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Guilt by association: How scientific misconduct harms prior collaborators

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ABSTRACT

Recent highly publicized cases of scientific misconduct have raised concerns about its consequences for academic careers. Previous and anecdotal evidence suggests that these reach far beyond the fraudulent scientist and (his or) her career, affecting coauthors and institutions. Here we show that the negative effects of scientific misconduct spill over to uninvolved prior collaborators: compared to a control group, prior collaborators of misconducting scientists, who have no connection to the misconduct case, are cited 8–9% less often afterwards. We suggest that the mechanism underlying this phenomenon is stigmatization by mere association. The result suggests that scientific misconduct generates large indirect costs in the form of mistrust towards a wider range of research findings than was previously assumed. The far-reaching fallout of misconduct implies that potential whistleblowers might be disinclined to make their concerns public in order to protect their own reputation and career.

1. Introduction

Scientific misconduct affects many more than those who commit it. Consider for instance the case of the Center for Developmental Biology in Kobe, Japan, where in 2014 two retractions due to scientific misconduct led to a change in directors, half of its laboratories closing, merging, or moving elsewhere, and a 40% budget cut (Cyranoski, 2015). In other cases, such as the one involving Dutch social psychologist Diederik Stapel, the work of graduate students was called into question due to the unethical actions of their supervisor.[1]

This raises the question of how far the ripple effect of scientific misconduct reaches. Prior research has shown that co-authors of scientists found guilty of misconduct experience significant drops in their publication flows (Mongeon and Larivière, 2015). While research on actual misconduct cases is scarce and, due to the limited amount of cases, rather descriptive (Lubalin and Matheson, 1999; Pozzi and David, 2007; Redman and Merz, 2008; Resnik and Dinse, 2012; Reynolds, 2004; Rhoades, 2004), we can refer to a related strand of the previous literature that has focused on retractions of journal articles. Though retractions can occur in response to scientific misconduct, they can also be due to honest mistakes (Azoulay et al., 2015a; Fang et al., 2012; Van Noorden, 2011). Despite the fact that a common cause of retraction is the honest reporting of a mistake by an author, retractions have been shown to have negative implications for the citations of the author's prior and future work (Azoulay et al., 2015a,b ; Jin et al., 2013; Lu et al., 2013), articles conceptually related to the research in question (Lu et al., 2013), and the narrowly defined research field as a whole (Azoulay et al., 2015a).

In this paper we show that the damage of scientific misconduct reaches further, affecting collaborators who previously worked with a scientist later found guilty of scientific misconduct, but who were not involved in the misconduct case. Our empirical analysis shows that prior collaborators face a citation penalty of 8–9% in the aftermath of a scientific misconduct case. We base this result on misconduct cases investigated by the U.S. Office of Research Integrity (ORI) between 1993 and 2008, which oversees misconduct investigations for research funded by the National Institute of Health (NIH) and the Public Health Service (PHS). Hence, our database is based on the complete list of investigated and well-documented scientific misconduct cases at the world's largest funder of medical research.

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[1] Cf. the report on Mr. Stapel's fraudulent research (Levelt Committee et al., 2012): the work of many of the doctoral dissertations overseen by him needed to be reassessed since they were based on fraudulent data.

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This observation fits a theory of stigma spreading through mere association (Pontikes et al., 2010), according to which scientists are punished by the scientific community for being associated with a scientist known to have engaged in misconduct – and hence deviant from the norms. Crucially, they are punished for associating with scientists who only afterwards are revealed to have engaged in misconduct, and did not choose to associate with a known fraudulent scientist. The effect we observe can be interpreted as an extended loss of trust in fellow scientists in the wake of misconduct. Trust plays an important role in science, considering its cumulative nature (Merton, 1973) and the lack of incentives and resources to replicate results (Hamermesh, 2007). While a loss of trust in the work of misconducting scientists can be seen as rational behaviour and as a means of self-regulation for the scientific community (Azoulay et al., 2015b), it turns into wasteful ignorance of public knowledge if it spills over to others.

To the best of our knowledge, there is no solution to this problem. Transparency about guilt, a presumably obvious measure, apparently is a necessary but not sufficient precondition as the U.S. ORI already publishes detailed information about the investigated cases, including the names of the scientists found guilty. This should help the community to distinguish fraudulent scientists from innocent bystanders, yet we do not find innocent bystanders emerging entirely unscathed from a misconduct scandal.

One important implication of our findings is that incentives for scientists to blow the whistle on unethical behaviour on the part of their collaborators are very low. Scientists are unlikely to draw attention to foul play if they can expect to be considered complicit by association. Such behaviour hinders the self-correction mechanism that science relies on. This implies that it is even more important to prevent misconduct at the bench, where it can be corrected without affecting the careers of others.

We contribute to the previous literature in several ways. First, by drawing on the theory of social stigmatization (Goffman, 1963; Pontikes et al., 2010), we provide a general explanation for previously documented negative implications of scientific misconduct and retractions on closely related parties (Mongeon and Larivière, 2015) and the afflicted research field (Azoulay et al., 2015a). These articles employ three different mechanisms to describe their findings. The first is Bayesian updating of beliefs (Azoulay et al., 2015b, Jin et al., 2013), which predicts that after retractions come to light, the scientists involved are considered to be of lower 'quality' than before. Second, a loss of trust may lead scientists to avoid citing work associated with misconduct – even indirectly – in order to protect their integrity (Fuchs and Westervelt, 1996). Lastly, the actual or feared invalidation of part of the scientific field by a retraction may incentivize scientists to refocus on different research topics (Azoulay et al., 2015a). The concept of stigmatization allows us to connect these different mechanisms. Caused by a *loss of trust*, social stigmatization can be the reason for a *Bayesian updating of beliefs* about the "quality" of prior collaborators and the means by which the members of the scientific community *protect their own scientific integrity*.

Second, our study focuses only on investigated cases of scientific misconduct in the field of medical research. Unlike most of the previous studies that are based on retractions (Azoulay et al., 2015a,b; Jin et al., 2013; Lu et al., 2013; Mongeon and Larivière, 2015), we base our findings on an analysis of the Findings of Research Misconduct published by the ORI, the central U.S. authority that is responsible for investigating scientific misconduct cases in biomedical research funded by the NIH throughout the country, between 1993 and 2008. This data constitutes a complete list of cases of scientific misconduct committed by NIH grant recipients and grant recipients at the PHS investigated by the ORI. We thus avoid the considerable uncertainty inherent to retraction-based analyses and instead base our analysis on confirmed cases of scientific misconduct (Azoulay et al., 2015a; Fang et al., 2012; Van Noorden, 2011). In doing so, we expand the literature analysing misconduct investigated by the ORI (Lubalin and Matheson, 1999; Pozzi and David, 2007; Redman and Merz, 2008; Resnik and Dinse, 2012; Reynolds, 2004; Rhoades, 2004; Wright et al., 2008).

Third, we contribute to the understanding of the consequences of misconduct on science by empirically showing that the implications of scientific misconduct reach beyond the scientists involved in the project and the fraudulent scientists' institutions. Specifically, our analysis shows that misconduct scandals affect prior collaborators. Hence, the potential fallout of a misconduct scandal is much wider than one might assume.

The remainder of the paper is organized as follows. In the next section, we develop our theoretical framework. Section three provides an overview of the institutional framework in the U.S. Section four details our methodology, while section five presents the data along with descriptive statistics. The results are presented in section six. Section seven concludes.

2. Conceptual framework

This section describes the key features of the scientific system that help our understanding of the incentives for scientific misconduct. The second part of this section draws on sociological research in order to introduce the concept of social stigmatization and apply it to the context of science and misconduct.

2.1. Science and misconduct

Trust is an important pillar of the scientific system (Dasgupta and David, 1994). This is due to distinctive features of the system itself, including the way in which scientists compete, the cumulative nature of science (Merton, 1973), and the freedom that scientists enjoy when choosing their projects (Stern, 2004; Aghion et al., 2008).

Scientists compete in a race for priority, advancing their reputation when they are the first to publish new discoveries in scientific journals. The rewards for publishing include access to further resources, prestigious jobs offers, contacts to peers in science, as well as other lucrative opportunities both within and outside of the academic sector (Merton, 1973). The race for priority is a winner-takes-all game, with the second to finish getting (almost) nothing, even though (his or) her investment might have been large. This structure is beneficial for society as it creates incentives for scientists to disclose their discoveries as soon as possible, thus allowing follow-up research to be conducted in a speedy manner and avoiding the duplication of research streams (Merton, 1957; Dasgupta and David, 1994; Stephan, 2012). The nature of scientific competition hence advances scientific progress. The absence of formal intellectual property rights in the usual scientific process further accelerates the dissemination and adaption of scientific results. The fact that third parties can freely access, exploit and modify a published idea is well in line with the scientists' pursuit of maximizing their reputation (Fleming and Sorenson, 2004; Murray and O'Mahony, 2007)

The downside of the winner-takes-all competition in science is that it creates incentives to cheat. As in sports, a someone might find it beneficial to use forbidden means in order to increase their chances of winning the race. Classic game theory predicts that it can be a rational strategy to cheat in these settings, at least when the chances of being caught are relatively low (Nalebuff and Stiglitz, 1983). This seems to be the case in science because incentives for replication and other forms of double checking published results are low (Dewald et al., 1986; Hamermesh, 2007). Kiri et al. (2015) as well as Lacetera and Zirulia (2011) investigate the peer review system in a game theoretical setting. The predictions of their models include a certain positive equilibrium