Big Idea for a Big Challenge: Influencing Reproducibility on an Institutional Scale

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Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

Summary

There is increasing concern that most current published research findings are false. The probability that a research claim is true may depend on study power and bias, the number of other studies on the same question, and, importantly, the ratio of true to no relationships among the relationships probed in each scientific field. In this framework, a research finding is less likely to be true when the studies conducted in a field are smaller; when effect sizes are smaller; when there is a greater number and lesser preselection of tested relationships; where there is greater flexibility in designs, definitions, outcomes, and analytical modes; when there is greater financial and other factors that influence this problem and some corollaries thereof.

Modeling the Framework for False Positive Findings

Several methodologists have pointed out [9–11] that the high rate of nonreplication (lack of confirmation) of research discoveries is a consequence of the convenient, yet ill-founded strategy of claiming conclusive research findings solely on the basis of a single study assessed by formal statistical significance, typically for a p-value less than 0.05. Research is not most appropriately represented and summarized by p-values, but, unfortunately, there is a widespread notion that medical research articles is characteristic of the field and can vary a lot depending on whether the field targets highly likely relationships or searches for only one or a few true relationships among thousands and millions of hypotheses that may be postulated. Let us also consider, for computational simplicity, circumscribed fields where either there is only one true relationship (among many that can be hypothesized) or the power is similar to find any of the several existing true relationships. The pre-study probability of a relationship being true is $R/(R + 1)$. The probability of a study finding a true relationship reflects the power $1 - \beta$ (one minus the Type II error rate). The probability of claiming a relationship when none
Lies, Damned Lies, and Medical Science

Much of what medical researchers conclude in their studies is misleading, exaggerated, or flat-out wrong. So why are doctors—to a striking extent—still drawing upon misinformation in their everyday practice? Dr. Ioannidis has spent his career challenging his peers by exposing their bad science.

Is Science Broken?

Or is it self-correcting?

Problems with scientific research

How science goes wrong

Scientific research has changed the world. Now it needs to change itself

The Truth Wears Off

Is there something wrong with the scientific method?

Biomedical researchers lax about validating antibodies for experiments

Failure to test common research component could undermine reproducibility of results

Dutch Cell Culture Contamination Renders Six-decades Worth of Studies False

Unreliable research

Trouble at the lab

Scientists like to think of science as self-correcting. To an alarming degree, it is not

Many Psychology Findings Not as Strong as Claimed, Study Says

By Benedict Carey  Aug 27, 2015

A Credibility Crisis in Food Science

The fall of a prominent behavioral scientist tells of a system where research is judged not on merit, but on the attention it gets.
Amid a Sea of False Findings, the NIH Tries Reform
When in doubt, educate
Step 1:

Be completely surprised that your grant application for a conference was funded.
Step 2: Figure out how to spend the funds.
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SUBMIT A POSTER PROPOSAL

The Research Reproducibility Conference poster session will showcase cutting-edge research and works-in-progress in pursuit of making research reproducible.

Presenting a poster is a great opportunity, especially for students and new researchers, to obtain interesting and valuable feedback on ongoing research from conference attendees.

More info at: campusguides.lib.utah.edu/UtahRR18/proposal
Eccles Health Sciences Library
@EHSLibrary

To ask any questions from the live stream use slido.com with the code #N673 #UtahRR18 #MakeResearchTrue #Reproducibility #medlibs #datalibs

No 1. Crowdsourcing Platform for Events and Meetings.

Slido - Audience Interaction Made Easy
Slido is an audience interaction tool for meetings, events and conferences. It offers interactive Q&A, live polls and insights about your audience.

Science is Unreliable. What Can We Do About It? #UtahRR18 #MakeResearchTrue healthcare.utah.edu/the-scope/show ...
Event summary report
2018 Research Reproducibility Conference: Building Research Integrity Through Reproducibility

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<th>Questions</th>
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<td>Likes / dislikes</td>
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<td>3.1</td>
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Popular questions

Ed Dudek
15 Jun, 4:49pm
Comment on: The elephant in the room is that reproducibility and rigor receive little or no consideration (compared to innovation and "high profile") by recruitment and tenure committees and grant review panels.

Anonymous
15 Jun, 8:44pm
How can undergrad/grad lab members encourage reproducible practices in labs with less than willing PIs?

Anonymous
15 Jun, 3:21pm
Do you see the culture found in many scientific fields to publish original,
It was great! I look forward to the next one! I'd love to see this annually rather than every 2 years!
I loved [Dr. Stodden]'s talk. It made me think about challenging questions I hadn't thought of before and redefined the question of reproducibility for me in a really eye-opening way.
It is actually a tough problem. It can't be solved unilaterally by U of U without adverse consequences to the status of U of U (i.e. through the reduction of overall publication volume). So, tracking what other universities are doing and keeping pace will probably produce a practical outcome.
I thought the Research Integrity and Journal Publishing panel was the best panel, in part because of the personalities of the panelists, but also the way the audience questions were answered, and how well the panel covered the questions many of us have regarding publishing manuscripts.
Panel 3 focused on too much of the "big hitter" items and they were not prepared to have a discussion on the small issue of reproducibility that affect most people. The vast majority of scientists are not blatantly falsifying or plagiarizing, but they are making small tweaks to data or arguments that make it "mostly" ok. Also the issue of superiority and power- struggle in science affects the ability to stand up for integrity of research was touched on but no one has any answers for this and it makes me frustrated that that conversation is too hard to even have in a panel like this one.
Thank you for making this discussion happen. It is important and uplifting to know that people out there care about scientific integrity when PIs are under so much pressure to publish or perish. It is hard as a student to see that there are people in the academic world trying to do the right thing and ask the hard questions about what we need to do going forward as a field. I just wish more people cared.
The poster session seemed to have several people that had to catch flights before it finished. Having the session at the beginning of the conference might be better.
Did we achieve institutional change?

Not yet. But it’s a start.
Funders & Support

• We’d like to thank our funders for #UtahRR18:
  • Office of Research Integrity: Department of Health and Human Services (ORIIR170034)
  • Vice President for Research Office, University of Utah
  • Center for Clinical and Translational Science, University of Utah (UL1TR001067)
  • Spencer S. Eccles Health Sciences Library, University of Utah
  • Department of Philosophy, University of Utah
  • MidContinental Region of the National Network of Libraries of Medicine (UG4LM012344 Subaward)
More Resources


• Research Reproducibility 2018: Building Research Integrity Through Reproducibility: [https://www.youtube.com/watch?v=OVeUcLRWaq4](https://www.youtube.com/watch?v=OVeUcLRWaq4)


• Rethlefsen ML. Research reproducibility and open science: [https://video.dartmouth-hitchcock.org/media/Research+Reproducibility+and+Open+Science/1_8p0d4rf](https://video.dartmouth-hitchcock.org/media/Research+Reproducibility+and+Open+Science/1_8p0d4rf)
Thank you! Questions?

@tishamentnech
@DBaluchi
@mlrethlefsen
@mellanye
@HeidiGreenberg
@zhao_shirley

#MakeResearchTrue