

Week 10: Popular Articles

The two articles here concern various kinds of medical and psychological studies and the general failure of replication

a) The Truth Wears Off, Jonah Lehrer, (*New Yorker*), December 13, 2010

This is the Jonah Lehrer who was fired from his job as a *New Yorker* staff writer for his making up Bob Dylan quotes in a book he wrote.

Generally, this article deals with replication failures and the “decline effect” (“what we have here is failure to replicate”)

From Wikipedia:

The decline effect may occur when scientific claims receive decreasing support over time.

The term was first described by parapsychologist Joseph Banks Rhine in the 1930s to describe the disappearing of extrasensory perception (ESP) of psychic experiments conducted by Rhine over the course of study or time. The term was once again used in a 2010 article by Jonah Lehrer published in *The New Yorker*.

One of the explanations of the effect is regression toward the mean (this is a statistical phenomenon happening when a variable is extreme on the first experiments and by later experiments tend to regress towards average), although this does not explain why sequential results decline in a linear fashion, rather than fluctuating about the true mean as would be expected.

Another reason may be the publication bias: scientists and scientific journals prefer to publish positive results of experiments and tests

over null results, especially with new ideas. As a result, the journals may refuse to publish papers that do not prove that the idea works. Later, when an idea is accepted, journals may refuse to publish papers that support it.

In the debate that followed the original article, Lehrer answered some of the questions by claiming that scientific observations might be shaped by one's expectations and desires, sometimes even unconsciously, thus creating a bias towards the desired outcome.

A significant factor contributing to the decline effect can also be the sample size of the scientific research, since smaller sample size is very likely to give more extreme results, suggesting a significant breakthrough, but also a higher probability of an error. Typical examples of this effect are the opinion polls, where those including a larger number of people are closer

to reality than those with a small pool of respondents. This suggestion would not appear to account for the observed decrease over time regardless of sample size. Researcher John Ioannidis offers some explanation. He states that early research is usually small and more prone to highly positive results supporting the original idea, including early confirmatory studies. Later, as larger studies are being made, they often show regression to the mean and a failure to repeat the early exaggerated results.

Funnel plots (from Wikipedia):

A funnel plot is a useful graph designed to check the existence of publication bias in systematic reviews and meta-analyses. It assumes that the largest studies will be near the average, and small studies will be spread on both sides of the average. Variation from this assumption can indicate publication bias.

Selective reporting: confirmation bias; cherry-picking the best; not surprising it doesn't cross-validate ("regression toward the mean" idea)

Publication bias: only positive things tend to get published so the publication process cherry-picks as well; for example, in clinical trials only publishing the successful ones; this has led to suggesting that all clinical trials be registered.

John Ioannides is mentioned in Lehrer's article: he published "Why Most Published Research Findings Are False"

Jonathan Schooler is a main figure in Lehrer's article; he studied "verbal overshadowing", or "asking people to put their perceptions into words leads to dramatic decreases in performance"

File-drawer problem (from Wikipedia):

Publication bias is also called the file drawer problem, especially when the nature of the bias is that studies which fail to reject the null hypothesis (i.e., that do not produce a statistically significant result) are less likely to be published than those that do produce a statistically significant result.

b) Lies, Damned Lies, and Medical Science, David H. Freedman, (*The Atlantic*), November 2010

This is a piece on John Ioannidis, who is now at Stanford (joint between statistics and medicine)

Ioannidis has an emphasis on the failure to replicate medical studies: “90% of medical studies are seriously flawed”

In his push for evidence-based medicine, he has become Mr. Meta-analysis