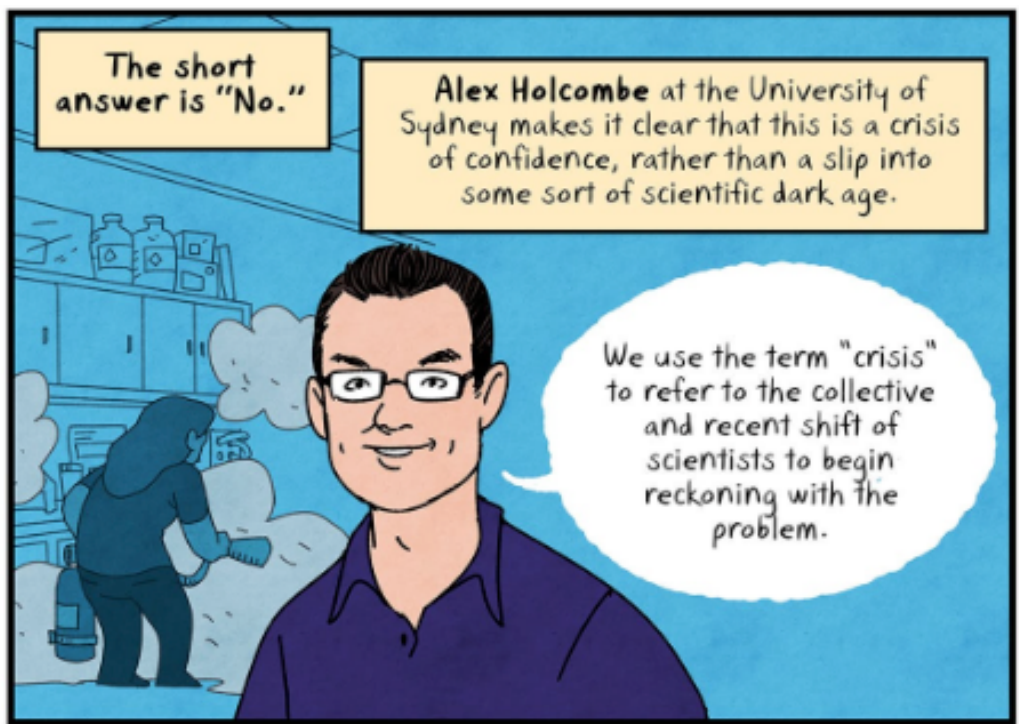


TEXT ONLY: As important as replication is to the scientific process, very few, if any, scientist devote themselves entirely to replications. And those that try are often met with both institutional and political barriers.

Simine Vazire [says] "There is a lot of trash talk about replicators. People question their motives and their competence. They think they must be blood thirsty – they must enjoy tearing other people down."

And while most original authors accept failed replications gracefully, scientific beefs between less polite authors and their replicators are not unheard of. In addition, journals often don't want to devote precious page space to replication studies. If they do, replication studies are often held to a much higher standard than the original study in order to protect the author's reputation.

Simine Vazire [says] "The idea that failed replications have the potential to cause great damage to the original authors' reputations, and so we should have a very high bar for publishing them – that seems problematic to me.



TEXT ONLY: Is this the end of science as we know it? The short answer is "No." Alex Holcombe at the University of Sydney makes it clear that this is a crisis of confidence, rather than a slip into some sort of scientific dark age.

"We use the term 'crisis' to refer to the collective and recent shift of scientists to begin reckoning with the problem. The idea that fewer than half of results are published (many of which were heavily covered by the media) are actually true is very dismaying. But the more optimistic interpretation of failures to replicate is that many of the results are true, but human behavior is so variable that the original researchers had to get lucky to find the result."

Even Martin is confident despite his findings. "This study certainly raises important questions. I think ego-depletion effect is probably real, but current methods and measures are problematic and make it difficult to find."

But as anti-vaccination movements, climate change denial, and alternative medicine gain steam, it's easy to see how this might shake people's confidence.



Many scientists, including Simine, stress the need for transparency as a way to improve replication, regain public trust in science, and also take the wind out of anti-science movements.

She recently founded the **Society for the Improvement of Psychological Science**, with the aim of taking an empirical approach to scientific self-correction.



If scientists show that they want to make the basis for their claims open and accessible...

...and that those claims stand up to scrutiny by the scientific community, even with full disclosure of all steps in the research process...

...the public will have more reason to trust scientists.

As things stand, we scientists should all feel red in the face.

But despite these problems, **science remains our most secure route to the truth.**

And many scientists have leapt into action to address the problem.



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[Alex]: "As things stand, we scientists should all feel red in the face. But despite these problems, science remains our most secure route to the truth. And many scientists have leapt into action to address the problem."

Just as the first journals made major strides in accessibility and openness, so too does the current Open Science movement, utilizing modern tools in order to improve credibility and bring the scientific process up to speed.

Alex was a founding board member of what has become the world's largest scientific journal, PLOS ONE.



PLOS differs in that it does not select what papers to publish based on perceived importance, but rather on **methodological rigor**.



This emphasis on methodology over interest of the results has helped address the replication crisis by making it easier for scientists to publish replications and non-replications.

And unlike conventional journals, which are often gated behind paywalls, PLOS ONE is **accessible to the public**.

For people like me, who have no academic connections, this is huge!

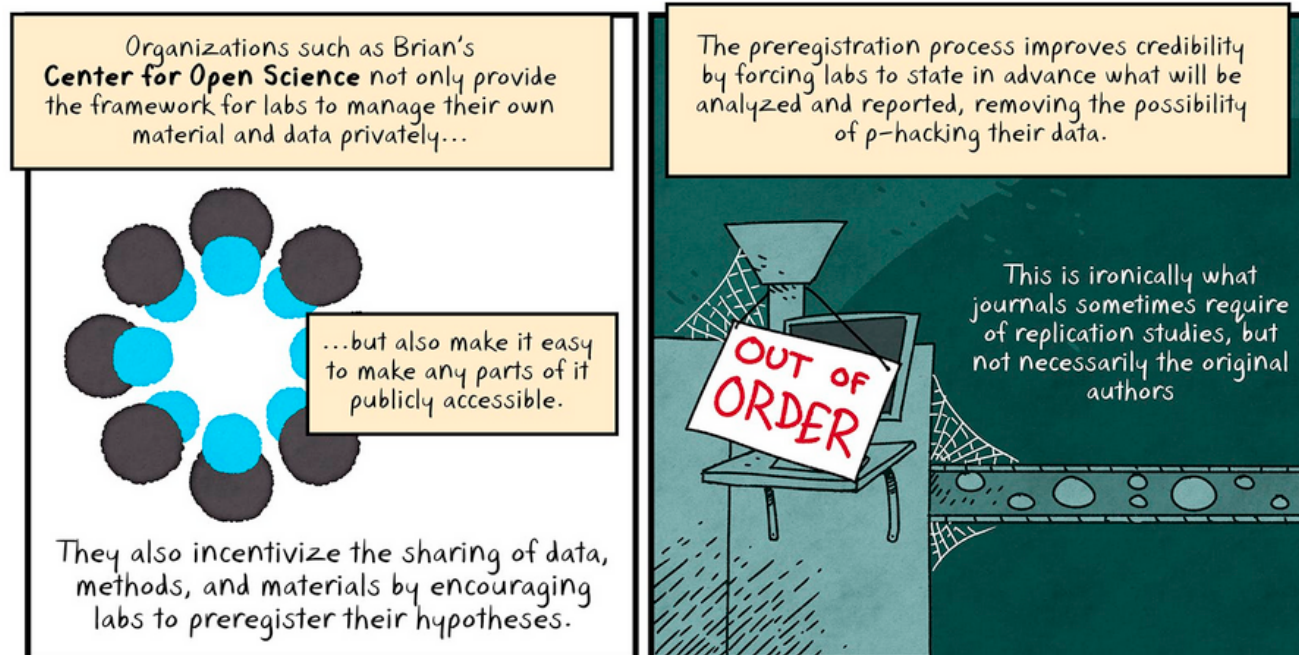


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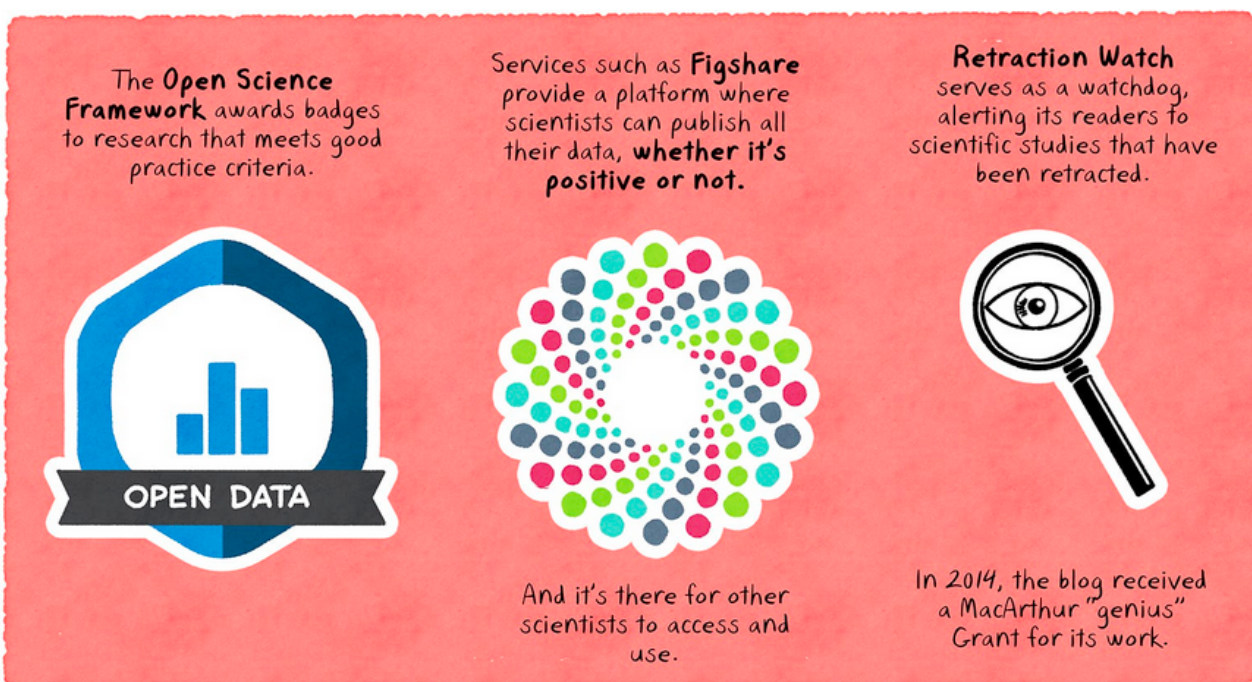
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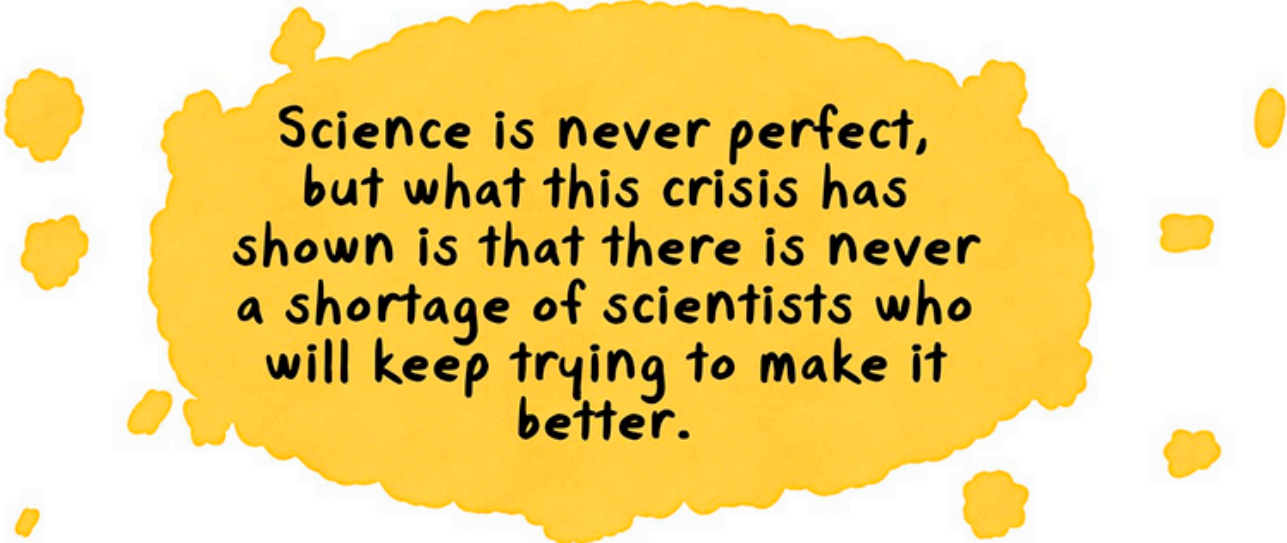


TEXT ONLY: Organizations such as Brian's Center for Open Science not only provide the framework for labs to manage their own material and data privately ... but also make it easy to make any parts of it publicly accessible. They also incentivize the sharing of data, methods, and materials by encouraging labs to preregister their hypotheses. The preregistration process improves credibility by forcing labs to state in advance what will be analyzed and reported, removing the possibility of p-hacking their data. The Internet has proven to be a fertile ground for all sorts of resources.

The **Open Science Framework** awards badges to research that meets good practice criteria.

Services such as **Figshare** provide a platform where scientists can publish all their data, **whether it's positive or not.** And it's there for other scientists to access and use.

Retraction Watch serves as a watchdog, alerting its readers to scientific studies that have been retracted. In 2014, the blog received a MacArthur "genius" Grant for its work.



Science is never perfect,
but what this crisis has
shown is that there is never
a shortage of scientists who
will keep trying to make it
better.

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