
Editorial

Show me the data

Lay public, writers and editors, and scientists alike want to believe that the data we read or see presented are “true” – free from error, manipulation, or spin. Sadly, as becomes more and more obvious, this is not always the case. *The Scientist’s* catalogue of retractions illustrates this amply. There are now so many retractions that *The Scientist* was moved to list 2010’s five most highly cited retracted papers, and the five “worst offenders”.¹ Is “scientific fraud” occurring more often, or are we just getting better at detecting it? According to a study published in the *Journal of Medical Ethics*, during the last 10 years in excess of 780 scientific papers have been retracted. Regardless of whether these retractions result from deliberate falsification or genuine error, the repercussions are grave, often curtailing the careers of those involved and possibly even affecting the scientific area as a whole.²

Why though, do a small minority of scientists falsify data? In his book *On Fact and Fraud – Cautionary Tales from the Front Lines of Science* David Goodstein lists three factors that have almost always been present in recent cases of fraud, and although these factors do not *per se* cause fraud, they do seem to be present when falsification occurs.³ Firstly perpetrators of fraud claim to be under “career pressure” – pressure to publish, and publish quickly. Clearly the need to succeed could be a motivating factor in fraud, but given that most scientists are under career pressure most of the time it does not explain why some scientists stray professionally while the vast majority do not. Secondly, scientists who commit fraud are usually convinced that they already know the answer to the problem, and so why bother to actually do the experiment properly when the results can more easily be hypothesized? Thirdly, as Goodstein points out, experiments are rarely repeated by others and, particularly in biology, are not exactly reproducible between subjects, thus leaving a lot of “wobble room” for massaged or even invented data.

In an ideal world fraud would be preventable by simple controls, but in a fast-moving and often high-profile research environment the pressure to publish results that have not been fully verified is high. Future research funding, careers, and professional profiles are all at stake. The suggestion that institutes should “quality control” the results issued from their laboratories is a good one, but it is not easy to imagine how this could be implemented,

or who should ultimately carry responsibility for policing the data. One could argue that ultimate responsibility for data integrity lies with principal investigators, and that they should make a written statement saying that all of the data has been verified. But, is examining every photomicrograph, FACS [fluorescent antibody cell sorting] plot, or statistical analysis that is associated with a research project a good use of their time, and who is to defend them against ambitious but dishonest post-doctoral fellows or students?

It would seem that there is no easy answer to detecting falsification, although clearly reviewers and editors have an important role in detecting duplications and alterations of images and data sets. In the end, the integrity of the research team as individuals and as a group is the key; without that, all data is meaningless.

Finally, it must be remembered that not all retractions are the outcomes of deliberate fraud. Take the recently reported events at the Jackson Laboratory – the authors of a study published in the *Journal of Immunology* in 2006 retracted their paper after realising that the wrong strain of mice had been used for a series of experiments, making the data uninterpretable in the experimental context.⁴ A single genuine mistake, which was repeated but not detected until it was too late, had devastating consequences.

Indeed, every retraction tells a different story.

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References

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- 4 Retraction Watch. 2011 January 7. <http://retractionwatch.wordpress.com/2011/01/07/authors-of-journal-of-immunology-paper-retract-it-after-realizing-they-had-ordered-the-wrong-mice/#more-1274>