Principles and Approaches in Ethics Assessment

Research Integrity

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Annex 1.b
Ethical Assessment of Research and Innovation: A Comparative Analysis of Practices and Institutions in the EU and selected other countries
Deliverable 1.1

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1 Introduction

Scientific research is a conscious and systematic approach to acquire knowledge, based on theories, methods and standards that have been developed through the history of scientific disciplines. The terms "research integrity" and "good research practice" refer to ideals for how research ought to be performed.

In the 1940s the American sociologist Robert Merton proposed norms for scientific research that have influenced the discussion on research integrity since then. According to Merton good research should not be secret or anyone's property but requires instead openness and publicity. Merton uses the term communism/communalism for this norm. The second norm, according to Merton, is universalism, which means that the only relevant criteria for assessing research are the scientific criteria. The position or characteristic of the researcher has no relevance. Thirdly, disinterestedness means that the main motive driving the researcher should be the quest for knowledge, not for example economic gain or fame. Finally, the researcher should always be open for questioning the result. Merton calls this "organized scepticism". This norm coheres with Karl Popper's famous demarcation line between research and other activities; falsification, i.e. the constant efforts to falsify one's result in order to get closer to the truth.[1] Merton's norms for research are summarized in the acronym CUDOS.[2] Although the exact meaning and implication of Merton's criteria can be discussed, they imply an ideal for scientific work and deviations from this ideal can be seen as misconduct in research.

Merton's CUDOS norms are well-known examples of ideals and norms for science. These norms could be seen as the basis for professional ethics of researchers. Scientific misconduct and fraud are deviation from the ideals of science and good research practice. In the following we first conceptualise the area of scientific misconduct. Then we present some norms, guidelines and codes of scientific integrity. In the next section we argue that scientific misconduct is a real problem that must be taken seriously by the research community and finally we discuss how scientific misconduct is investigated, how common it is and how it can be explained.

2 Description: Scientific Misconduct and Scientific Fraud

Scientific misconduct and scientific fraud imply that the researcher, intentionally or by carelessness, deviates from the ideals of research. There are various forms of scientific misconduct and there is an on-going discussion of how to delimit the concept. In a narrow sense, scientific misconduct implies falsification, fabrication and plagiarism. *Falsification* means that the researcher manipulates research materials and equipment or omits or changes data or results, *fabrication* means that the researcher makes up data or results and *plagiarism*

[1] Popper, Karl, *The Logic of Scientific Discovery*, Routledge, London, 1959.
[2] Merton, Robert, *The Sociology of Science*, University of Chicago Press, Chicago, 1973.

that the researcher uses other researchers' texts, ideas, etc., without given proper recognition.[3] In combination, falsification, fabrication and plagiarism form the acronym FFP.

So far, the conceptualisation in this area is rather ambiguous. The narrow definition of scientific misconduct has been questioned for excluding problematic activities related to research. "Ghost writing" is one example of problematic research practice that is not covered by FFP. Ghost writing means that famous scholars in a field of research put their names on publications that others have produced in order to facilitate the publication. This has for example been practiced by drug companies in order to speed up the marketing of their products.[4] Another questionable research practice is the so called salami-publications. In order to get more publications a researcher splits up a research finding in a number of publishable units. The motive behind is to get as many publications as possible. A third questionable research practice is when a company reveals or delays the reporting of research findings for the reasons that the publication is not in the interest of the company. Should also ghost-writing, salami-publication and revealing or delaying publication be considered as scientific misconduct?

Defining scientific misconduct (and similar phenomena) can have different points of departure. One can start from cases of misconduct that have been investigated and prosecuted. From a number of cases one can deduce views on how to understand misconduct. Another starting point is ideal definitions of science and research. On the basis of views on what characterises exemplary scientific work, for example Merton's CUDOS norms or ideals found in codes of scientific integrity, *The European Code of Conduct for Research Integrity* (ESF) and the *Singapore Statement* (see below), one can identify different kinds of deviations from the ideals. From this point of departure, ghost-writing, salami-publications and the delay of research findings are certainly instances of scientific misconduct.

The conceptual work of defining scientific misconduct must adhere to philosophical standards, such as clarity and precision. The aim of this conceptual work is to stipulate useful definitions in the area of scientific misconduct, much needed by committees that are investigating cases.

One should also note that scientific misconduct varies according to degree and intention. Sloppiness and carelessness leading to false results can be seen as milder forms of misconduct, while fabrication and falsification are graver forms. A careless researcher may have no intention to deceive on the one side, while a fraudulent researcher who fabricates results might do this intentionally. The degrees of misconduct and intentions are well illustrated in the graph below.[5]

[3]The Swedish Research Council's expert group on ethics, *Good Research Practice,* 2011. https://publikationer.vr.se/produkt/good-research-practice/

[4] Saul, Stephanie, "Ghostwriters Used in Vioxx Studies, Article Says", *New York Times,* 15 April 2008. http://www.nytimes.com/2008/04/15/business/15cnd-vioxx.html?hp%3Cbr%20/%3E&_r=0

[5] Nylenna, Magne and Sigmund Simonsen, "Scientific misconduct: a new approach to prevention", *The Lancet*, Volume 367, No. 9526, 10 June 2006, pp. 1882–1884.

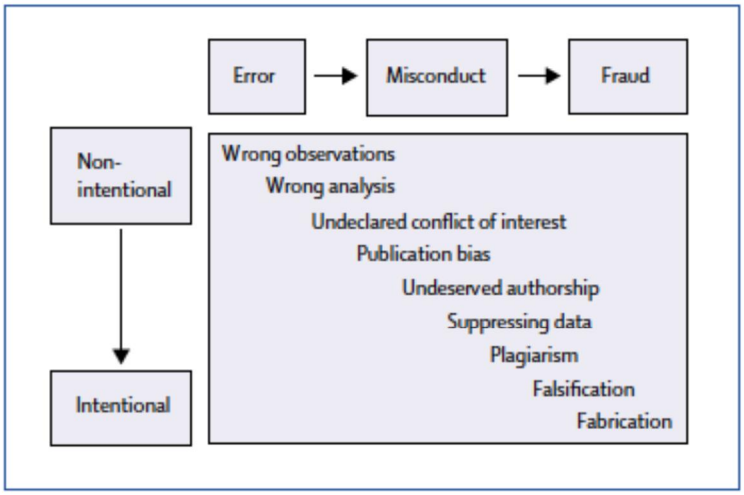

***Figure:* Slippery slope between honest errors and intentional fraud, with examples in the middle**
Horizontal axis represents extent of deviation from acceptable scientific behaviour. Vertical axis represents extent of blame, from excusable errors, via non-intentional but still blameable deviance, to wilful actions.

There are reasons to believe that deviation from good research practice is not uncommon, and even increasing in a time characterised of academic competition and publication stress. Examples of grave and highlighted cases of scientific fraud are the British Doctor Andrew Wakefield's studies linking vaccines and autism,[6] the Korean Woo Suk Wang's research of human cloning,[7] the Norwegian cancer researcher Jon Sudbö's findings of new medicines[8] and the Japanese researcher Haruko Obokata's fabrication of STAP-cells (stimulus-triggered acquisition of pluripotency).[9] These three examples were all cases of fabrication and falsification. In recent years two German ministers, the minister of defence Karl-Theodor zu Guttenberg and the minister of education Annette Schavan, have been forced to step down from their political positions due to allegations of having plagiarised their PhD-theses.[10]

From the figure above, one can conclude that there are numerous different kinds of scientific misconduct and deviations from good research practice. It is also clear that there is a grey zone between bad research and misconduct and it can sometimes be difficult to make clear if a particular case is just an instance of bad research or of misconduct.

There are different reasons why scientific misconduct is challenging. The first reason relates to human existence. The quest for knowledge is a basic human drive. Already the new-born child is eager to learn about the world around him or her. Curiosity and desire to learn is an integral part of human nature and a basic human value. It is a precondition for human and social development. Science can be seen as a way to organise the quest for knowledge and the systematic endeavour to get new knowledge in order to get a better understanding of the world

[6] http://www.bmj.com/content/342/bmj.c7452
[7] https://embrybros.wordpress.com/2011/04/08/375/
[8] http://jnci.oxfordjournals.org/content/98/6/374.long
[9] http://www.japantimes.co.jp/tag/haruko-obokata/
[10] Kulish, Nicholas and Chris Cottrell, "German Fascination With Degrees Claims Latest Victim: Education Minister", *New York Times*, 9 Feb. 2013. http://www.nytimes.com/2013/02/10/world/europe/german-education-chief-quits-in-scandal-reflecting-fascination-with-titles.html?pagewanted=all&_r=0

around us. As a consequence, scientific misconduct violates and undermines a basic value of human life.

Second, research, and in particular the natural, technical and medical sciences, results in new products that in different ways can aid and help humans. Technical research is a condition for new power plants, bridges etc. and medical research for new medicines and treatments. But if the research is not done in a proper way, it might result in deficient products. Then the safety of power plants and bridges and the effects of the medicines and treatments will be challenged. For example, as a consequence of Andrew Wakefield's false report that triple vaccine could cause autism, many parents decided not to vaccine their children, which later led to diseases and deaths. The Norwegian cancer researcher Jon Sudbö's fraudulent research led to ineffective drugs against mouth cancer.

Third, the central aim of science is to provide new knowledge and a better understanding of the world. This aim is undermined by scientific misconduct, since it leads to false views and misunderstandings. This is all the more serious because research is a cumulative process and scientists depend on others' findings. False research results will then lead to further false results.

Fourth, science is to a large extent funded by public means. When cases of scientific misconduct are revealed in the media, this will undermine public trust in science. As a consequence, taxpayers' readiness to contribute to research may diminish.

Finally, scientific misconduct means breaking the important moral norms not to lie and not to steal. Fraudulent researchers who falsify or fabricate their results are lying to the public and researchers who plagiarise others' results steal from scientists who have followed the standards for good research practice.

3 Norms for Good Research Practice. Legislation, regulation, national and international frameworks

The ethical discussion on scientific integrity relates both to norms and rules for good research practice and to scientific virtues. Norms and rules for good research practice are formulated in national and international codes of conduct.

A recent study shows that national guidelines of scientific integrity vary in Europe and globally.[11] 12 European countries lacked guidelines. The following table shows the situation for some of the SATORI target countries regarding national guidelines:

[11] Godecharle, S, Nemery B, Dierickx, K, Guidance on Research integrity: no union in Europe, *Lancet* 2013, 381:1097-98.

	Countries having a national framework to deal with research integrity or misconduct, established by law	Countries having a national framework (or equivalent) to deal with research integrity or misconduct, not established by law	Countries that do not have a national framework to deal with research integrity or misconduct	Countries where no guideline could be identified or analysed
Austria		x		
France			x	
Germany		x		
Netherlands		x		
Poland			x	
Serbia				x
Spain			x	
UK		x		

Table 1: National guidelines of scientific integrity for SATORI target countries

Some guidelines limit scientific misconduct to fabrication, falsification and plagiarism while others include also other forms of misconduct. Some guidelines include intention to deceive in the definition of misconduct, others leave it open if scientific misconduct requires an intention to deceive. In conclusion, the authors plea for harmonisation of European guidelines on research integrity. [12]

In parallel to the increase of EU-funded research and the globalisation of research cooperation one can notice an increased European and global interest in research integrity. This development is illustrated by some recent international codes of conduct. The European Science Foundation (ESF) and ALLEA (All European Academies) formulated in 2011 *The European Code of Conduct for Research Integrity*. The Code starts with the following principles of scientific integrity: honesty in communication, reliability in performing research, objectivity, impartiality and independence, openness and accessibility, duty of care, fairness in providing references and giving credit, and responsibility for the scientists and researchers of the future. The Code contains a number of guiding principles for good research practice and recommends principles for investigating research misconduct. The new Horizon 2020 EU funding programme is also emphasising the importance of research integrity in a more forceful way then the previous programmes did.[13]

The Singapore statement on Research Integrity was declared by the second global conference in research integrity held in Singapore in 2010. It states the following principles for research: "Honesty in all aspects of research, Accountability in the conduct of research, Professional courtesy and fairness in working with others, Good stewardship of research on behalf of others" and then 14 principles of responsibility for the researcher.[14]

The national, European and global codes contain principles for good research practice. However, research integrity can also be seen from a virtue ethics perspective. Then the focus is on the character of the researcher. In line with Alasdair MacIntyre's theory of virtue ethics, research can be seen as a "practice" with some internal values and virtues).[15] Good research is

[12] ibid
[13] http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm
[14] Singapore Statement on Research Integrity 2010
[15] MacIntyre, Alasdair, *After Virtue, a study in moral theory*, Duckworth, London, 1981.

characterised by virtues like honesty, truthfulness, openness, integrity and accuracy. Virtues of how to act as a researcher are, at least ideally, acquired through doctoral education and collegial discussions, research seminars etc.

4 Investigating Scientific Misconduct

Ways and procedures for investigating scientific misconduct vary. Some countries have a central, national board for investigating misconduct while others have decentralised systems in which the universities are responsible for investigating alleged cases.[16]

Normally, after an accusation is made, the responsible body appoints experts working in the same scientific field as the accused researcher and a commission to investigate the alleged case of misconduct. The experts' report then forms the basis for the body's decision.

Accusations of misconduct are very serious matters and can undermine a researcher's reputation even when they are groundless. Therefore it is of utmost importance to observe maximum confidentiality during an investigation.

There is an on-going discussion of whether scientific misconduct should be put to trial as a legal offence or as an ethical matter. One argument for legal regulations is that it would better ensure the security and confidentiality of persons accused for misconduct and procedural justice. On the other hand, while scientific misconduct is a violation of the professional ethics of researchers, it should be dealt with as primarily an ethical offence.

5 How common is Scientific Misconduct?

It is very difficult to estimate the frequency of scientific misconduct. First, any estimation of course depends on how scientific misconduct is delimited and defined. Are only intended falsification, fabrication and plagiarism included or should also sloppiness and deviation from good research practice be considered?

A study by Fanelli in 2009 gives perhaps a hint of the frequency of scientific misconduct. According to Fanelli, who made a meta-analysis of 21 surveys of the prevalence of misconduct, 2-3% of scientists admitted having falsified and fabricated research results themselves, but 14% responded that they knew of colleagues who had fabricated and falsified. When asked about doing other questionable research, 34% admitted that they had done it themselves and 72% believed that colleagues had done it.[17]

Ferric et al. reported to the US National Academy of Sciences in 2012 that in the period 1975-2012, 67.5% of retraced scientific publications were retraced due to misconduct. Out of these,

[16] Godecharle, S., B. Nemery, K. Dierickx, "Guidance on Research integrity: no union in Europe", *Lancet* 2013, 381, pp. 1097-98.
[17] Fanelli, D., "How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data", PLoS ONE 4(5), e5738, 2009. doi:10.1371/journal.pone.0005738

40% were retracted due to falsification or fabrication, 14% due to double publication and 10% due to plagiarism).[18]

6 Explanation of Scientific Misconduct

Research is increasingly becoming competitive. This may lead to a larger number of new scientific results, but the flip side is that incentives to fraudulence or deviation from good research practice also increases. The salami-method is an example of this development. This way of multiplying publications was unknown a few decades ago. The salami-method may not be an example of grave scientific misconduct but the practice is questionable with respect to good scientific practice and the ideals of science. The ideal is to publish research results in the most appropriate and relevant way with respect to the knowledge gained, not to divide the results in parts because of external pressure.

What are then the motives behind scientific misconduct? The following factors have been pointed at in the discussion on misconduct: fame, university positions, rivalry, the race for patents, and, as a consequence, funds. In the humanities or social sciences, ideology can be a motive, i.e. when a researcher wants to prove a political or ideological view with the help of falsifying or fabricating his or her scientific results.

There seems to be a positive correlation between private sponsorship and biased research. Sismondo concludes in his investigation of the impact of sponsorship in pharmaceutical research: “Results are clear: Pharmaceutical company sponsorship is strongly associated with results that favour the sponsors' interests.” [19]

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