Driving Force

Share |

The 'irreproducibility' problem

May 1, 2013 | Author:Summer Allen, Graduate and Postdoc, Brown University

Scientific studies often can't be reproduced. This is highly problematic for both academic and industry scientists whose work requires them to build on published studies. But what should we do about the so-called irreproducibility problem? Two websites are trying to face this issue head on.

Before discussing these websites' solutions, I'll tell you a bit more about the problem. Data irreproducibility plagues scientists across disciplines. Scientists at the pharmaceutical company Bayer failed to fully replicate two-thirds of the preclinical studies they tried to repeat (Amgen scientists report similar replication difficulties). In a different corner of science, two groups failed to reproduce NASA's arsenic bacteria finding. Psychologists are also struggling with replication. To top it all off there is this 2005 essay: Why Most Published Research Findings Are False.

Why do so many findings in published (and peer-reviewed) articles fail to hold up to further scrutiny and replication? Carl Zimmer's piece last year in Slate gets into some of the cultural forces at play here. Some cases may be due to poor experimental design. Other times "scientists may unconsciously ignore their own negative evidence and focus on the findings that provide a positive result" or they may have come across their positive result simply by chance. These first two points could apply just as easily to other scientists' replication attempts as to original studies -- even objective scientists trying to reproduce a study can fall victim to chance or poor design and execution. But there is also an incentive structure in scientific publishing that rewards positive findings and discourages both the reporting of negative findings and reporting on the reproducibility or irreproducibility of previously published findings.

So what can be done about the irreproducibility problem? Two websites are trying different approaches. PsychFileDrawer is an online archive where experimental psychologists can deposit their attempts to replicate published studies. It also provides a forum for discussion about why a particular study may have been difficult to replicate. This website is a great idea and is pretty fascinating to peruse even if you're outside the field. I hope it picks up more traction because I would love to see if some more of their top 20 articles are replicated (some of these are headline grabbing studies like "Seeing subliminal smile-faces makes people drink more kool aid; seeing frown-faces makes them drink less.")

PsychFileDrawer is useful for experimental psychologists who have already tried to replicate a published study, but what about the rest of us? What about experiments that are costly to reproduce? And can labs with little time or money do these replications when there isn't much incentive to do so? This is where the Reproducibility Initiative could help. The goal of this program is to match interested researchers with an independent research group that will attempt to reproduce the researchers' study. The original researchers may then publish the independent groups' findings in the PLOS ONE Reproducibility Collection. According to the site, prominent journals, including Nature, will provide links to the PLOS publication from the original study. The idea is that this will enhance the original study's credibility.

The problem with this approach is that someone must fund the independent replication experiments. Right now researchers can pay to have their experiments independently validated if they have the funds. The Reproducibility Initiative is also soliciting money from charitable, public, and commercial funding bodies to repeat the experiments of researchers who cannot afford the service (as of now, 1,892 researchers have said they would like to be part of this 'opt-in' group). There is some hope that government funding agencies like the NIH will provide funds for this service, although that seems less likely in this time of bare-bones budgets.

Both PsychFileDrawer and the Reproducibility Initiative are in their early days, but they are attempting to meet a really important need in the scientific community. I will be curious to see if either of them catches on enough to change the culture of reproducibility.

Most Emailed | Most Commented

Last 24 hours This Week This Month

No results found

Categories

- Science Policy (317)
- K-12 Education (138)
- Undergraduate Education (112)
- International Co-operation (86)
- Human Rights (30)
- Public Engagement (153)
- Evolution (66)
- Climate Change (91)
- Energy (65)
- Medicine (163)
- Workforce Development (125)
- Career Development (138)
- Diversity (77)
- Communicating Science (192)
- Biology (168)
- Chemistry (34)
- Earth Sciences (34)
- Engineering (50)
- Physics (43)
- Social Sciences (26)

Copyright © 2013. American Association for the Advancement of Science. All rights reserved. Read our privacy policy and terms of use. Contact info.