Co-author responsibility

Distinguishing between the moral and epistemic aspects of trust

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Several high-profile cases of research misconduct during the past decade have explicitly raised the question whether co-authors share responsibility for scientific misconduct perpetrated by a collaborator. There is no clear answer though, as different cases of misconduct differ in terms of how the co-authors were involved in the work. Nonetheless, media coverage, public interest, and intense debates have at least increased awareness and triggered discussion among the scientific community over the issue of co-author responsibility. This article aims to contribute to this important discussion by analyzing four particular high-profile cases of scientific misconduct and providing a deeper analysis of trust in research with a special emphasis on cooperators' and co-authors' responsibility for fraudulent or flawed research. Our working hypothesis is that we can distinguish between a moral and an epistemic dimension of trust that have different repercussions for how scientists should deal with and prevent misconduct.

Jan Hendrik Schön received his PhD in physics at the University of Konstanz in Germany in 1997 and started working as a postdoc at the Bell Laboratories in Murray Hill, NJ, USA, in 1998, under the supervision of solid-state physicist Bertram Batlogg. His research on superconductors seemed to make dramatic progress, and Schön published in prominent journals such as *Science* and *Nature*. In 2001, Schön published an article per week on average; papers that reported stunning results, such as a single-molecule transistor. His unusually high productivity and extraordinary results raised suspicion among his colleagues. Other scientists eventually discovered that papers reporting different experiments contained identical graphs of

random noise. They alerted officials at Bell Laboratories, who formed a misconduct investigation committee. The committee found compelling evidence of data manipulation and misrepresentation in several of Schön's papers, and during 2002–2003, almost thirty papers were withdrawn by *Science*, *Nature*, *Physical Review*, *Applied Physics Letters*, and *Advanced Materials*.

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As part of its investigation, the committee examined drafts of the papers and conducted extensive interviews with the three primary co-authors. They found that almost all experimentation and data processing had been carried out by Schön alone and that none of the co-authors had seen any of the experiments behind the most significant results. The committee cleared all of Schön's co-authors of scientific misconduct, but questioned whether they had shown sufficient responsibility to ensure the validity of the data and the claims. Two of Schön's collaborators—one had grown crystals and the other had synthesized molecules and films of organic material—did not have any deep expertise in those areas in which Schön was publishing, and the committee therefore concluded that it would be unreasonable to expect them to have noticed the data manipulation. Yet, the committee questioned

whether Schön's senior co-author, Bertram Batlogg, was sufficiently critical and whether he should have insisted on an exceptional degree of validation, given the extraordinary results reported in the papers. Although the committee stressed that the responsibility of co-authors was distinguishable from scientific misconduct, they also found this responsibility a complicated issue that varied with the co-authors' expertise, their contributions, and their role in the collaboration. Finding itself unable to offer a definitive resolution to the question about co-authors' responsibilities, the committee also hoped to stimulate discussion of the question in the scientific community.

Woo Suk Hwang was working on genetically modified livestock at Seoul National University in South Korea. By the mid-2000s, Hwang became famous when he and his collaborators reported the cloning of human cells and the creation of 11 human embryonic stem cell lines by somatic cell nuclear transfer. After an initial scandal—Hwang had used oocytes donated from employees in his laboratory—it was discovered that the research papers on the human embryonic cell lines had duplicated photographs and that the data did not show the expected inter-experimental variation. An investigation by Seoul National University eventually found that Hwang's publications on human stem cell lines were based on fabricated data.

The two fraudulent papers had been co-authored with Gerald Schatten, a leading American stem cell researcher. His employer, the University of Pittsburgh, conducted its own investigation into whether Schatten shared any responsibility for the fraud; the university found no evidence that Schatten had been aware of Hwang's misconduct.

However, the investigative committee did find that, as a scientist, Schatten had not exercised a sufficiently critical perspective because he did not react to changes of results and procedures that should have roused suspicion. Furthermore, the committee pointed out that Schatten was the sole signatory of the submitted cover letter for one of the fraudulent papers. According to the investigative report: “in this letter, it was stated that all authors agreed that they had read and approved the manuscript. However, information communicated to [the investigative committee] suggests that [sic] the likelihood that only a few of the 25 authors read the manuscript prior to submission and that perhaps many did not read it until it was accepted and available online. As co-corresponding author and sole signer of the cover letter, Dr. Schatten must assume responsibility for including this false statement. We cannot rule out the possibility that if more authors had reviewed the manuscript, they would have noted and reported the falsification and fabrication detailed by the SNU Investigation” (http://ecommons.library.cornell.edu/bitstream/1813/11589/1/Gerald_Schatten_Final_Report_2.08.pdf, p. 7f.). The committee concluded that although Schatten was cleared of misconduct, and although he had reacted expeditiously and appropriately on allegations of Hwang’s misconduct, he had still shirked his responsibilities as a co-author.

Diederik Stapel was head of a social psychology group at Tilburg University in the Netherlands and published numerous papers in high-profile journals on how environmental factors influence human behavior. Stapel, who was found guilty of serious scientific misconduct and suspended from the university in 2011, developed an ingenious way to hide how he falsified and fabricated data from his collaborators. They would typically develop a set of hypotheses and experimental tests in real-life settings at various institutions. Stapel would then allegedly contact the institutions where the experiment should be carried out, deliver the necessary material, collect the data, and finally pass these data on to junior collaborator(s) for analysis. Eventually, three of his collaborators raised suspicion about the data. Tilburg University, as well as the two previous universities at which Stapel had previously worked—Groningen and Amsterdam—began to investigate the allegations. The three committees found many cases in

which experiments and data collection had been entirely fictitious, and 55 publications turned out to be fraudulent. The committees also stated in their joint report that there was no evidence that co-authors were guilty of misconduct; because most of Stapel’s collaborators were graduate students and postdocs, the committees argued that they had to trust the integrity of their supervisor and that, consequently, they could not be expected to have taken a more critical stance.

Silvia Bulfone-Paus was head of the Department of Immunology and Cell Biology at the Research Center Borstel in Germany. In 2010, she reported to the German Research Foundation (DFG) allegations about data manipulation in some of her publications. An investigative committee confirmed data manipulation in four publications by two postdocs who were the first authors of these publications. With respect to Bulfone-Paus, the committee concluded that although she had not been involved in the actual data manipulation, she had been grossly negligent as a supervisor to the extent that it constituted scientific misconduct.

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A number of Bulfone-Paus’ colleagues wrote an open letter to the research center in which they criticized the verdict of misconduct. They claimed that Bulfone-Paus had never had reason to question the two postdocs’ work and that she was a victim rather than a culprit. In response, the center’s Board of Directors replied that, “The view of the commission initiated by the Research Center Borstel, which is likely to be accepted by a wider scientific community, was that the first, the corresponding and the senior author of a scientific paper reporting original research data bear equal responsibilities for the validity of the publication” (http://www.fz-borstel.de/cms/fileadmin/content_fz/downloads/Pressemitteilungen/2011/Responseto-openletter.pdf). They also stressed that

Bulfone-Paus had already received “repeated warnings” about the data and hesitated before taking appropriate action. In the view of the board, her reluctance to investigate the allegations had therefore damaged the reputation of the research center and of biomedical research in Germany.

Despite the differences in these cases, and the different conclusions arrived at by the investigating committees, there seems to a basic appreciation that senior co-authors and supervisors in particular carry some kind of responsibility for the integrity of the data and results in published papers. Violating or ignoring this responsibility does not necessarily amount to outright scientific misconduct, even though the investigators in the Bulfone-Paus case interpreted her negligence of her duties as a supervisor as misconduct. Thus, there is an intuitive understanding that co-authors generally should have some responsibility; however, to move beyond this relatively vague notion, more analysis is needed. A first step for clarifying the responsibility of co-authors and its implications is to distinguish between their responsibilities prior to and after publication, which is implicitly laid out in the guidelines to publish provided by journals and their editors.

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As a reaction to high-profile cases of misconduct, some journals have tried to increase transparency with respect to credit and responsibility by requiring statements that explicitly describe each individual author’s contribution to the publication. This was first introduced in the late 1990s by a number of biomedical journals in response to a suggestion from, among others, the editors of the *New England Journal of Medicine* and *JAMA* [1]. Many journals outside the biomedical fields have also

adopted contribution statements, including *Science* and the *Nature* journals.

Another proposal did not reach the same level of popularity, namely the idea that a few named “guarantors” would take special responsibility for the integrity of the entire work and would be accountable both before and after publication. By organizing, overseeing, and double-checking, the guarantor would minimize the risk of misconduct prior to publication and be responsible for taking immediate action if concerns were raised about a published paper—and, as an ultimate measure, withdrawing his or her guarantee. The International Committee of Medical Journal Editors (ICMJE) recently included in their authorship guidelines that an author must be accountable for all aspects of the work, ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated, and should be able to identify who is responsible for each component in the paper [2].

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Similar to the guarantor proposal, it is important to distinguish between the pre-publication responsibility for preventing misconduct from happening (being confident in the integrity of collaborators) and the post-publication responsibility for promptly responding to any concerns (ensuring that questions related to the integrity of a work is investigated and resolved). Hesitating to act properly to allegations about misconduct is therefore willingly neglecting a post-publication responsibility. But the question still remains regarding the pre-publication responsibility for preventing misconduct among collaborators. On this issue, philosophical analyses of trust in science can help us to come to a better definition of this particular responsibility.

A recurrent theme in discussions about co-author responsibility is the importance of trust in science. The general argument is that trust is essential for

collaborative research because tight control will be detrimental to the open and free nature of science. Moreover, mutual control would not even be possible for collaborations that span different disciplines and great physical distances. But trust has several dimensions, and a clear distinction between these dimensions would provide a key to resolving some of the complicated issues related to co-author responsibility, including confidence in the ability and integrity of co-authors.

The philosopher John Hardwig (University of Tennessee, USA) has argued that rational trust requires a criterion, namely that a co-author’s trust in a claim made by a collaborator requires that the collaborator’s reasons for the claim are epistemically better than the reasons which the co-author can come up with [3, 4], that the co-author believes that the collaborator knows what would be good reasons for the claim, that the collaborator actually has these good reasons, and that the collaborator speaks truthfully when making the claim. The co-author’s trust in the collaborator therefore relies on reasons for believing in both the *moral character* and the *epistemic character* of the collaborator: the collaborator’s truthfulness is part of the moral character, while competence, conscientiousness, and self-assessment are part of the epistemic character. In this way, the co-author’s reasons for believing in the collaborator’s moral and epistemic character forms part of the co-author’s total reasons for believing the claim in question [5].

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Hardwig’s analysis provides a philosophical basis for ICMJE’s statement regarding the recent addition to the Vancouver guidelines which explicate that co-authors should be confident in their collaborators’ ability (epistemic character) and integrity (moral character) and that this is part of authorship responsibility to refrain from collaborations with co-authors whose integrity or quality of work raises concerns [6]. Furthermore, Hardwig’s analysis underlines that trust should not be blind, but needs to be based on reasons for believing in a collaborator’s

epistemic and moral character. However, the assessments of moral and epistemic character differ substantially in kind, and this gives rise to important distinctions in the responsibility of co-authors.

The basis for judging another scientist’s epistemic character will always be the assessor’s own expertise. To assess whether a collaborator is knowledgeable requires that the assessor is at least as knowledgeable. Hence, there is an asymmetry between senior and junior scientists because the former are capable of assessing the latter’s epistemic character, but not necessarily the other way around. By the same token, assessment of epistemic character is an integral part of the education of young scientists. As supervisors, senior scientists are expected to judge the work of their junior collaborators and intervene if it is not up to standards. Senior scientists regularly write reference letters for their junior colleagues in which they explicitly describe their command of the field and the thoroughness of their work. Senior scientists’ assessment of junior colleagues’ epistemic character is therefore an integral and explicit part of normal practices.

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Assessment of epistemic character between senior peers is a more intricate task. First, senior collaborators are only able to assess the epistemic character of each other if they share expertise. If they do not, they have to make indirect judgments, for example by drawing on assessments performed by others, by assessing previous work, or by assessing general argumentative power [7,8]. Second, whether direct or indirect, such assessments are usually not explicit unless outstanding competence may be remunerated through prizes or rewards. At the other end of the spectrum, incompetence may be the topic of rumors, but scientists seldom make such statements openly. The epistemic character of senior peers is something that is rarely addressed officially, especially when it is found lacking.

This analysis supports the intuition shared by most scientists and editors that

responsibility varies with seniority and with area of expertise. Senior collaborators may be responsible for the work of their juniors because they are in a position to assess it, but not the other way around. Similarly, collaborators from the same field may be responsible for shared work because they can assess it, whereas this does not hold for collaborators from different fields.

But Hardwig's analysis also enables us to reflect with more nuance on the responsibility of a co-author who places trust in a collaborator whose work is not up to standards. Failure to establish sufficient warrant for a belief, namely the belief in the collaborator's competence and conscientiousness, is an epistemic failure. In science, such epistemic failures are regarded as poor science. Insufficient calibration and control, ignoring alternative explanations, and objections are other examples. These are all actions of omission that qualify as poor science, but not as scientific misconduct.

Evaluation of moral character differs from the evaluation of epistemic character. Science has often been described as driven by scientists' dedicated search for

truth. But, despite their centrality, moral virtues such as truthfulness have not traditionally been considered a topic for training, nor is it expected of senior scientists to assess novices' moral character on par with assessing their epistemic character. Instead, it is tacitly expected that scientists are truthful and that moral character is therefore not something that needs to be addressed. In addition, rational choice arguments based on the assumption that individual scientists act as self-interested agents state that it is in the best self-interest of scientists to be trustworthy, owing to the severe sanctions for untrustworthiness and that it is therefore rational to trust them.

However, as argued by the philosopher Karen Frost-Arnold (Hobart & William Smith College, USA) [9], this reliance on self-interest has severe limitations, including that it does not necessarily hold for individuals with little power such as junior scientists and that it builds on a questionable assumption of reliable mechanisms to detect violations of trust. Instead, Frost-Arnold points out that scientists do ground their trust in the evidence of moral virtues, such as honesty, loyalty, cooperativeness, fairness, consider-

ation for others, and so on. Consequently, the assessment of moral character as a precondition for trust need not lead to a culture of distrust and control, but instead to the recognition that it is integral to collaborative scientific practices, even if they are usually not made explicit and often remain opaque.

If we recognize the importance of such assessment, we need to analyze how moral character and its local interpretation in different disciplines can be made transparent in scientific practice. Furthermore, we must reflect on how the ability to recognize deviations from standard practices in providing, sharing, and discussing results can be included in Responsible Conduct of Research (RCR) training.

Is a co-author's failure to identify the misconduct of a collaborator a moral failure that qualifies as scientific misconduct, or is it an epistemic failure that qualifies as poor science? Tacitly overlooking glaring misconduct without intervening would constitute complicity to the immoral act and thereby qualify as misconduct. But such cases are rare. In most cases, misconduct is performed in isolation, without the collaborators' knowledge. Nevertheless, co-authors sometimes find themselves in a situation where results

appear “strange” or “almost too good to be true”. It is important to remember that extraordinary results call for an extraordinary level of proof. Not providing such proof is an epistemic failure and poor science. But the ability to identify the extraordinary and to provide sufficient reasons to warrant its acceptance depends on expertise, and this epistemic responsibility therefore varies between juniors and seniors and between experts from different fields. This explains why seniors carry a larger responsibility than juniors, and why collaborators from different fields have only a limited responsibility outside their area of expertise.

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Extraordinary results also call for extraordinary cooperation and hence for extraordinarily sound judgment of moral character. Secrecy, concealment, or sudden and unexplained corrections when critical questions are asked should serve as warning signs

and prompt scientists to assess their collaborators’ moral character. Recent and historical cases show that this is often not the case. The early 20th century scandal about the work of the physicist Emil Rupp has revealed how Albert Einstein, during his collaboration with Rupp, witnessed him changing his data several times and remarkably quickly so that they became in better accordance with Einstein’s own position. Even when it had to be clear to Einstein that something was seriously wrong with Rupp’s result, he still presented his work to the Prussian Academy and had it printed alongside his own [10]. The desire to see a theory confirmed may prevent collaborators from recognizing potential warning signs. Nevertheless, it is here where the slippery slide toward negligence begins that may end in moral complicity by willingly closing the eyes to glaring misconduct. Recognizing the importance of assessing moral character may therefore provide an improvement to current collaborative practices.

Conflict of interest

The author declares that she has no conflict of interest.

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