

Demarcating misconduct from misinterpretations and mistakes

Hanne Andersen
Steno Department for Studies of Science and Science Education
University of Aarhus

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1. The emergence of scientific misconduct debates

Within recent years, scientific misconduct has become an increasingly important topic. Spectacular cases have been extensively covered in the news media, such as the cases of the Korean stem cell researcher Hwang, the German nanoscientist Schön, or the Norwegian cancer researcher Sudbø. In *Science's* latest annual "breakthrough of the year" report from December 2006, the descriptions of the year's hottest breakthroughs were accompanied by a similar description of "the breakdown of the year: scientific fraud". But scientific fraud is by no means a new phenomenon. However, until the 1980es it remained the standard view of science that it was a self-correcting system in which fraud would soon be discovered and corrected. This view of science as self-correcting changed in the 1980s after a series of spectacular cases had reached the public media. The so-called "Summerlin case" in which the dermatologist William T. Summerlin from the Sloan-Kettering Cancer Institute had faked transplantation results by darkening skin patches on a white mouse with a black felt-tip pen was vividly described to the public in the 1976 monograph *The Patchwork Mouse* (Hixon 1976). By the same token, the monograph *Betrayers of the Truth* (1982) written by the two science journalists William Broad and Nicholas Wade partly on the basis of the articles they had written for *Science* and for *New Scientist* on various misconduct cases also attracted attention.

2. Misconduct regulations

2.1 US

Responding to what was perceived as a rash of embarrassing cases of fraud in research, the US Congress mandated federal action through the Health Research Extension Act of 1985. After more than a dozen congressional hearings, Federal regulations governing scientific misconduct in research funded by the Public Health Service (PHS) were put in place in 1989 (CRI 1995, p. 1). Misconduct was defined by the PHS as

Fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research. It does not include honest error or honest differences in interpretations or judgements of data (CFR part 50, subpart A., August 8, 1989).

– a definition that has also been referred to as the FFP-definition of scientific misconduct. This FFP-definition was also adopted by the National Science Foundation but was criticized from several sides. Especially, the “other practices that seriously deviate” clause was criticized by some members of the scientific community on the grounds that it might be used to punish creative or novel science (CRI 1995, p. 10). Thus, for example, the National Academy of Science stated in their report *Responsible Science* (1992) that it

"wishes to discourage the possibility that a misconduct complaint could be lodged against scientists based solely on their use of novel or unorthodox research methods" (NAS, p. 27)

Apart from the disagreements on the adequacy of the definition, there was a continued controversy concerning the ability of the scientific community and the government to deal adequately with scientific misconduct, and the Congress therefore created a Commission of Research Integrity that was commissioned to suggest both a better definition of misconduct and adequate administrative procedures to handle the cases.

The recommendation from the commission was to define research misconduct as “significant misbehaviour that improperly appropriates the intellectual property of contribution of others, than intentionally impedes the progress of research, or that risks corrupting the scientific record or compromising the integrity of scientific practices” (CRI, p. 15). Examples of misconduct were listed to include (but not be limited by) misappropriation (replacing the former plagiarism clause), interference, and misrepresentation (replacing the former fabrication and falsification clause), also referred to as the MIM-definition.

What I shall focus on in this paper is misrepresentation and how to draw the line between misconduct and simply poor science when including various forms of

distortions in the definition.

The definition of misrepresentation was stated to have two essential parts: “first, a material or significant false statement or an omission that significantly distorts the truth, and second, a culpable mental state” (CRI 1995, p. 14). Thus, the Commission explicitly noted that “to qualify as research misconduct, an erroneous statement must be made with an intent to deceive” (CRI 1995, p. 14). However, it was also noted that

An intent to deceive is often difficult to prove; proof almost always relies on circumstantial evidence, which can, however, include an analysis of the behavior of the person accused of misconduct. One commonly accepted principle, adopted by the Commission, is that an intent to deceive may be inferred from a person’s acting in reckless disregard for the truth. Conduct that is merely careless or inadvertent is not included in the Commission’s proposed definition of research misconduct (CRI 1995, p. 14)

Further, the qualification was made that “free scientific inquiry naturally includes proposing hypotheses that may ultimately prove to be false, offering interpretations of data that conflict with other interpretations, and making scientific observations and analyses that may prove to be in error” (CRI, p. 17).

Thus, this definition of misrepresentation was to balance delicately between on the one hand including distortions made in reckless disregard for the truth and on the other hand excluding daringly unorthodox or revolutionizing hypothesis.

However, the MIM definition failed to win serious support and remained largely ignored. Instead the “other serious deviations” clause was removed from the FFP-definition, which was finally adopted in the US as the uniform federal definition for research misconduct and published in the Federal Register in December 2000.

2.2 Denmark

But FFP-like definitions have not been adopted everywhere. One of the countries that has adopted a much broader definition is Denmark, that also happened to be the first European country that formed a national body to handle allegations of scientific misconduct. In 1992 the Danish Medical Research Council had established a Committee on Scientific Dishonesty covering the health sciences, and in 1998, the Danish Minister of Research issued an order concerning the Danish Committees on Scientific Dishonesty, establishing three committees covering all areas of research.

The definition of scientific misconduct both for the original medical committee and for the later committees was based on a report commissioned by the Danish

Medical Research Council (Andersen et al. 1992). This report suggested a broad definition of scientific misconduct (or scientific dishonesty, as they preferred to call it):

“Scientific dishonesty has a wide scope. The part which the working group suggests should be included in the field of action of the investigatory system is characterized by forgery or distortion of the scientific message or a false claim of the contribution of researchers. These include deliberate fabrication of data

- selective and undisclosed rejection of undesired results
- substitution with fictitious data
- erroneous use of statistical methods with the aim of drawing other conclusions than those warranted by the available data
- distorted interpretations of results or distortion of conclusion
- plagiarism of the results or entire articles of other researchers
- distorted representation of the results of other researchers
- wrongful or inappropriate attributions of author ship
- misleading grant or job applications” (Andersen et al 1992, p. 20)

Thus, in addition to the mere fabrication and falsification included in the US FFP definition, the Danish definition also included misrepresentations (or distortions of the truth/scientific message) in the forms of e.g. erroneous use of statistical methods and distorted interpretations of result or distorted conclusions.

When the regulations in 1998 were extended to cover all sciences, it was stated in a separate subsection that in order to characterize the behaviour of a scientist as scientific dishonesty it must be documented that the accused has acted with intent or gross negligence. This separation of the definition into two sets of conditions became the basis for the Committees' later practice of distinguishing between 'objective dishonesty' understood as acts that can be characterized by one or several of the listed conditions characterizing distortion of the scientific message or misleading information regarding a person's efforts, and 'subjective dishonesty' understood as acts that in addition to fulfilling the definition of objective dishonesty also fulfil requirement of intent or negligence.

3. Case

This distinction became central in one of the most prominent cases treated by the DCSD: Bjørn Lomborg and his monograph *The Sceptical Environmentalist* (Lomborg 2001).

Bjørn Lomborg received his Masters Degree in political science from the

University of Aarhus in 1991, and his PhD from the University of Copenhagen in 1994 and was immediately hired by the University of Aarhus where he received tenure in 1997. Until the end of 1997, the publications he had reported to the annual reports of the university covered six papers, all on game theory and the simulation of multiparty systems.

In the beginning of 1998, Lomborg and some of his students wrote a number of feature articles in one of the major Danish newspapers in which they argued that the standard conceptions of the state of the environment are wrong: we are not developing a shortage of raw materials, we are not losing species at an alarming rate, and the importance of the green house effect is questionable (Lomborg 1998a-c, Larsen 1998). In September the same year Lomborg had expanded the material into a monograph in Danish with the title "The True State of The World" (*Verdens Sande Tilstand*, Lomborg 1998d) which gave rise to intense discussions, including a rejoinder in the form of the monograph "The Price of the Future" (*Fremtidens Pris*, Schroll et al. 1999) published in May 1999 and Lomborg's rejoinder to the rejoinder, the monograph "The Price of Goodness" (*Godhedens Pris*, Lomborg & Larsen 1999) published just five weeks later. In August 2001 Lomborg's initial monograph was published in English with the title *The Sceptical Environmentalist* (Lomborg 2001).

Nationally as well as internationally, Lomborg created a stir. He was repeatedly interviewed on television, and appeared in programs like HardTalk, NewsNight and 60 Minutes. He was selected "Global Leader for Tomorrow" by the World Economic Forum, named one of the 50 stars of Europe by Business Week, and named one of the world's 100 most influential people by Time Magazine.

By the end of 2001 the Danish Committees on Scientific Dishonesty received a number of complaints regarding *The Sceptical Environmentalist*. In its ruling, the Committees had to settle two issues: 1) whether *The Sceptical Environmentalist* should be considered a scientific publication, and if so, 2) if it qualified as scientific misconduct.

With respect to the first issue, if *The Sceptical Environmentalist* was a scientific publication, some members of the committees argued that "in its manifest one-sidedness" and "with the vast breadth of topics treated and the lack of qualification of any scientific method - including criteria for the selection of sources" it did not "present the appearance of a scientific work but precisely that of a provocative debate-generating

book” that should not be treated by the Committees. Other members argued that because Lomborg presented himself as associate professor of statistics, because the many notes and references gave the book a scientific form and because it was listed as a research monograph in the University of Aarhus Yearbook it had to be treated by the Committees. Without further argument, the Committees concluded that “all members of the three DCSD committees concur in the view that DCSD should not simply decline to take a position on the complaints” (dcsd 2003). The DCSD thus decided to treat the case, although it was not clear from the final document which arguments and been decisive for this decision.

With respect to the second issue, whether it was a case of scientific misconduct, the DCSD argued, based on a summary of the review in the magazine *Scientific American*, that “that there has been such perversion of the scientific message in the form of systematically biased representation that the objective criteria for upholding scientific dishonesty ... have been met”. However, with regard to intent, the DCSD argued that “in consideration of the extraordinarily wide-ranging scientific topics dealt with by [Lomborg] without having any special scientific expertise” it could not be justified that Lomborg had acted with intent. Consequently, the DCSD arrived at the ruling, that

“Objectively speaking, the publication of the work under consideration is deemed to fall within the concept of scientific dishonesty. In view of the subjective requirements made in terms of intent or gross negligence, however, Bjørn Lomborg's publication cannot fall within the bounds of this characterization. Conversely, the publication is deemed clearly contrary to the standards of good scientific practice” (DCSD 2003).

4. The danger of including distortions in the definition

By including distorted interpretations and conclusions in the definition of scientific misconduct, the DCSD became vulnerable to cases like the Lomborg case that concerned scientific results that some would see as outrageously wrong and suspect to be distortions. When the regulations about the scientific dishonesty were issued in 1998, it was noted by a professor of economics at the University of Copenhagen that they were an invitation to file complaints, exemplifying by what he saw as clearly ridiculous

examples: "Greenpeace may bring charges against Lomborg if they like! Resistance men may question historians' views of WWII in this forum, etc." (Hjorth-Andersen 1998).

At first this prophecy remained unfulfilled. But after the Lomborg case, other cases soon followed. Thus, when in May 2003 the Danish Democracy and Power Study published a report on globalization and nationalism in Denmark, linking the Danes' widespread fear of anything non-Danish to a special kind of fundamentalist Protestantism, two clergymen representing the very nationally inclined Danish People's Party in the Danish parliament immediately filed charges of scientific dishonesty against the authors of the report (see e.g. Astrup 2003 as well as DCSD 2004, p. 32). The case was dismissed by the DCSD (DCSD 2004, p. 32), and the clergymen reacted by demanding the abolition of the DCSD (see e.g. Ravn 2003). Likewise, among historians a heated discussion raged concerning communism and socialism in Denmark in the post-war era, and dismissing each other's work as scientific dishonesty became part of the standard rhetorical strategies (see e.g. Rohleder 2003, Sørensen 2003).

5. Arguments for including distortions in the definition

Obviously this had not been the intention when the regulations were created. But what had been the arguments for including distortions in the definition? In the 1992 report that provided the basis for the first Danish Committee on Scientific Dishonesty the key premise was that "honesty and credibility are a necessary foundation for research and for its interaction with society" (Andersen et al. 1992, p. 13).

Regarding the former point, honesty and reliability as a foundation for research, the report emphasized the necessity that researchers can "build upon the results of others, in confidence that these results are honest representations of observations made" (Andersen et al. 1992, p. 12). This would seem to primarily set the stage for regulations of the Falsification & Fabrication type. However, it was also noted that with respect to lack of good research planning, erroneous or twisted interpretation of data, or insufficient use of statistics, "the dividing line between scientific dishonesty and low quality scientific work is vague" - and it was then stated that "From a purely scientific point of view, it is probably much more desirable to clear up this grey zone than to establish restrictive rules aimed at preventing e.g. conscious forgery of primary data"

(Andersen et al 1992, p. 50).

In other publications from the medical committee on scientific dishonesty, it seemed that with respect to the latter point, honesty and reliability as a necessary foundation for the interaction between science and society, an important point was to avoid the communication of untenable results to the public. However, the critical evaluation was continuously linked to debate and criticism *among researchers*, not solely to the efforts of the *individual researcher*. Thus, these arguments regarding the interaction of science with society seemed to set the stage for regulations about the necessity of peer review in ensuring the quality of the communicated results, and consequently a ban on prepublication of results in the public media prior to the critical scrutiny involved in the peer review process. Nevertheless, prepublication in public media remained only mentioned among 'other forms of misconduct' that were not considered full-blown 'scientific dishonesty' (cf. Andersen et al. 1992, p. 21).

However, in the Lomborg case, the DCSD had noted in their ruling that the topics dealt with in *The Sceptical Environmentalist* were of great political and social interest, and that it was out of keeping with good scientific practice to bypass specialist academic fora and publish directly to the general public. But it was not explicitly discussed whether this was what Lomborg had done. Thus, rather than discussing whether Lomborg had bypassed specialist academic fora – which would have been hard to argue, given that *The Sceptical Environmentalist* was published by a university press – the DCSD indicated that Cambridge University Press were to blame for having published the book, and that either the book had not been through peer review, or the reviewers had not had the sufficient scientific expertise within the main topic of the book, the environmental sciences (see Harrison 2004 for CUP's views on this issue). As a further consideration with respect to communications of research results to the public, the DCSD argued that

"when researchers make statements to the press about research results, their opinions are often ascribed greater importance than those of non-researchers, regardless of whether such statements relate to topics remote from their own area of expertise and in which they therefore have no qualified opinion to match their formal position and any academic degree they may hold. This requires researchers not to misuse their title and position in communications with the public" (DCSD 2003).

Again, it was not explicitly discussed whether Lomborg had offended against these rules of conduct, it was only mentioned as a premise for the decision to treat the case that Lomborg in the book presented himself as associate professor in statistics. Further, even if Lomborg had offended against such a rule of conduct, misusing his title of associate professor to look like an expert of a field which he did in fact not master, it was not included in the definition of scientific dishonesty that only included incorrect information about the scientist when these were used in research applications.

In summary, if the DCSD was primarily concerned with ensuring the publication only of the most viable results to the public, this concern would have called for, first, a definition of what qualifies as scientific publications that would include not only considerations of the character of the publication, but also considerations of the author's area of expertise, and second, an obligation for scientists to engage in organized scepticism in the form of peer review, and a ban of public pre-publication, closely linked to an obligation for publishers to perform peer review of all scholarly publications.

6. Discussion

How did scientific misconduct end in this mess? Scientific misconduct is both about ethics, law and epistemology. Let us look first at the legal issue, culpability. Culpability comes in different degrees. First, as the most serious degree, responsibility is incurred by an intentional act. Second and less seriously, the act may be reckless, that is, characterized by gross negligence. Third, as the least serious degree, the act may be inadvertent, that is, characterized by negligence.

It is the issue of negligence that shall concern us here. Usually, negligence means discarding the standards of a normal, reasonable person and similarly gross negligence means significant deviations from what a normal, reasonable person would do. But what does that mean within *science*? This epistemological issue has largely been ignored in the misconduct discussions, but it is crucial when it comes to questions regarding revolutionary science and to questions regarding areas of expertise. Thus, what a reasonable scientist would do will depend on the paradigm that the scientist in question is working within.

This is, of course, what is expressed in the various worries that misconduct

should not include the use of novel or unorthodox research methods. But to avoid that revolutionary science be included in the misconduct definition would mean that negligence would have to be defined as deviations from what *any* reasonable scientist would do, independently of paradigms. Only very general methodological norms would seem to come into question for such a definition and leave a very narrow definition, like the FFP-definition.

Conversely, if it is attempted to include paradigm-specific norms in this concept of "what-a-reasonable-scientist will do", then these norms hold only for that scientific community whose members ascribe to this paradigm. Thus, if paradigm-specific norms are included, a definition of scientific misconduct will have to be linked to a demarcation of the relevant scientific community.

Thus, from these epistemological considerations there is a tendency to stay with a narrow definition of scientific misconduct.

But other considerations draw in the opposite direction. Thus, in many countries scientific misconduct discussions started in the biomedical realm and included also an ethical concern for the health of the citizenry. To avoid harm of the citizens they should be protected from false research results - whether produced intentionally or by negligence. Thus, from this consideration of protection of the public it is tempting to call for a broad definition of misconduct - although the inclusion of negligence will of course raise the same epistemological challenges as described previously.

It is this tension between ethical considerations and epistemological considerations pointing in opposite directions that seems to have created both much discussion and much confusion. The way out of the mess would seem to be much more explicit discussions of each of these considerations - philosophy of science very much in practice!

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