Fraud: Comparison among different fraudsters and their techniques

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Abstract
What is it about academic culture that makes it so conducive to committing fraud? This article will attempt to provide some insights into current academic culture and the particular characteristics of that culture that tempt those who function within it to commit fraud. Three prominent cases of fraud will be compared and contrasted with regard to their methods, how they were exposed, and why they started to commit fraud in the first place. First, the case of the physicist Jan Henrik Schön will be considered. Second, the recent case of the social psychologist Diederik Stapel will be examined. Third, the case of Yoshitaka Fuji, who published 172 articles based on research he never did, will be discussed. The goal of this article is to increase awareness of the propensity to fraud in current academic culture.

Keywords: fraud, academic culture, publish or perish, scientific misconduct.

Introduction

On November 28, 2012, the report *'Flawed science: the fraudulent research of social psychologist Diederik Stapel'* was released. In 2011, three PhD students of his had blown the whistle on him, because his data looked too good to be true (Levelt committee et al, 2012; Komter, 2012). Nine years before, in 2002, the physics world was shaken when it was revealed that German physicist Jan Henrik Schön had misrepresented the devices and materials he had based his career on. Although there had been several unsuccessful attempts to replicate his work, it was only when he publicized the exact same graphs for different variables in the same article that his fraudulent practices became apparent (Reich 2009). Most outrageous of all might be the case of the Japanese anesthesiology researcher Yoshitaka Fujiii, who in 2012 was found to have fabricated data in 172 papers (Koji Sumikawa, 2012). Suspicions had been raised a decade earlier, but were never seen as serious enough to warrant an investigation (Timmer, 2012; Koji Sumikawa, 2012).

These cases illustrate the rise in scientific misconduct over the last decade (Komter, 2012), a time in which science has grown more intense and competitive, one in which a 'publish or perish' culture prevails (De Rond & Miller, 2005; Heilbron, 2005). Science has become tainted by these developments and academic culture seems to be failing to register bad science. The rules and methodologies aren't as strictly obeyed in a culture characterized by quickness and efficiency. Or perhaps it is the case that scientific rules and codes of conduct were never made sufficiently clear, or the self-regulating ability of science has never worked properly (Reich, 2009).

A Series of articlas have been reviewed for this paper in order to provide an overview of information on the three cases and academic culture in general. The main question posed in this paper is: What in academic culture makes it conducive to commit fraud? First, there will be a brief explanation of fraud and scientific misconduct. Then, the three cases will be discussed, after which a picture of current academic culture will be provided. An attempt will be made to explain how it was

possible for fraud to remain undetected over the course of several years in each case.

What is fraud?

Fraud is the fabrication or falsification of research data and also includes plagiarism; the three practices are abbreviated as FFP. "Scientific misconduct" is a broader term and also includes questionable research practices (QRPs) such as data cooking, omitting contradictory evidence, rephrasing hypotheses until a positive result appears and falsely claiming credit as author or co-author (Heilbron, 2005). Research results show that 2 percent of all scientists commit FFP, and that between 34 and 37 percent of scientists engage in questionable research practices (Komter, 2012; Levelt committee et al, 2012).

Jan Hendrik Schön

In 2002 Schön was the most promising young physicist in the world. He worked at the renowned research facility of Bell Labs in the US. He had published eight papers in *Nature and Science* in 2001 alone on subjects such as physics, materials science and nanotechnology. He claimed to have: transformed the properties of materials by the application of an electric field; built high-performance transistors made of carbon-based materials; and described both the world's first electrical laser and the first ever light-emitting transistor. In addition, he claimed to have created the smallest transistor ever by wiring up a single molecule, and transformed materials into superconductors. In September of 2002 the managers at Bell Labs released a report that revealed that much of the data Schön reported was fake, and many of his devices had probably never even existed (Reich, 2009).

Schön had already committed fraud in his PhD research in Germany. He engaged in even more fraud when he worked in the demanding but relatively more permissive environment of Bell Labs (Reich, 2009). His motivation for engaging in scientific misconduct seems to have been his eagerness to achieve acceptance of ideas that he 'felt' were correct. The explanation he gave himself was that he didn't have enough time to do the research (Heilbron, 2005; Komter, 2012). Even after his exposure Schön remained convinced that he had done nothing wrong, that his ideas were right and he hoped he could become employed in scientific research again (Reich, 2009).

Schön revealed his fraudulent methods. He did his research backwards, starting with the conclusion he wanted and then contriving data to support this conclusion. These conclusions were always in accordance with predictions and expectations of other researchers in his field. For example; when a colleague suggested that he might be able to tune crystals into a superconducting state, Schön agreed, and produced the data. He always made sure to produce a smooth sweep of data, in order to dispel doubt of his reported conclusions (Komter, 2012; Reich, 2009).

Although there had been several scientists who had unsuccessfully tried to replicate Schön's work, it wasn't until Schön started to duplicate graphs that his fraud was noticed. None of the failures to replicate were ever published, which is why the fraudulent activity was discovered quite late. When many of his articles started showing the same graphs describing different variables and materials, an investigation into his publications was launched (Reich, 2009). It was found that most of Schön's research was fraudulent. Schön wasn't able to refute the accusations of fraud, because the laboratory logs weren't maintained properly and measurements had been deleted. Moreover, there were no witnesses to the experiments that Schön (alledgedly) preformed, because Schön claimed to have done the work alone (Heilbron, 2005).

The fraud committed by Schön was discovered rather late, because he was initially able to fabricate convincing data

to respond to those who challenged him. In addition, peer reviewers did not raise suspicions because they also found his data and explanations convincing. People simply had an excessive degree of trust in such a respected scientist working at a renowned research facility. It took a few whistle blowers to finally reveal the deception Schön had engaged in over a period of several years (Reich, 2009).

Diederik Stapel

Stapel, a social psychologist, began engaging in QPR very early in his career. In his later work at Groningen and Tilburg, he progressed to outright fraud. Stapel had three different ways of committing fraud. In his first method, research preparations were normal. He and his co-worker would think of everything that was needed for the experiment and calculate the ideal outcomes of the hypotheses. In the second phase of the research (i.e., the experiment or the creation of data) Stapel would work alone and made up data sets, which he then sent back to his colleague to be analyzed.

In a second way of committing fraud, Stapel would 'help out' his PhD students. After an experiment the PhD student who did research under Stapel's supervision would have a student fill in the data into a computer program. This data would then be sent first to Stapel, who would adjust the data according to the expectations the PhD student had formulated before the experiment. Afterwards the adjusted data would be sent to the PhD student so the PhD student would only have seen the adjusted outcomes of the data, and thus base his or her research on fraudulent data.

In his third method, Stapel would send fraudulent data to colleagues so that they could analyze it for their own research. He did this so that he could then claim co-authorship of the paper that was subsequently published (Levelt committee et al, 2012; Stroebe, 2012).

Stapel had two different ways of manipulating data. He would either work with real data, deleting outliers and supplying missing data, or he would just fabricate complete data sets. He almost always did the data collection and processing himself. Also, because Stapel worked at two universities, he could claim that he would do part of the research at the other university and then just not do it (Levelt committee et al, 2012).

Three of Stapel's PhD students blew the whistle on him in 2011. As a result, three committees were formed to conduct research into Stapel's entire work, at the universities of Amsterdam, Groningen and Tilburg. This was the first time that such a thorough investigation involving a case of alleged fraud was undertaken (Levelt committee et al, 2012).

Stapel's data had always been too good to be true, but his amiable character and his authority, as a respected researcher, made it unthinkable that he could have tampered with the data. Another factor that allowed Stapel's fraud to go undetected for so long was that he always conducted research with at least one other collaborator, but then did the data collection and processing alone. His published research thus always listed at least one co-author. Furthermore, there was never any high degree of oversight of Stapel's research and, in most of his publications, Stapel would remain vague about the methodology that he employed (Levelt committee et al, 2012).

Stapel himself says that he committed fraud because there were such high expectations of him, and because he had no time to properly conduct research. He has also written an autobiography in which he discusses the factors that led him to commit fraud (Stapel, 2012).

Yoshitaka Fujii

Fujii, a researcher in anesthesiology, produced a large body of research on postoperative nausea and vomiting over the course of two decades. Although three researchers expressed their skepticism about his work in 2000, no serious

investigation of possible fraud was conducted until 2012 (Timmer, 2012), when Fujii submitted a manuscript to the *Canadian Journal of Anesthesia* in which the editor found signs of plagiarism. The manuscript was withdrawn and the matter was brought to the attention of officials at Toho University where Fujii held a faculty position. What followed, as A. Marcus (2012) notes, was a struggle between the editors of the journal, who sought to expose Fujii's fraud, and representatives of Toho University, who wanted to limit the public damage to their institution (Marcus, 2012). When the university finally released a report about Fujii they did admit that he did not have proper Ethics Committee permission for some of his research. However, they did not issue any statement regarding whether he had engaged in fraud. At this point *Anaesthesia* published an article by John Carlisle on the probability of the outcomes of Fujii's research (Carlisle, 2012). This article, which showed that Fujii's randomized test results were highly improbable, led the Japanese Society of Anesthesiologists (JSA) to establish a Special Investigation Committee to investigate Fujii's work (Koji Sumikawa, 2012).

This Committee investigated the original research data, lab note-books and other relevant records at the institutions where Fujii had worked, and interviewed Fujii and the co- authors on his papers. All his papers were evaluated in terms of submitted original research data, records of use of animals, number of subjects, medication records, and the reliability of randomized controlled trials (RCT's). After this investigation, only 3 of Fujii's 212 papers were verified to be authentic, 172 were determined to be fraudulent and 37 papers were found to be of indeterminate status (Koji Sumikawa, 2012).

Fujii used different methods to cover up his fraud. First, he would act as if his papers were based on RCT's conducted in a double-blind manner, which enabled him to remain vague about his methods. Secondly, Fujii provided no specific information about where he had conducted the research, or on the Ethics Committee that supposedly would have had to approve on his project (Koji Sumikawa, 2012; Timmer, 2012). Thirdly, Fujii would add a lot of co-authors to his papers, a strategy that tends to add credibility to a study. He would enlist co-authors from different institutions, making it seem as if the papers where multi-hospital studies. Often those individuals listed as co- authors didn't even know that their names were being used. Fujii didn't ask for permission, and if journals required proof of the co-author's approval, Fujii would forge their signatures. Therefore, most co-authors have been cleared of blame (Marcus, 2012). Finally, Fujii hardly ever published in journals that specialized in anesthesia. Academics reading his work were thus not, for the most part, specialists in the subject, and therefore no objections were raised about Fujiis's research over the course of many years (Marcus, 2012; Timmer, 2012).

Fujii's published work helped him obtain public funding for his studies, an assistant professor position at the University of Tsukuba, and an associate professor position at Toho University. His body of work also enabled him to apply for the Academic Prize of Japanese Society of Anesthesiologists five times,(although he never won the prize) and to receive several grants for speaking at two sponsored seminars (Koji Sumikawa, 2012).

Academic culture

The aforementioned cases raise questions about the integrity of current academic culture. Particularly the case of Fujii, where suspicions where raised several times and an investigation was only undertaken after a journal had published proof of fraud, makes one wonder where current academic priorities lie; in preserving the image of the institution or in

preserving the integrity of research (Marcus, 2012).

Although different academic disciplines have different cultures and characteristics, some overall trends in current academic life that contribute to producing a culture in which fraud remains undetected will be considered in the following section (Komter, 2012).

'Publish or Perish'

The pressures of current academic culture are conducive to fraud. You need to publish to keep your 'H- Index' up, and one will be able to publish more if one commits fraud (Stroebe, 2012). The 'H-Index', or Hirsch' index, is a way to calculate both a researcher's productivity and the impact of his or her publications. It incorporates the amount of publications and the amount of citations of a researcher. "The index favors enduring performers that produce a continuous stream of papers with an above-average impact" (Bornmann, 2007). A low H-Index means little prospect of a flourishing academic career. Therefore a faculty member's career becomes a function of his or her success in publishing.

Adding to this is the competition for research funds (De Rond & Miller, 2005).

This competition for academic positions and funds comes at the expense of the quality of research, and often results in scientists not having sufficient time to check on what their colleagues are doing. As a result, there is no culture of mutual supervision.

Peer reviewing

In order to get one's articles published, one has to submit them to a review process. The peer reviewing system is designed to determine whether reported data supports an author's assertions, and to check for possible flaws in the research. The article's study design is evaluated, but peer reviewing doesn't determine whether the primary and raw data are true. There are many steps in processing the raw data, and there are many ways an investigator or data manager could change the data. So the peer reviewing system is unable to detect fraud, even though that is one of its functions (Vastag, 2006).

Publication bias

There is a current trend of 'publication bias', which means that negative or weak findings don't find their way into journals. Reviews are often more focused on a good story than on scientific accuracy. Editors and reviewers now ask for adjustments to or the removal of certain variables in the publication that don't support the hypothesis (Levelt committee et al, 2012). In addition, although one of the ground rules in research entails that other researchers should be able to replicate the experiments, and that the experiments therefore should be documented in such a detailed way that they can, meticulously detailed logs of methods aren't always included in publications, simply because of space limitations (Levelt committee et al, 2012).

In some disciplines, the phenomenon of "verification bias" seems to exist. This refers to the fact that research methods are used in a way that leads to negative results being repressed (Levelt committee et al, 2012). An example of publication bias would be the Schön case, where the scientists that failed at reproducing his work wouldn't publish their failures. This then resulted in a lot of other researchers trying and failing to replicate Schön's reported results (Reich, 2009). An example of verification bias would be Stapel's case, where the research reported a highly improbable amount of verified hypotheses (Levelt committee et al, 2012).

Hierarchy

Dependency on those with more power or prestige can lead to corruption. The kinds of problems that might arise from such a state of affairs include falsifying authorship, exploitation of junior

colleagues, and theft of ideas or data. Also, one's reputation as reliable researcher seems to free an academic of any kind of suspicion. The result is that renowned scientists are able to continually commit fraud with impunity (Komter, 2012).

In other words, the hierarchy of the academic world contributes to the impunity of well-known researchers. Reporting fraud is, under any circumstances, in itself no easy enterprise. Being suspected of fraud has considerable consequences for one's career. Therefore whistle blowers need to be absolutely sure about the fraud, and, more importantly, they need to have proof of the fraudulent practices. It is quite hard to provide proof for fraud, since the accused can say he had made a mistake or that he has already destroyed the relevant data (Komter, 2012). It is especially hard to blow the whistle on someone that you are dependent on, as was the case with the PhD students that provided the evidence that led to Stapel's exposure. The careers of these students are now compromised, because they were dependent for their PhD research on data Stapel had adjusted. (Levelt committee et al, 2012).

Conclusion

What in academic culture makes it conducive to committing fraud? From the literature on the subject we can derive that the pressure to publish in order to secure both an academic position and research funding is very high. One element of this state of affairs that has remained unconsidered so far is the psychological dimension of fraud. Schön and Stapel both seemed to have succumbed to high expectations, and both say they didn't have enough time to conduct research. Moreover Stapel admitted that he found it thrilling to commit fraud and that he was struck by how easy it was to do so (Stapel, 2012). In an environment with little or no supervision, (as is the case in a closed lab) the temptation to commit fraud will be even greater. The increased prestige that can be gained through committing undetected fraud is also obvious (Komter, 2012).

Another aim of this article was to include some considerations as to why fraud is possible. Part of the answer seems to be a culture of sloppy science. In other words, detection of fraud should not only depend on peer reviewers and editors of journals. The institutions where scientists work and their co-workers should also contribute to the prevention of fraud. The cases discussed in the present paper involve co-authors who weren't aware of the actions of the fraudsters. This highlights the fact that co-authors share in the responsibility for an article and should therefore make sure they know about the actions of the other authors.

One could argue that the current academic culture is no longer built upon the pure notion of science for the sake of knowledge. Instead, productivity and the quest for personal gain have become increasingly important (Reich, 2009; Burnman, 2007; Levelt committee et al, 2012; De Rond & Miller, 2005). Therefore less attention is paid to the procedural correctness of the actual data gathering and experiments on which the publications are based. As stated earlier, higher status often creates immunity from suspicion (Reich, 2009; Levelt committee et al, 2012; Heilbron, 2005). The consequences of being accused of fraud are considerable. The three researchers in the cases reviewed here have all been fired and will probably never work in science again. The level of suspicion necessary to lead to an actual report of suspected fraud is very high. This means that many who suspect fraudulent activity will simply choose to keep mum (Levelt committee et al, 2012; Heilbron, 2005; Reich, 2009).

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