

AFTERWORD BY WILLIAM HAPPER

David Randall and Christopher Welser have done a service by drawing attention to the flood of shoddy “science” that has flooded journals, conferences, and news releases in recent decades. This is a bigger problem than it used to be, although perhaps not on a per-scientist basis. We have many more scientists today than we used to.

Science has always had problems with quality control. Some particularly bizarre examples were given by Irving Langmuir in his classic lecture, “Pathological Science,”¹⁷³ where he describes “N rays,” “Mitogenetic Rays,” etc. Langmuir gave a table that maps very well onto points made by Randall and Welser:

Symptoms of Pathological Science:

1. The maximum effect that is observed is produced by a causative agent of barely detectable intensity, and the magnitude of the effect is substantially independent of the intensity of the cause.
2. The effect is of a magnitude that remains close to the limit of detectability; or, many measurements are necessary because of the very low statistical significance of the results.
3. Claims of great accuracy.
4. Fantastic theories contrary to experience.
5. Criticisms are met by *ad hoc* excuses thought up on the spur of the moment.
6. Ratio of supporters to critics rises up to somewhere near 50% and then falls gradually to oblivion.

But Langmuir, a great scientist, was not immune to self-deception. As described in J. R. Fleming’s book, *Fixing the Sky*,¹⁷⁴ Langmuir was convinced toward the end of his career that he and his colleagues had succeeded in controlling the weather by seeding clouds with silver iodide. Dispassionate reviews of his experiments showed no statistical evidence that they had affected the weather in any way. Langmuir, a good mathematician with a deep understanding of statistics, was fully capable of applying statistical tests himself. He did not do so. Training young scientists more rigorously in statistics may not help as much as we would like to alleviate the irreproducibility crisis.

As Randall and Welser make clear, young academic scientists are under tremendous pressure to publish. Often what they publish makes little sense, but it helps to ensure the next pay raise or promotion. Academic management, with its fixation on publications and citations, has exacerbated the irreproducibility crisis. But even in government and industry, the number of publications is often an important career determinant.

Science that touches on political agendas has contributed more than its share of problems to the irreproducibility crisis. For many years, researchers willing to demonize carbon dioxide, low-level radiation, meat products, etc., have benefited from generous funding by governments and virtue-signaling private foundations. Consider, for example, the list of harmful effects of carbon dioxide, published by “scientists,” much of it in peer-reviewed journals.¹⁷⁵ Almost none of it is reproducible.

Many scientists think of themselves as philosopher kings, far superior to those in the “basket of deplorables.” The deplorables have a hard time understanding why scientists are so special, and why they should vote as instructed by them. More than two thousand years ago, Plato, who promoted the ideal of philosopher kings, also promoted the concept of the “noble lie,” a myth designed to persuade a skeptical population that they should be grateful to be ruled by philosopher kings.¹⁷⁶ Our current scientific community has occasionally resorted to the noble lie, a problem that can’t be fixed by better training in statistics. Noble lies are also irreproducible and damage the credibility of science.

By eloquently drawing attention to the problem of reproducibility of “scientific” results, and by proposing ways to address the problem, Randall and Welser have done science a big favor.

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