



The Problem of Irreproducibility in Scientific Experimentation: Is there a “Replication Crisis”?

According to a widespread perception, scientific activity today is facing a so-called “replication crisis”. A large number of seemingly groundbreaking findings published in leading scientific journals, such as *Nature* and *Science*, have turned out to be invalid or highly questionable, and in recent years, many papers have been retracted. It is estimated that more than half of the experimental results (Ioannidis 2005) - some claim the percentage is over 70% - published in journals of medicine, biology, economics, clinical medicine, and other fields are inflated and difficult to replicate.

This development comes at a time when even well-established scientific facts, regarding, for instance, man-made global warming or vaccination, are being questioned for political reasons. The ongoing controversy about the reproducibility of scientific results threatens to undermine the authority of science. The extent and severity of the “replication crisis” are being continuously discussed in the literature. It seems, however, that these discussions, rather than revealing the existence of a fatal flaw at the heart of modern scientific practice, show that our general understanding of the complexities concerning the replication and reproducibility of experimental findings and experimental methods is rather limited. The failure to replicate can be a result of scientific fraud, insufficient scientific methods, failure to adhere to good standards of research or the consequence of flawed publishing practices. The different causes of irreproducibility – such as poor use of statistics, selective reporting, pressure to publish, flawed peer-

review practices, poorly described methods, incompletely reported data, financial and other interests, biased reasoning and prejudices, outright scientific fraud – each suggest different reforms. Addressing the problems of replication and their causes is crucial for suggesting appropriate reforms.

Our international and interdisciplinary workshop brings together scientists, historians, and philosophers to reflect on the current controversies about the replication of scientific research. The workshop is organized by the *Jacques Loeb Centre for History and Philosophy of, and Critical Dialogues in, the Life Sciences*. The workshop will take place on 14 March 2022, at Ben-Gurion University of the Negev in Beer Sheva, Israel.

The overall goal will be to understand in more detail the nature of experimental replication and its failures, both in the traditional Baconian sense and in the sense of statistical testing, which has recently become prevalent. The workshop will also address the following questions:

- Does the current failure to replicate scientific findings represent a crisis?
- To what extent are the recent failures to replicate due to the mindless, mechanical use of statistical testing? (Gigerenzer 2018)
- Should the failure of replication be regarded as part of scientific advance that is usually self-corrected in science?
- What does it mean to replicate an experimental procedure and an experimental result?
- What is the epistemic importance of replication?
- How does replication compare with other methodological strategies that scientists use to confirm and validate their experimental procedures and results?
- How do the answers to these questions differ across disciplines and how have they changed over time?