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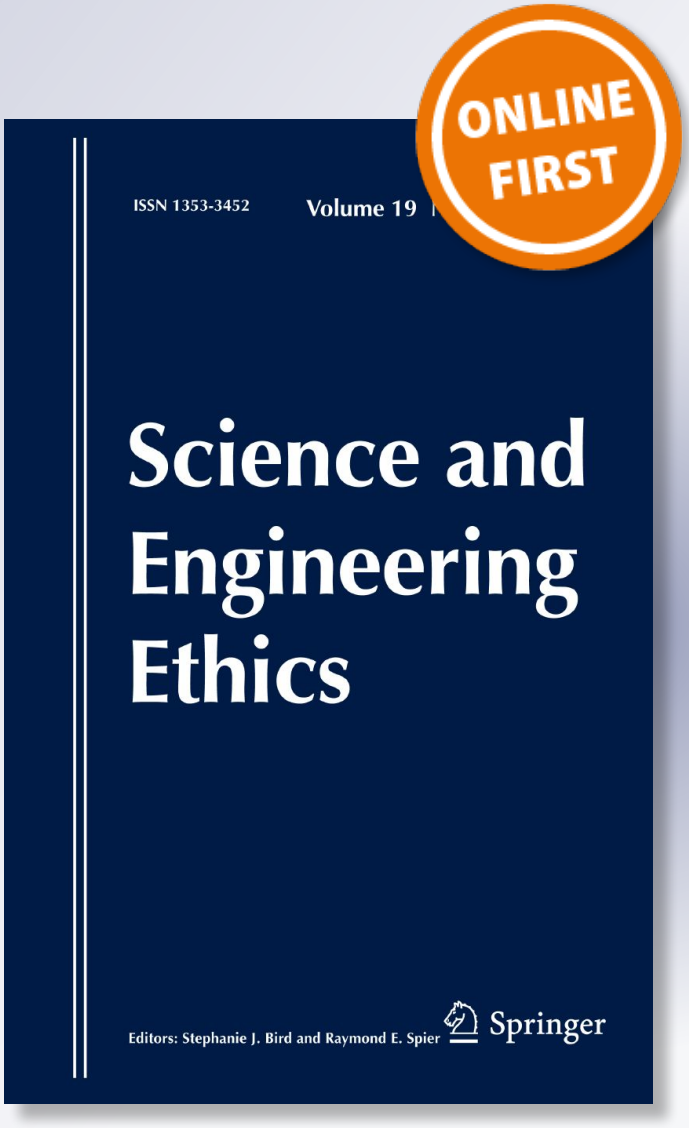

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ORIGINAL PAPER

Science as a Matter of Honour: How Accused Scientists Deal with Scientific Fraud in Japan

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Abstract Practices related to research misconduct seem to have been multiplied in recent years. Many cases of scientific fraud have been exposed publicly, and journals and academic institutions have deployed different measures worldwide in this regard. However, the influence of specific social and cultural environments on scientific fraud may vary from society to society. This article analyzes how scientists in Japan deal with accusations of scientific fraud. For such a purpose, a series of scientific fraud cases that took place in Japan has been reconstructed through diverse sources. Thus, by analyzing those cases, the social basis of scientific fraud and the most relevant aspects of Japanese cultural values and traditions, as well as the concept of honour which is deeply involved in the way Japanese scientists react when they are accused of and publicly exposed in scientific fraud situations is examined.

Keywords Scientific fraud · Honour · Japan · Research misconduct

Introduction

Research misconduct practices constitute a fascinating field for science studies as they blur the boundaries between ethics, science and culture. Although scientific fraud has been mentioned in early studies in sociology of science, in recent years it has become a much more visible problem. Stories about fraudulent scientists and retracted papers are becoming frequent, as well as quantitative surveys of scientific

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fraud and discussions on what to do with this issue as a whole. Nevertheless, studies trying to understand the singularities of research misconduct practices and the social reactions to them in each culture are far less common. Although further quantitative studies analysing research misconduct practices and scientists' reaction to it in different countries are welcome, they will hardly be conclusive on the issue. Conversely, the purpose of this work is to offer a framework for understanding the phenomena based on the cultural context which conditions reactions to scientific fraud accusations.

Thus, the aim of this paper is to contribute to such discussion by analysing the way in which scientists in Japan deal with accusations of scientific fraud. The article is based on a qualitative approach through the reconstruction of cases and an analysis of broader elements of the Japanese cultural background, seeking to inquire into the social bases which condition the way scientists deal with fraud.

First, I will provide a general framework to understand the social dynamics behind scientific fraud. Second, the recent situation regarding research misconduct in East Asia will be discussed. Then, I'll reconstruct a series of cases that took place in Japan which will allow the demonstration of the peculiarities of Japanese scientists' reaction to such situations. A further section of the article looks into the particular way in which honour and suicide have been shaped in Japanese culture and society. Finally, I will discuss the conclusion of the article arguing that the most outstanding feature of scientific fraud in Japan is the way in which accused and publicly exposed scientists react, that is, by assuming the situation as a profound dishonour.

Scientific Fraud and Its Causes

Fraud is usually associated with deception. Someone who presents something as legitimate but being aware that it is not, is committing fraud. It happens in every human activity: arts, business, religion, sports and even science.

Social studies of science have paid attention to misconduct in science arguing that although it is a quite common practice, it is not easy to define since fraud is ultimately what scientists tell each other fraud is (Martin 1992). For these perspectives, the way scientific facts are constructed and stabilized as truths is considered a social process reflecting the result of struggles between actors (Bloor 1976; Latour and Woolgar 1979). Fraud seems to make sense in opposition to truth: it is the ultimate manipulation of truth. But then, if we do not consider truth as an obvious and intrinsic value, but rather we assume it as a social construction, what can be said about fraud?

Consider the following examples. A scientist publishes an altered graphic of his study, but afterwards, he maintains that such graphic has been published by mistake. Should this be considered fraud? Or, if experts do not really understand what a scientist has published, is he being fraudulent? If a scientist publishes an amazing result, but most of his colleagues cannot replicate it, has he committed fraud? These

situations show that to establish a practice as a scientific fraud is not a simple and objective task.[1]

The manipulation of a scientific fact is considered fraud only when it is done on purpose. That is, the ontological locus of a hoax lies in the intention of the author (Collins 2008). Deception and fraud are very close notions. According to the Oxford Dictionary, fraud is a "wrongful or criminal deception intended to result in financial or personal gain".

Then, to judge the intention is never easy or objective. Academic committees are formed when suspicion of fraud is sustained, and an exhaustive evaluation of the suspect is carried out. Some cases of scientific fraud involve the confession of a faulty act by the accused. But, if the suspect alleges to have made a mistake, then the whole accusation of fraud may fall into a blurring mist.

One aspect of scientific fraud of major interest for this article is the social effect it generates mainly for the accused author and his near colleagues. Indeed, public opinion is strongly against scientists who commit misconduct (Pickett and Roche 2017). Scholars also agree that such behaviour is morally wrong, and should be penalized (Judson 2004). Since moral values are considered essential within the scientific community, an accusation of fraud implies that the author's intentions are being questioned by the scientific community. That is why scientific fraud fits into what is called *misconduct practices* in science. It is the morality of the person committing fraud that is being censored.

Kinds of Fraud

Misconduct practices in science are as ancient as science itself. Furthermore, it is a prolific and heterogeneous field. In 1830, the mathematician Charles Babbage published a book describing the premeditated scientific misconduct that was, according to him, forging the decline of science in England.[2] Since then, diversity of scientific misconduct practices, and concerns about them, continued to expand. The National Science Foundation describes three major forms of misconduct: fabrication, falsification, and plagiarism.[3] By fabricating results, someone pretends to show an empirical research project when in fact it was never carried out. Plagiarism consists in using someone else's results or ideas as if they were one's own, without giving any credit to the actual author. Another usual misconduct practice relies in altering some data, therefore, falsifying research records. In the presence of any of these practices, we can talk of scientific fraud because there is a conscious intention to present as a scientific fact something the researcher already knows it is not.

[1] On the other hand, there are several studies regarding the types and causes of cognitive bias, such as the classic work of Stuart Sutherland (1992), or recent works as the one from Harker (2015) or Fanelli et al. (2017). Cognitive bias, as a source of irrational practices is usually considered non-voluntary and, therefore, not a research misconduct. It is the will to alter the results of a research project what defines scientific misconduct practices as such.

[2] Charles Babbage's (1791–1871) work regarding scientific misconduct was published in London in 1830, under the title "Reflections on the Decline of Science in England, and on Some of its Causes".

[3] NSF's Research Misconduct regulation is found at 45 CFR 689. Available at: https://www.nsf.gov/oig/_pdf/cfr/45-CFR-689.pdf.

Scientific misconduct may involve fabrication as well as falsification by the same person. Nevertheless, sometimes, one of these specific practices stands out from the rest. The record in research fabrication seems to belong to the anesthesiologist Yoshitaka Fujii, who in 2012 was found guilty of having invented data in at least 172 papers (Normile 2012). Eric Smart, nutritionist from Kentucky University, preferred falsification by altering images in scientific papers and applications during 10 years until he was finally discovered (Cossins 2012).

An important question to be highlighted is that misconduct practices in science are not confined to a specific kind of discipline. Indeed, there is not one scientific discipline immune to fraud. There have been cases of reported fraud in applied sciences, as the case of Jan Hendrik Schön in nanoelectronics; or Hwang Woo Suk in biotechnology. Health is a prolific field for fraud, as the cases above mentioned illustrate, or in the case of Jon Sudbø and his fraudulent papers on cancer research. But, more fundamental sciences are also subject to these practices, as shown by Shinichi Fujimura and his fraud in archaeology; or, by mathematician Alexander Spivak and his accusation of plagiarism. The renowned case of Diederik Stapel is just one of the many examples to be found in psychology. Even in anthropology fraud can be found: anthropologist Max Bart has been accused of inventing historical events as well as the sources which supported them. As a whole, whether natural or social, applied or fundamental, there are records of scientific misconduct practices in every kind of science.

Struggle for Recognition

Sociologists have already shown that the search for originality in science is not an idyllic path to truth. In fact, Merton (1957) argued that scientists usually get fiercely involved in competitions to be the first in achieving a discovery, hence, giving way to the usual priority conflicts in science. Moreover, if there is a widespread cultural ideal of individual success and distinction, then values such as wealth, power and prestige may take precedence over the value of inquiry when the two conflict in science (Weinstein 1979).

According to Pierre Bourdieu, struggle for recognition is structural to the scientific field since every scientist needs the recognition of his colleagues in order to achieve scientific capital (Bourdieu 1976). Whoever wants to increase his scientific capital will need to convince his fellow scientists that his results are valid, original, and the consequence of a proper science practice. For Bourdieu, every epistemological conflict is a political conflict as well, since the struggle for recognition motivates every scientific practice.

Getting recognition from other scientists may be crucial, but it is not a simple task. To convince other scientists involves, at least, discussions on the kind of evidence considered decisive, discussions on the way this evidence was obtained and how to interpret it. Even so, none of those discussions can be considered purely objective. They can always open a controversy. However, one way to make it an easier enterprise is to have an important recognition already. The Matthew Effect, as Merton has called it, implies that it will be easier for a scientist who is already recognized for his previous work to receive credit for his new research (Merton

1968). But then, again, there is not a simple and unique way for a scientist to create scientific capital.

A researcher can work hard and patiently and still may not get much recognition. Sometimes, the results of a research do not awake much enthusiasm or attention among a scientific community. Struggle for recognition is structural to science. However, recognition is never guaranteed. Although competition is permanent, triumph may never arrive. Some researchers adapt to those rules while some young scientists do not stand them and leave the laboratory. At the same time, there are few scientists who may decide to avoid that uncertain struggle and take a shortcut to recognition instead. These are scientists who get involved in misconduct practices. Competition for rewards in science has strong impacts on the way science is done, increasing the likelihood of a scientist engaging in misconduct (Anderson et al. 2007).

Many of those who invent results and get the desired recognition begin to practice scientific fraud as a habit, as Diederik Stapel has confessed (Stapel 2014). In any case, those scientists who have assumed to have committed fraud state that they did it to obtain a quick and important recognition from their colleagues.

Research Misconduct in East Asia

Science fraud has recently received attention in East Asia (Tan 2014; Maslog 2014). In Taiwan, a scientist at the National Pingtung University of Education created false email accounts to assume the identities of 130 fake and real scientists in order to pose as reviewers for his own papers. Taiwan's Education Minister resigned due to this scandal, as he co-authored several of the retracted papers (Leung and Sharma 2014). Similar cases were discovered in South Korea at the College of Nature Resources and Life Science of Dong-A University, and in China at the Guiyang College of Traditional Chinese Medicine (Wagner 2012). Publications by Chinese researchers have dramatically increased over the last years, but the same happened with research misconduct and, as a recent study shows, this has become a major concern for researchers in China (Liao et al. 2017).

Asian scientific credibility had already received a major hit in 2004, when several papers were retracted in *Science* after the South Korean researcher Hwang Woo Suk was found responsible for a false stem cell cloning study (Hong 2008).

Do these cases show that scientific fraud in East Asia is a much deeper problem than in other regions? Some authors argue that this is so by pointing to a particular "toxic academic culture" in the region (Matthews 2015). According to these perspectives, it is an academic culture where plagiarism and scientific results falsification are common. On the contrary, others argue that while research fraud may be increasing worldwide, the "cases of science fraud seem rare in ASEAN[4] due to a cultural factor—South-East Asians are generally non-confrontational" (Maslog

[4] ASEAN (The Association of Southeast Asian Nations) is a regional organisation comprising ten Southeast Asian states.

2014). These qualitative approaches are contradictory and mostly uncertain, but quantitative studies do not exhaust the discussion on this issue either.

Steen (2011) evaluated retracted papers in the PubMed database from 2000 to 2010 as an indicator of scientific fraud, specifically pointing out first authors' countries of residence. In his article, Steen argues that despite several recent high-profile fraud cases, there is no evidence to support that there is a wider tendency towards scientific misconduct in East Asia. Chinese scientists, for instance, published 11.5% of all scientific papers and accounted for 11.3% of retractions in the world literature (Steen 2011). In fact, the results showed that the largest amount of retracted papers came from the USA, suggesting that "American scientists are significantly more prone to engage in data fabrication or falsification than scientists from other countries" (Steen 2011). Nevertheless, Van Noorden criticized this study, by pointing out that American scientists produce more papers of all kinds, and a comparison between publications versus retractions does not support that Americans are more likely to commit fraud (Van Noorden 2010).

The attempts to quantify scientific fraud cannot be fully satisfactory for several reasons. First, it is necessary to compare those numbers with the total amount of papers published, as they have also been increasing over the last decades. Indeed, estimations show that only between 0.02 and 0.2% of papers in the literature are fraudulent (Claxton 2005; Fanelli 2009; The Economist 2013). On the other hand, the indicator of scientific fraud is based on the number of retracted papers due to misconduct practices. But not all scientific journals have the same, or even any, policies about paper retraction. In fact, most retracted papers appear in high impact factor journals. Fraudulent papers published in other journals may just neither be detected nor retracted. Therefore, growing retractions may be a good sign (Fanelli 2013), as they could be showing a healthier and better institutionalized scientific system, with strong retraction policies.

In conclusion, the emergence of scientific scandals and growing retracted papers in East Asia cannot be taken as an indicator of a more fraudulent science than in other parts of the world. Initially, they just show that scientific misconduct practices are becoming more visible than before.

Scientific Fraud in Japan

To take the amount of research misconduct in Eastern Asia as its distinctive feature may be fruitless. But, to analyse the cultural framework in which those practices take place is certainly worthwhile, since science exists within a certain social context and such analysis would serve to better understand the complex relations between science and society.

For such a purpose, I will focus on research misconduct in Japan. Through a series of cases, I will argue that there is something specific in the way Japanese scientists react to an accusation of fraud: the sense of a deeply injured honour, which frequently leads to suicide.

Rise and Fall of God's Hands

One of the most well-known cases of fraud in archaeology was centred on the figure of Shinichi Fujimura. In 1981, he found a site with several-thousand-year-old pottery fragments (Johnston 2016; Normile 2000). It was a pretty amazing discovery, since such ancient artefacts had never been found in Japan. In other regions such as China, it is quite usual to find objects which support the presence of humans several hundreds of thousands of years ago. But Japan seems to have been inhabited much more recently. By finding increasingly older objects in every excavation, Fujimura pushed back the history of Japanese people.

His discoveries were very successful. It was said that he had "the hands of God". He was named director of the Tohoku Paleolithic Institute and became a celebrity not only in the archaeology field but also in almost the whole country. He never disappointed the expectations he fostered since the objects he found were always older than the previous ones, proving the existence of human beings in Japan up to 200,000 years ago.

In October 2000, he may have pushed his luck too much, or maybe he caused too much interest in his research, when he found objects older than 600,000 years which caused some journalists to secretly record his excavations. They found that Fujimura had *sowed* the archaeological evidence that, a few hours later, his team of archaeologists would *discover* (Normile 2000; West 2006).

When his fraud was exposed, Fujimura confessed to have faked at least 42 of the excavations he had made. But then, all his work was suspected of fraud. Archaeology textbooks in Japan had to be rewritten deleting all Fujimura's contributions (Sutton 2013). Much of what was considered as facts from the Paleolithic Era in Japan had to be deleted.

What happened with Fujimura himself is not clear. Some people say they had seen him in a mental health hospital; some others state that he just changed his name. In any case, he disappeared from both scientific and public life. But the hoax had a collateral victim.

After Fujimura's fraud Japanese archaeologists were seriously distrusted, mainly if they alleged to have found Paleolithic objects. For example, Mitsuo Kagawa was a respected archaeologist who, in the early 1960s, discovered human and animal bones and stone artefacts dating back 10,000 years or more in the Hijiridaki Cave in Western Japan. However, another research team challenged his discovery and, although that dispute seemed to fit under normal scientific discussions, after Fujimura's scandal a weekly news magazine presented Mitsuo Kagawa's controversy as another case of fraudulent science research.

Kagawa couldn't stand the ignominy of such an accusation and hanged himself (Normile 2001; West 2006). After Kagawa's suicide, his family sued the publisher for defamation. In 2004, the Supreme Court ordered the magazine to pay compensation to the family and to publish an apology. However, Professor Kagawa's drastic reaction to fraud accusation has not been the only case in Japan.

Molecular Biology and Poison

Dr. Akio Sugino was a Professor at Osaka University and one of the leading scientists in the field of DNA replication in Japan. On 12th July 2006, Sugino and his team published a paper in the *Journal of Biological Chemistry* where they suggested that a type of DNA helicase called MCM2p played an important role in DNA replication. The achievement seemed a cause for celebration for Sugino's lab. But only a few weeks later, suspicions of falsified image data in the DNA research began to spread and, on 2nd August, the journal labelled the paper as "withdrawn". Osaka University decided to request the Research Integrity Committee to perform an investigation on Sugino's lab in order to determine if it was a case of scientific misconduct.

Consequently, one of the leading teams in molecular biology in Japan suddenly turned its ascendant path into a nightmare fall. Yasuo Kawasaki was one of the team scientists and co-author of the suspected paper. 42 year-old Kawasaki was considered a talented young scientist with a promising career. However, the scandal might well have crushed his plans. On 1st September, Kawasaki went to the lab and killed himself by taking poison (Fuyuno and Cyranoski 2006).

Osaka University argued that there was no proof linking the suicide with the ongoing misconduct inquiry, but the whole situation might indeed have some relationship with it. Akio Sugino, head of Kawasaki's lab, had submitted the paper for publication without checking it with the rest of the co-authors (Tsurimoto et al. 2009; Fuyuno and Cyranoski 2006). Indeed, the co-authors themselves—probably Kawasaki was one of them—pointed out that there were many problems with the published data and requested Professor Sugino to withdraw the paper (Fuyuno and Cyranoski 2006).

Apparently, Sugino told the university ethics committee that he had falsified data because of being in a hurry to publish papers (Goldberg 2006). The *motto* "publish or perish" always seems to be related to scientific misconduct practices, since publishing is the fundamental means for obtaining recognition in science.

The Research Conduct Committee from Osaka University finally concluded that, beyond any doubt, data were fabricated or modified (Scientific Ethics and Research Conduct Committee 2006). They also stated that Sugino had not shared the final manuscript with all the co-authors to get their approval for submission. The Committee exonerated all co-authors and acknowledged that Sugino's actions might severely tarnish their reputations and futures. Kawasaki did not wait for the Committee's final decision probably because he assumed the damage inflicted on him as impossible to be repaired by any committee.

STAP Cells and the Shame of the Mentor

One of the most famous episodes of scientific fraud in recent years in Japan involves what could have been a major advance in stem cells research.

As early as the age of 30, Haruko Obokata headed her own research team on stem cells in Japan. Everybody would agree that she had a most promising career ahead. In 2014, she met those expectations when she published two papers in the *Nature*

journal describing a very simple but powerful experiment. The experiment consisted in turning blood cells into stem cells just by the use of a smooth acid bath, exposing cells to a pH of around 5.7 for 30 min. Her results clearly proved her statements and, therefore, her discovery was undoubtedly considered a great breakthrough by all current perspectives in the field. Stem cells have the capacity for becoming specialized cells, and the attempts to reverse the process are considered very important in order to have stem cells which afterwards can be used to regenerate tissues or organs. Obokata's experiment was extremely simple and effective. Stem cells obtained by her method were called STAP (Stimulus-Triggered Acquisition of Pluripotency) cells. The news appeared in many daily papers around the world, since medicine would be revolutionized by her achievement.

But the story did not continue so well. Some specialists began to raise doubts. For example, in Obokata's papers images looked doctored and some fragments of the text seemed to belong to articles already published. As a result, a Committee concluded that some misconduct practices had taken place (Rasko and Power 2015).

Haruko Obokata gave a public conference. Between tears and regrets, she admitted that the papers had some minor mistakes. However, she urged the audience not to divert attention away from the big achievement. She alleged that STAP cells were real and no one should doubt about them.

Her convictions seemed genuine and most of her colleagues supported her. Consequently, she went back to her lab to continue working on STAP cells. Many people tried to replicate the experiment but nobody could do it; even her own attempts failed. STAP cells just would not appear again. Clearly, it began to be assumed that there were not just minor mistakes which appeared in the published papers. The simple and effective method to obtain stem cells was not effective at all: STAP cells did not seem real after all.

One of Obokata's mentor, Dr. Yoshiki Sasai, was a very prestigious scientist. He was one of the founding leaders of the RIKEN Centre for Developmental Biology in Kobe. He achieved important advances in developing new methods to grow stem cells. But when it became obvious that Obokata's effort to redeem herself by obtaining STAP cells was useless, Sasai fell into a deep depression. He had no direct involvement in the issue, but he was criticized for failing to provide oversight to Obokata's work (Connor 2014). STAP cells were humiliating him and he felt "overwhelmed with shame" (Rasko and Power 2015). He finally committed suicide. He left a dramatic note to Haruko Obokata, urging her to reproduce STAP cells (Rasko and Power 2015).

Obokata asked her institution to allow her a final attempt in order to fulfil her mentor's last wish. She received the necessary resources and tried once again to replicate the original STAP cells procedure. But months passed by and no results were obtained. She finally resigned (Gallagher 2014). She alleged that her physical and mental deterioration from the constant pressure of the media had affected her ability to replicate the original results (Martin 2016).

A further study concluded that Obokata's STAP cells actually came from embryonic stem cell contamination (Konno et al. 2015). It had not been a real reversion process; stem cells did not come from blood cells, they were just two different cells.

Accusations to Scientists and Suicide in Japan

What links the above cases is not only the presence of scientific fraud and suicide, but a deeper Japanese cultural trait in which dishonour of being pointed at as a cause of a serious moral damage is unbearable. When an accusation of scientific fraud happens, that trait reinforces itself. However, such a trait may be found in other aspects of Japanese science, as will be shown in the following examples.

There is a recent case of a Japanese engineer who committed suicide after assuming that the bridge he had built had a problem. He stated in a note that he assumed doing his job wrongly was a failure to his sense of honour (Daily Sabah 2015).

There is also the case of a scientist accused neither of scientific fraud nor even of doing his research wrongly, but accused of doing wrong *with* his research.

Tanii Akio was a Japanese plant scientist. His research focused on a disease called fire blight, which attacked fruit trees and is caused by a bacterial infection. It is a highly contagious disease that causes devastating losses in agriculture. Therefore, countries free of fire blight may impose trade restrictions on fruit imports to protect their crops from contagion. Japan was one of the few countries free of fire blight, and as a result, its apple market was isolated from global trade and only domestic apple growers could sell in Japan.

In 1981, Tanii Akio described a novel fire blight-like disease in Japan. That may have abolished his own country's trade barriers to foreign apples. But he stopped the research, the samples sent to a lab for preservation mysteriously vanished and the results were only published in Japanese (PLE Disease Ecology 2015).

Several years later, in 1995, a scientist from Cornell University—based on Tanii Akio's research—proved that Akio had indeed described a Japanese strain of the fire blight. Immediately, some countries halted imports of Japanese apples. Tanii Akio was blamed for revealing the presence of fire blight in Japanese fruit to Western scientists, therefore damaging the Japanese market with his scientific research. With the burden of this accusation, Tanii Akio committed suicide by drinking pesticide (Helm and Eisenstodt 1996).

Here we have shown the context of the selected cases of scientists' suicides in Japan. Other studies have focused rather on a quantitative description of suicide rates. In a study of newsworthy Japanese suicides between 1912 and 2015, for instance, Kantha (2015) shows several characteristics of these suicides, as the predominance of men over women.[5] But yet more interestingly, he argues that since 2001, accusations of research fraud resulted in the suicides of Japanese scientists (Kantha 2015).

Therefore, all the above mentioned cases can be thought not merely as singular cases but rather as the emergence of a particular and drastic way in which Japanese scientists react to accusations of a moral harm. Dishonour is taken seriously in Japan in a vast range of situations, and research misconduct precisely falls into that issue.

[5] Japan follows the global trend on that aspect, as death rates from suicide are four times greater for men than for women across OECD countries (OECD 2014). The OECD (Organisation for Economic Co-operation and Development) has 35 member countries, many of the richest nations of the world among them.

Honour and Suicide in Japanese Culture

Japan has traditionally been described as a country where honour is a central value. Even recent studies show that differences in emotions and values among countries are notorious when describing particular features in Japan:

> "We found that anger, an emotion emphasising individuality and entitlement, was culturally promoted in the USA and avoided in Japan; conversely, shame, an emotion that underlines the importance of connectedness between people, was culturally promoted in Japan, and avoided in the USA. There is thus evidence that, in each culture, everyday interactions afford emotions to the extent that these emotions fit the central cultural concerns" (Boiger et al. 2014).

In Japan, shame is an emotion related to concern for one's social reputation and it is also linked to the concept of honour. Indeed, shame and honour played a central role in constructing the cultural identity of the Japanese samurai, since they defined themselves as those who knew shame and would risk their lives to defend their honour (Ikegami 2003).

Honour involves both an external and an internal value. It relates to social concern but it is also an estimation of one's worth. Consequently, honour is both paid by others and claimed by oneself (Leung and Cohen 2011).

Regarding suicide, Durkheim (2002 [1897]) was a pioneer in the systematic study of the issue, as well as in understanding it as a social phenomenon and not merely as an individual act. In certain situations, honour and suicide may relate to each other, as in the cases described by Marx and Puchet, where desperate people cannot stand the humiliation of public opinion against them and commit suicide (Marx 1999 [1846]).[6]

In 1946, anthropologist Ruth Benedict published her most influential book called *The Chrysanthemum and the Sword*, pushed by the USA's need to better understand Japanese values. Benedict describes Japanese culture as being developed over centuries around the notion of *giri*, which involves a set of moral obligations mainly devoted to keeping one's name and reputation stainless. When one's name is damaged, the world tips and it becomes necessary to get the balance back again. In those circumstances, neither vengeances nor suicides are considered aggressions, but fair acts in search of cleansing one's honour. In other Asian or Western societies, this sensibility towards one's name is not considered a virtue; but it is in Japan where the respect a person has for himself strongly shapes his behaviours (Benedict 2005 [1946]).

If professional aptitudes are brought into public criticism, commitments to cleansing one's name may also derive in drastic measures: "There are for instance the long list of school principals who committed suicide because fires in their school—with which they had nothing to do—threatened the picture of the Emperor which was hung in every school" (Benedict 2005 [1946]: 151). Generals and

[6] First published in 1846, this book is a very free translation that Marx made of French police officer Jacques Peuchet's account of suicides in Paris.

ministers have also committed suicide in adverse situations. For instance, in 2007, the Japanese agriculture minister hanged himself in the middle of a financial scandal.

Maurice Pinguet has devoted himself to analysing suicide in Japan, showing that it is a society with a very long tradition of voluntary death. Japanese have never deprived themselves of the freedom to die, and unlike other cultural approaches to suicide, in Japanese culture voluntary death may mean a proof of greatness. This is because the person who commits suicide is not considered defeated but responding with free will to an adverse context (Pinguet 1984).

Suicide in Japan has developed many forms over time and, of course, not all suicides are related to ethical behaviours. *Seppuku* (also known as *hara-kiri*) is a ritual suicide by disembowelment. It was part of the bushido honour code of the samurai. *Shinjū* is a double suicide, usually reserved for lovers. During World War II, as part of a tradition of voluntary death rather than defeat, military aviators from the Empire of Japan who committed suicide with their aeroplanes against Allied naval vessels were called *kamikaze*. A new trend has been the rise of Internet suicide pacts (Japan Watching 2010). There are also high rates of suicides in kids and young men (Lu 2015; Iga 1981); and there are also suicides related to excessive work, as "karoshi"—the Japanese word for death from overworking—which is an increasingly visible phenomenon (Demetriou 2016).

The level of suicides is usually high in Japan.[7] Occasionally, there may be more suicides in other countries since suicide rates tend to increase in times of economic crises everywhere (Ceccherini-Nelli and Priebe 2011; Classen and Dunn 2012). Some authors argue that suicide in Japan is an ordinary phenomenon when comparing the prevalence of suicide with other countries (Di Marco 2016). Indeed, Japan as "The Suicide Nation" has frequently become a stereotype for Western narratives, as if Japanese were born with some essentialist adoration of death (Wolfe 1990). But at the same time, away from a simplistic and essentialist view, suicide is an important feature of Japanese culture, with a significance and a performative strength that should not be ignored. The effects of these cultural singularities do set out suicide differently in Japan than in other countries (De Vos 2004 [1963]). As Benedict argued, suicide appears as a strong theme in this culture. Japanese play up suicide as Americans play up crime, says Benedict, with the crucial difference that in the first case interest is towards self-destruction, whereas in the second case interest is towards the destruction of others (Benedict 2005 [1946]).

The sense of honour is present in many Japanese stories within a conflictive relation with justice and truth. When someone is humiliated or dishonoured, when he or she cannot convince others of his or her truth, then, voluntary death appears as a redemption act or as a proof of a purity of honour. In such a culture, suicide is not assumed as a symptom of social oppression or as an expression of a rebellion, but rather as an attempt to reconcile to an ethical system (Pinguet 1984; Zaraspe 1970). In certain situations, suicide is a way of showing respect for self-reputation.

[7] Countries with the current highest suicide rates are: Hungary, Japan, Korea and the Russian Federation, with more than 20 suicide deaths per 100,000 population (OECD 2014).

Accusations of scientific fraud are major attacks to a scientist name. There is no evidence showing that research misconduct rates are higher in Japan than in other countries, but the reactions to such situations reveal, as we have seen, some unique features. Japanese scientists involved in misconduct practices have assumed their situation as a dishonourable one. Suicide followed in many cases, precisely because their culture recognizes suicide as a legitimate way of dealing with dishonour.

Discussion

In science, individual behaviour has always been seen as very important. Robert Merton considered that scientists had to follow a series of special norms, which he called the *ethos* of science, which guaranteed the objectivity and rationality of scientific knowledge. It was an idealized vision of science, which conceived scientists as having a special morality. Although other perspectives from sociology of science criticized the normative vision of Merton, individual behaviour has been kept as a central issue in science studies, but in relation with its social structure. As we have seen, social recognition is determinant in science, since every scientific fact is considered so only after the approval of the scientific community. Consequently, what is considered to be bad science also depends on the judgement of fellow scientists.

Accusations of scientific fraud mean that the scientific community has judged the accused scientist as not behaving properly, hence as not producing real science. The stigma of such accusations is not easily removed, and scientists involved in misconduct practices often move away from academic institutions.

When analysing research misconduct in East Asia, no special features seem to arise in regard to the origin and quantity of such practices. But the way accused scientists react to such situations may differ. It is the examination of the cultural context surrounding scientists accused of fraud, and the way this context conditions their reaction, that is the main objective of this article. Further studies could explore other related aspects, such as the way institutions deal with an accusation of fraud of one of their scientists. Indeed, these institutions are the main bodies responsible for dealing with these situations. They usually deploy an expert committee in charge of analysing fraud suspicions. Specificities of these institutional spaces deserve more attention since in many countries—for instance—, universities have no institutionalized mechanisms to deal with these situations.

In the cases described in "Scientific Fraud in Japan" section, many Japanese scientists have reacted to an accusation of fraud or of publishing bad science by committing suicide. This is something peculiar, since research misconduct exists everywhere. However, it is not usual for scientists involved in such situations to end in this way. At the least, they walk away from academic science environments.

Another interesting feature of the analysed cases is that the suicide scientist did not wait until a research committee had decided whether he was guilty or not of research misconduct. Mitsuo Kagawa committed suicide when he was publicly accused of scientific fraud by a weekly news magazine, although later, Justice ruled that there was no evidence for such an accusation. Yasuo Kawasaki decided to end

his life when his name appeared in a paper suspected of research misconduct, but subsequently, a research committee found that the actually guilty person had been Dr. Akio Sugino—the leading author and responsible for the lab—and exonerated all co-authors including Kawasaki. In another controversial case, Dr. Yoshiki Sasai took his life when his disciple Haruko Obokata was accused of scientific fraud, although only an indirect moral responsibility pointed to him, because Obokata had been found the only guilty person.

In a way, these cases illustrate that it is not the final sentence of a committee for research integrity that leads Japanese scientists to commit suicide, but the situation of being publicly discredited and dishonoured. As has been seen in "Struggle for Recognition" section, scientific capital is a central feature of scientific activity, and the accusation of fraud implies its loss. Well-known cases of scientific fraud, as Diederik Stapel in Netherlands or Hwang Woo Suk in South Korea, show that the fraudulent scientist can no longer continue his/her academic career normally since no academic institution nor colleague wants to be associated with misconduct practices. Nevertheless, they can move into other kinds of institutions (such as private companies) or social activities. Suicide is not the usual response to fraud accusation in science worldwide. But in Japan, it seems to play a different role. This does not mean that every Japanese scientist accused of fraud will commit suicide: even in the cases shown here, other researchers involved in the accusations have reacted differently. Suicide following a fraud accusation in Japanese science is neither a linear nor an inevitable response, as no human action is. But it is a more usual response than in other countries.

Research misconduct in science is an area of analysis where sociology and ethics usually converge. But the main focus of interest tends to be the origin of misconduct and a normative approach about what should be done to avoid it. Much less attention is devoted to the social and individual effects of science fraud. The qualitative approach of this article expects to contribute to the latter, showing the importance of specific cultural contexts as the background where scientists' decisions are taken. In Japanese culture, honour acquires a sensitive symbolic place, and voluntary death may function in relation to such a value. A most significant and distinctive aspect of research misconduct in Japan is, precisely, the way in which exposed and suspected scientists react to a dishonourable situation.

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