Why Most Published Research Findings Are False

In this paper John et al. discussed how factors affect the probability of a research finding being true. He used PPV(positive predictive value) to model false positive findings, and discussed it in bias and multiple independent teams participating in the test. Based on the above discussion, six inferences are put forward.

1. The smaller the sample size of a scientific field, the less likely the research findings are to be true.

2. The smaller the standardized mean difference between the experimental group and the control group (effect sizes) in a scientific field, the less likely the research findings are to be true.

3. In a scientific field, the more the number of tested relationships and the fewer the number of choices, the less likely the research findings are to be true.

4. In a scientific field, the greater the flexibility of design, definition, results, and analysis modes, the less likely the research findings are to be true.

5. The more the researcher studies for financial or other benefit purposes, the less likely the research findings are to be true.Promotion pressure and commercial sponsorship may affect academic integrity.

6. The more popular the research direction, the lower the authenticity of the research findings.When a large number of teams are competing in the same field, fast moves and sensational headlines become more important than reliable findings.

Then the John et al. come up with two conclusions.

1. For most research designs and for most fields, most research findings are wrong.

2. Many of the findings may be just a measure of noise in areas where there is no real science. Also known as "null fields".

Finally John et al. proposed some solutions to improve the situation.

This very provocative article with personal views is intended to stimulate readers to think about their current research work and re-position themselves.

Take an example of how business interests affect science.The Sugar Research Foundation (SRF, renamed the International Sugar Research Foundation, or ISRF, in 1968) funds animal research on the effects of sucrose on cardiovascular health.When evidence suggested a possible link between sugar and heart disease and bladder cancer, the foundation pulled the plug on the project without publishing the results.The SRF even secretly sponsored a 1967 commentary debunking the link between sugar consumption and coronary heart disease.[i] And claimed: "There is no reliable link between sugar intake and cancer.". But those in the sugar industry know that animal research supports the link and stopped funding research half a century ago to protect their commercial interests.[ii] This is a clear example of how business control science. This manipulation of research is similar to that of the tobacco industry, which greatly damages the credibility of capital-funded research in the sugar industry and makes it insufficient to support its academic integrity as a reference source for public policy making.

In order to make more research results more authentic and reliable, we can take the following methods:

1. Large-scale collaborative research. Multi-team cooperation to share data, methods, and reproducible practices.

2. Conduct research design, peer review, and report training for scientific researchers.

3. Strengthen the reproducibility requirements for published papers.

4. Improve the mechanism related to scientific research awards, funding, and promotion, and introduce

better personnel and capital flow strategies.

5. When evaluating scientific research results, investigate and understand the funding motives of various funders and stakeholders who have control over the scientific research activities.

Word count: 570

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[i] Cristin E. Kearns, Dorie Apollonio, Stanton A. Glantz. Sugar industry sponsorship of germ-free rodent studies linking sucrose to hyperlipidemia and cancer: An historical analysis of internal documents. 2017;11. https://doi.org/10.1371/journal.pbio.2003460

[ii] https://medicalxpress.com/news/2017-11-sugar-industry-withheld-evidence-sucrose.html