

## Science Fraud <sup>[1]</sup>

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As scientists, we like to think that science is a bastion of virtue, untouched by science fraud.

The perception is that, other than junk science <sup>[3]</sup>, science should be beyond reproach, unsullied by lies and propaganda. Results should always be regarded as valid <sup>[4]</sup> and completely unbiased <sup>[5]</sup>.

Human nature dictates that scientists are human and are always going to be prone to bias and error <sup>[6]</sup>. Most such mistakes are subconscious, and a result of looking too hard for patterns that are not there.

Unfortunately, there are a number of more sinister cases, where scientists deliberately fabricated results <sup>[7]</sup>, usually for personal fame. With the advent of corporate and politically funded research grants, poor results are becoming more dictated by policy than by scientific infallibility.

## Some of the More Common Types of Science Fraud

There are many types of science fraud, from minor manipulation of results or incorrect causal connections to full-blown fabrication <sup>[7]</sup> of results and plagiarism <sup>[8]</sup> of the work of others.

There have been cases of researchers stealing the work of their students to obtain all of the credit and kudos.

There is a well-documented rumor of a scientific referee delaying the work of a rival, to ensure that he received the acclaim and a Nobel award. These allegations are often difficult to prove, as institutions often cover them up and try to sweep science fraud under the carpet.

Citations are one area of the scientific process <sup>[9]</sup> that is coming under increased pressure, especially with the easy availability of information on the internet.

A citation <sup>[10]</sup>, or reference, is supposed to credit past research that influenced the current research. Now, a bibliography <sup>[11]</sup> and list of works cited often becomes a list to impress, readers assuming that the longer the list, the better the paper <sup>[12]</sup>.

For example, most academics have had a tutor assign an essay and instructed them to use 'at least twenty references.' Most students then use 3 or 4 sources and throw in the other 16 to fill the quota, a problem in every academic area, not just science.

It is better to use a few reliable primary sources than rely upon secondary sources, all often saying the same thing. Supervisors and referees are becoming stricter about quality rather than quantity, so attitudes should slowly change.

Conversely, not citing the research of others, and stealing ideas, is another common science fraud. It is very easy to 'spin' the words of others, and pass it off as the researcher's own.

Most scientific papers, especially during the literature review [13], use other sources, but they need to be properly cited.

A related type of fraud is where supervisors and funding bodies, who had little direct involvement in the work, often appear in the title whereas lab assistants, typists and translators are missed out. To try to evade this practice, it is common to include an acknowledgements page [14], to avoid cluttering up the title too much.

## **Some Famous Science Frauds**

### **Dr. Hwang Woo Suk**

For those who remember, this South Korean announced, to a fanfare, that he had successfully cloned a dog, and also had some success in human cloning. This research was published, passed the tests and then he was subsequently suspected of fraud and ethical violations.

He withdrew the paper and, as yet, there is no consensus as to whether the fraud was deliberate or the result of a badly written paper.

### **The Piltdown Hoax**

This is probably one of the most famous science frauds of all time, which persisted for many years. A fossilized skull, apparently of the 'missing link' between apes and humans, was discovered in a quarry in Piltdown, Sussex, England. The find was taken to a distinguished paleontologist, Arthur Smith Woodward, head of the Geological Department at the British Museum.

He declared the find authentic, but almost straight away, questions were asked, and it gradually came to light that it was made up from bones of at least 3 hominid species, including the jawbone of an Orangutan with filed down teeth. Poor Woodward was the victim in this fraud, and his otherwise notable career became forgotten, his name forever linked with the fraud.

The perpetrators remain unknown, although the discoverer, Charles Dawson is suspected as an attempt to find fame and fortune.

## **Institutional Problems**

Institutions are often reluctant to discipline wrongdoers, ignoring it, quietly shifting the fraudster to another department or even disciplining the wrongdoer.

Science has a problem that people are reluctant to risk losing their careers to report science fraud [15].

The problem is that it is difficult for reviewers [16] to isolate flawed results without repeating the experiment themselves.

## The Grey Area

The problem is defining what fraud is and what is honest. Scientists, like anybody, can make genuine mistakes, or be a little eager to see a correlation amongst the randomness.

This is not really fraud, but experimental error [6], and it would be unfair to be overly critical about this process. Unfortunately, a scientist's wages and career are possibly on the line unless they produce results, and this crosses the line.

Another example of a grey area is in images. Scientists in cell biology, for example, would often use false color in an image to enhance areas, making it easier for their results to be seen.

With the increasing sophistication of graphics programs, there have been implications that this image enhancement has actually been used to manipulate images and show what is not there. Many scientific bodies now advise against enhancing images, because it leaves the researcher open to accusations.

## The Review Process – Is it Flawed?

The fact is that, despite a few high profile cases, the scientific peer review process [16] is fairly sturdy.

Reviewers pick out the worst of the fraud and replication of the experiment will pick out the aberrations and cases where genuine mistakes have been made.

A major shift in scientific beliefs does not happen with one paper, however groundbreaking the research. Hundreds of papers are required for the scientific community to accept something as 'proof'.

A paper selectively using a few citations [10] will eventually be caught out and copyscape and other tools are making it easier to detect plagiarism [8].

Journals are starting to encourage an acknowledgments page [14], where the many people contributing to the research can have some recognition, from the copywriter to the lab technician.

A far more sinister process than failures in the system is the increasing amount of private research funding in the quest for research grants.

The Global Warming debate is one area where the genuine science has been swamped in a sea of conflicting interest, and it has moved into politics rather than science. The quest for grants has led to the over exaggeration of the significance of proposals and often research

tied to areas with mass appeal, driving out pure science.

Scientists are paid according to the number of papers that they produce, and this leads to rushed and shoddy science, as well as discriminating against female researchers who take maternity leave or work part time to juggle bringing up children and work.

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