

## Research Misconduct in East Asia's Research Environments

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High-profile cases of scientific misconduct, such as the Hwang scandal in South Korea, the Obokata scandal in Japan, and the growing number of retracted papers written by Chinese scientists have led to a new interest in research misconduct in East Asia. Since research misconduct is by no means rare in the history of science, some observers may view them merely as indicative of increased research activity in this region. From this perspective, research misconduct tends to result in blaming and punishing individual scientists. However, if we subscribe to the precept of STS that scientists' behavior is embedded in their social and cultural contexts, we may use research misconduct to apprehend the distinctive social and cultural contexts of scientific practices. In other words, the investigation of research misconduct in East Asia is a valuable opportunity for the STS community to discuss the social and cultural environment that shapes research practices in this region. Drawing on three cases of research misconduct in Japan, South Korea, and China, this special issue highlights the social and cultural environments surrounding each case rather than the scientific misconduct itself.

Local biologicals are a promising way of capturing the influence of social and cultural environments of a specific location on scientific practices. Sarah Franklin has explained stem cell science as a global biological enterprise interwoven with local biologicals. She described a local biological as practices in stem cell science that reflect "specific national and economic priorities, moral and civic values, and technoscientific institutional cultures" (Franklin 2005, 61).

Using the concept of local and global biologicals, Koichi Mikami's article in this issue highlights the importance of social and institutional culture to understand a case of research misconduct. She addresses the stimulus-triggered acquisition of pluripotency (STAP) cell scandal, often called the Obokata scandal, in Japan where Haruko Obokata and her colleagues at RIKEN Center for Developmental Biology (CDB) published two papers in *Nature* on a new method to reprogram differentiated somatic cells to be pluripotent, or capable of becoming any type of cell in the body, but soon these papers were retracted. Mikami focuses on how Japan's socioinstitutional culture influences the reactions of society to Obokata's claim of the existence of STAP cells, instead of her individual misbehavior. She notes the influence of Shinya Yamanaka's

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success on stem cell science in Japan. Obokata's work attracted media attention in Japan partly because it claimed to extend Yamanaka's work on iPS cells. As a Nobel Prize winner, Yamanaka was a young hero in Japan and brought high expectations for stem cell research not only in the stem cell research community but also in the Japanese government and the public. According to Mikami, the initial enthusiasm for Obokata and her colleagues' successful experiment on STAP cells reflected the high expectation for stem cell research in Japan since Yamanaka's success in 2007, which constitutes a local biological.

Mikami also points out that the senior scientists at RIKEN CDB remained convinced of "doability" of STAP cell research and the existence of STAP cells partly because it could satisfy the needs of the research center. As the Japanese government's support for stem cell research shifted toward Yamanaka's human iPS cells technique, RIKEN CDB, once a primary research center in regenerative medicine in Japan, lost its leadership in the field. Senior scientists at RIKEN CDB were therefore looking forward to another breakthrough in stem cell research to replace Yamanaka's iPS cell technique, so that the center could regain its prominence. Obokata's announcement on the success in STAP cell research seemed to come at the right time. In sum, Mikami explains convincingly how the STAP cell experiment could be so enthusiastically and uncritically accepted by Japanese scientists and the public by looking at the high expectations for STAP cell research at the institutional and societal levels.

The importance of high expectations on a specific scientific field or technique is also found in Myungsim Kim and her colleagues' article in this issue. In their analysis of what happened in stem cell science in South Korea after the Hwang scandal, the authors first discuss the concern of South Korean scientists that the Hwang scandal might make the international scientific community more suspicious of all stem cell research coming out of the country and thus inflict irreparable damage on the field. Noting that the advocates of embryonic stem cell (ESC) research in the UK tried to rehabilitate ESC research after the Hwang scandal by asserting the superiority of the UK's scientific culture and research governance systems (Kitzinger 2008), Kim and colleagues suggest that such a boundary-making strategy could be persuasive because Hwang's research was conducted in a country that was outside the scientific mainstream. That is, since South Korea did not have a reputation as a powerhouse of scientific discovery, the Hwang scandal required a swift response from both the scientific community and the South Korean government.

Using their quantitative analysis of publication records in the stem cell field over fourteen years, however, Kim and her colleagues report that the fear was unfounded. Although the number of South Korean articles on stem cell research stalled, this was temporary and research continued. Kim and her colleagues view the government's continuous funding for the stem cell field as a primary reason for the quick recovery. The South Korean government, like the stem cell research community and biotech industry, maintained high expectations on stem cell research, which Kim and colleagues call "the politics of hope." In contrast, the expectation for large economic returns from stem cell research caused haste to commercialize stem cell research in South Korea, posing a new challenge to the governance of stem cell research. While the South Korean government pushed for ethical reform in scientific research and became more cautious about mobilizing imaginary futures of stem cell science after the Hwang scandal, its relaxation of the regulations on investigative stem cell therapies

to expedite the commercialization of stem cell research has renewed the ethical concerns about stem cell research in South Korea.

It is noteworthy that the significant role of the state is revealed in all three articles in this issue. When we discuss sociocultural environments in which scientific practices are embedded in East Asia, an active role of the state and a strong nationalistic culture have been often emphasized. In East Asia, the state mobilized science and technology as a means of modernization, which tended to make the state a key actor in scientific enterprise and to promote scientific activities toward economic and social values rather than straightforwardly scientific values (Nakayama 2012). Such an environment sometimes induced a research practice that might violate the norms of science. For example, it has been reported that South Korean scientists tended to accept secrecy for the sake of the national interest (Bak 2014).

While earlier studies have stressed the role of the state as an active promoter of science in East Asia, the articles in this issue attend to more diverse yet decisive roles of the state as an important regional environment for scientific practices. For example, Kim and her colleagues are mindful of the role of the state as a regulator in science. They argue that, while the South Korean government has long been known for its loyal support of scientific research with commercial potential, the Hwang scandal made it realize that scientific governance systems in South Korea left much to be desired, compared to the global standard. Thus, the South Korean government assumed a vigorous role as a regulator by pushing for the prompt and sweeping reforms of research ethics. The authors assert that, without the state's assertive role, South Korea's scientific community alone would not have been able to embark on such a prompt and far-reaching ethics reform. At this point, there was virtually no resistance in the scientific community to the government's initiatives to strengthen research ethics in South Korea, which may indicate the limited autonomy of South Korea's scientific community. In many western societies, by contrast, the government's efforts to regulate scientific misconduct were often faced with resistance from the scientific community, who claimed that such intrusion was an overreaction to an infrequent occurrence of research misconduct and that the scientific community can police and correct misconduct on its own (Chubin 1999).

The other articles in this issue also describe the role of the state in research misconduct. In her analysis of the STAP cell scandal in Japan, for example, Mikami discloses how the Japanese government's prioritization of a specific field or technique (i.e., Yamanaka's human iPS cells technique) created a competitive environment for Japanese scientists to have their research area prioritized and, in so doing, made them insensitive to potential misconduct in their own organization. If Mikami illuminates a rather subtle influence of the state policy on research misconduct, Junhui Han and Zhengfeng Li analyze a case in which the assessment and reward systems mandated by the Chinese government nurtured a unique type of research misconduct.

Indeed, changing institutional assessment and reward systems have long been important in explaining research misconduct (Wolpe 2013). In North America, where the commercialization of science has rapidly advanced, for example, scholars have been concerned about whether it increased secrecy for the sake of commercial profits even among scientists in universities and public research institutes (Blumenthal et al. 1997). However, it would be the pressure of the "publish or perish" idea that

displays most remarkably the impact of the institutional assessment and reward systems on research misconduct.

The “publish or perish” culture in East Asia may lead to increased research misconduct. In North America, research institutes have long linked their scientists’ publication records to their promotions and salaries. In contrast, academic institutes in East Asia, where seniority has traditionally determined promotions, scientists’ research performance has only recently begun to factor into assessment of salaries and reward systems. However, the new system of assessing scientists’ performance has tended to rely on quantitative measures of publications; in North America and Europe qualitative evaluations on publications by colleagues have been considered more important. In particular, coinciding with the growing influence of global university rankings, academic institutes in East Asia have begun to emphasize publications in journals indexed by Thomson Reuters’ Science Citation Index (SCI). For example, in China, the performance assessment system using SCI listed articles was adopted universally under the guidance of the Chinese Academy of Science. The Academy also classified the SCI journals into four categories based on the journals’ average impact factors in the last three years, which in turn have been used to determine the amount of incentives in many Chinese academic institutes (Suo 2016). Other countries in East Asia, notably Taiwan and South Korea, have seen a similar institutional change, although the speed and scope of the change have varied.

Such an environment has placed a double burden on scientists in East Asia: in addition to having to “publish or perish,” they are expected to publish their work in journals listed in SCI in English, instead of domestic journals in the native language, to score high on the metrics of academic evaluation. Especially for scientists who were not trained to publish their work in English journals, this double burden may tempt them to buy assistance.

In their analysis of the BioMed Central (BMC) case in which forty-one papers authored by Chinese scholars were retracted in 2015 due to falsified peer reviews, Han and Li link the growing number of retracted papers to the rapid changes in China’s evaluation system. While the income, status, and reputation of clinicians in China are directly associated with their professional title, the title assessment system has increasingly required a strong record of publications, especially in SCI-listed journals. Faced with difficulties in meeting the requirement, the authors of the retracted papers, most of whom worked as clinicians in China’s top-level hospitals, subscribed to services from third-party agencies that transact business related to submissions. These agencies help the authors organize, revise, or polish their manuscripts and even fabricated glowing peer reviews: when asked to recommend reviewers for their manuscripts, the agencies recommended candidates who had false e-mail addresses.

The BMC retraction case reveals a new type of scientific misconduct. However, it is the service agencies themselves, rather than the agencies’ or their clients’ misbehavior, that merit attention, because these businesses reflect China’s distinctive culture of science where the pressure of publishing in SCI-listed journals is intense. As Han and Li point out, language problems and inexperience in publishing SCI papers, in addition to heavy hospital workload, contribute to explaining why clinicians resort to paying service providers to fabricate peer reviews. Of course, many scientists can work in a stressful environment and maintain their professional ethics. Nevertheless, Han and Li’s research shows the unmistakable impact of pressure on research misconduct.

Although articles in this issue have not analyzed any Taiwanese case, Daniel Fu-Chang Tsai's commentary gives us more than a glimpse of the social and cultural environment surrounding Taiwanese science. Like the authors of three articles in this issue who have focused on social and cultural contexts of research misconduct instead of an individual scientists' misbehavior, Tsai emphasizes the politicization of research misconduct as a unique characteristic of Taiwan in which research misconduct or academic flaw was actively searched for and used to attack political opponents' moral integrity. In this political environment, cases of research misconduct have tended to become highly publicized and drove the Taiwanese government, rather than the scientific community, to lead research ethics reform. He concludes that such a state-driven research ethics reform was necessary and should be further developed to improve more effectively the research ethics and integrity in Taiwan.

While the scientific community has traditionally attributed research misconduct to a few rotten apples, each article in this issue has explored a case of research misconduct by linking it to East Asia's social and cultural contexts. In doing so, this issue contributes to our understanding of the distinctive sociocultural environments around science as much as the specific cases of research misconduct in the region. What, then, might be areas of inquiry we may have to pursue further?

First, we must pay greater attention to scientific practices in the gray area between acceptable and unacceptable practices, which are more likely to be influenced by local contexts. Data fabrication, falsification, and plagiarism, for instance, are blatantly unethical. For such cases, therefore, all scientists, no matter where they work, would recognize this kind of misconduct. However, there is a growing area in scientific practices where cultural meanings of misconduct are ambiguous, such as managing the visibility of research papers by citing each other's work or splitting one article into several (Johnson and Ecklund 2016). In medical science, emerging commercial applications like stem cell therapies also create gray areas. Given the increasing importance of these emerging areas in scientific practices, there is much empirical work to be done here.

Second, comparative research on social and institutional environments and how scientists respond to them would be a fertile subject for scientific inquiry. This issue suggests that the same emphasis on publishing or perishing can have different connotations in different societies and that similar high-profile cases of research misconduct can elicit different levels of concern depending on where they happened. Careful comparative studies on the ways in which specific sociocultural environments around scientific practices result in certain patterns of research misconduct and responses to them would therefore be a logical step for further inquiry.

Finally, we may need to more actively commit to making practical contributions that improve research ethics. As Tsai emphasized in the commentary, STS should be able to contribute to the development and design of more effective programs to enhance ethical awareness and research practices.

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