Ethics of scientific work and evaluation of scientific publications

Rimas Norvaiša

Vilnius University, Institute of Mathematics and Informatics

Akademijos 4, Vilnius, Phone 2109335, E-mail: rimas.norvaisa@mii.vu.lt

Submitted: August 16, 2011

Abstract. In many countries scientific institutions use metrics of scientific performance when make decisions related to allocation of research resources, salary decisions, scientific performance reviews et cetera. Such type of politics is sometimes called publish or perish culture. In the paper we point out to several works on scientometrics research showing that publish or perish culture has consequences to scientists behaviour. The changes found in this research are discussed in the context of Ethics of a scientific work. We also ask, whether the Lithuanian science policy decisions create an initiative to break Ethics of scientific work?

Key words: Ethics in science, responsible conduct of research, questionable conduct of research, science policy, causes of misconduct

INTRODUCTION

Evaluation of scientific publication is one of the main tools of scientometrics, the science of measuring and analysing science. This type of tools is often called bibliometrics. More generally, bibliometrics means a measurement of the impact of scientific publications. Modern scientometrics is mostly based on the work of Derek J. de Solla Price[1] and Eugene Garfield. The latter founded the Institute for Scientific Information, known as ISI. Currently the institute is owned by Thomson Reuters Corporation.

Also the evaluation of scientific publication is used for policy decisions, like allocation of research resources, salary decisions, award nomination and so on.

[1] Price, D.J. *Little Science, Big Science*. New York. 1963

This practice is used in many countries but in different time periods with a different intensity. The usual argument for this practice is based on simplicity for use and on the alleged relation to quality of science.

In this paper we argue that such science policy distorts the tool of scientometrics and creates an initiative to break Ethics of scientific work. Our argument is based on the so called Campbell's law and on the resent results of the research on research behavior. We apply this conclusion to evaluating the Lithuanian science policy.

We begin with a review of a terminology used to classify research behavior.

RESEARCH (MIS)BEHAVIOR

Generally researchers and policy makers use different terms to refer to the way research should or should not behave. For example, the expressions *integrity in research*, *research ethics* or *responsible conduct of research* are often used without formal definitions. European Science Foundation us the term *good research practice* to describe a related phenomenon ESF[2] . In Lithuania the term *academic ethics* is used both in the context of science research as well as in the context of university studies. There are some differences between the meanings of these phrases. But for the purposes of this paper we adopt the terms suggested by Steneck[3].

Steneck[4] summarized the consensus concerning a description of types of irresponsible conduct of research as follows.

- *Responsible conduct of research* (RCR). RCR represents the ideal which institutions and individuals endeavor to meet. More specifically, RCR is

[2] ESF. Good scientific practice in research and scholarship. *ESF Science policy briefing* 10, 20.12.2000

[3] Steneck, N.H. Fostering Integrity in Research. Science and Engineering Ethics. 2006, 12: 53-74

[4] Supra note 3

conducting research in ways that fulfill the professional responsibilities of researches, as defined by their professional organizations, the institutions for which they work and, when relevant, the government and public.

- *Questionable research practices* (QRP). QRP constitute the actions that violate traditional values and commonly acceptable research practice such as improper authorship, dual submission, salami slicing, redundant publication, improper authorship, sloppy or careless research, misrepresentation of research in publications, bias between subjectivity and objectivity to investigations, bias caused by sources of funding, statistical errors etc.
- *Fabrication, falsification, plagiarism* (FFP). FFP are practices which everyone agrees should be avoided.

Clearly, we have the following relations between these groups of behavior:

RCR (ideal) ← --- QRP ---→ FFP (worst).

Around eightieth and ninetieth of the last century it was commonly assumed by policy makers and research community in the USA that the worst behaviors FFP are not acceptable but rare. It was also assumed that QRP is troubling but not serious enough to warrant government action. A similar opinion is widespread at present among Lithuanians. One can see this by reading the comments to papers in the internet criticizing the questionable research practice.

Recent research on research behavior shows that this description is far from being adequate[5]. At least in USA where such research has more than 30 years long history.

It also depends on the attitude with respect to the QRP in the research community. These attitudes are related to what people think about manipulative misrepresentation. The philosopher Harry G. Frankfort calls this type behavior as

[5] Steneck, N.H. Fostering Integrity in Research. Science and Engineering Ethics. 2006, 12: 53-74

bullshit in his book[6] [2005]. He argues that bullshit (manipulative misrepresentation) is worse than an actual lie since it denies the value of truth. Specifically he says that "[a] bullshiter's fakery consists not in misrepresenting a state of affairs but in concealing his own indifference to the truth of what he says. The liar, by contrast, is concerned with the truth, in a perverse sort of fashion: he wants to lead us away from it." Bullshitters ignore the rules of an honest behavior altogether which is more dangerous since it denies the value of truth and the harm resulting from dishonesty. Thus the questionable research practice may not bother the researchers and the society if it tolerates bullshitters.

IMPACT AND CAUSES OF MISCONDUCT

Measuring the frequency of the irresponsible behavior does not provide information about its real impact to science and society. Steneck[7] lists four types of negative impact. The irresponsible behavior can: "(1) undermine the reliability of the research record, (2) weaken the trust colleagues have in one another and the trust the public has in researchers, (3) waste research funds, and (4) lead to decisions that cause public and/or personal harm".

One may wonder about differences between possible impact on the reliability of research may have FFP and QRP. Plagiarism has no such impact since it just copy research results without alternating its content. Instead plagiarism may waste money devoted to review and publish a duplicated material. It can also make a harm on a trust between scientists. But the level of plagiarisms harm on research is essentially small in comparison to other type of misconduct.

On the other hand fabrication and falsification can have significant impact while it may be difficult to assess. Steneck[8] claims that in the USA fabrication and falsification may have a little effect since it is discovered before publishing the

---

[6] Frankfort, H.G. *On Bullshit*. Princeton University Press. 2005

[7] Supra note 5.

[8] Steneck, N.H. Fostering Integrity in Research. Science and Engineering Ethics. 2006, 12: 53-74

wrong results. This is not obvious at all and may not be the case in other countries. It depends on the attitude to the questions of Ethics and priorities of the policy makers and research funding organizations in each country. In any case Steneck concludes that "impact [of FFP], even in major cases that attract national attention, is neither obvious nor easily measured". One may agree with Steneck concerning impact of FFP in the sense that the cases of falsification and fabrication may be limited in number when compared with the other type of misconduct. But the damage made by FFP may be very high.

Further on Steneck argue by examples that due to higher levels of occurrence, QRP should have proportionally greater impacts on research than FFP. He gives the estimated level of occurrence of FFP as about 1%, while occurrence of QRP is between 10%-60%. So QRP is more prevalent and may have a stronger impact than FFP.

Next is probably most important question about causes of misconduct. The importance stems from the fact that our actions concerning misconduct depend on our belief about causes of this phenomenon.

According to Resnik[9] there are two main theories about why researchers commit misconduct.

1. The bad apple theory: most researchers are highly ethical in their work, while only a few are corrupt, economically desperate, or psychologically disturbed.

2. The theory of a stressful or incomplete working environment: various institutional pressures, stimulations and limitations push researchers to break the rules of Ethics.

Thus if the real cause is the bad apple theory, then any attempt to teach research ethics will have little effect on ``bad apples". According to the second theory pressures to publish or obtain grants or contracts, career ambitions, the pursuit of

[9] Resnik, D.B. What is Ethics in Research and Why is it important?

profit or fame, poor supervisions of students and trainees, and poor oversight of researchers push people to break the rules of Ethics. In this case teaching Ethics may help people get a better understanding of their feelings, to understand ethical concerns, and improve ethical judgment. Resnik[10] writes that "Misconduct probably results from environment and individual causes, i.e. when people are morally weak, ignorant, or insensitive are placed in stressful or imperfect environments".

Thus according to Resnik the main reasons of research misconduct lie mainly on the side of research community itself. While various institutions just make imperfect environment. This suggests that it is enough to work with institutions and research to improve research behavior.

B.K. Sovacool[11] added one more possible cause of research misconduct. He suggested three types of possible explanation of research misconduct and solutions to each of the case:

1. *Individual impurity*: misconduct is rare phenomenon caused by a few unethical researchers. *Solution*: self regulation of science by scientists (teach and discuss).

2. *Institutional failure*: misconduct is an institutional problem caused by some research organizations that inadvertently foster it. *Solution*: institutional reform such as protection for whistle-blowing or harsher penalties for misconduct.

3. *Structural crisis*: misconduct reflects a deeper phenomenon concerning the values that modern science itself promotes. Misconduct will be inevitable as long as science continue to prioritize publication, exploitation and competition over discovery, full recognition and

[10] Resnik, D.B. What is Ethics in Research and Why is it important?

[11] Sovacool, B.K. Exploring Scientific Misconduct. *Bioethical Inquiry*. 2008, 5:271-282

cooperation. *Solution*: Improve transparency within science and recognize the tension between publication and discovery, competition and cooperation.

Here we see that among the causes of misconduct might be the values that modern science itself promotes. In the rest of the paper we try to show that the available evidence may point exactly to this cause.

ARGUMENTS AND EVIDENCE FOR MISCONDUCT

An increasing use of bibliometric indicators such us number of publications and the impact factor of the journals they appeared in pressures scientists into continuously producing "publishable" results, and this may conflict with the objectivity and integrity of research. It would be too easy to blame policy makers and funding agencies as being capable to force a research community to use bibliometrics as indicators of the quality of their research. Without going to the analysis of possible causes of this phenomenon, here we just label it as "publish or perish" culture. We consider such culture as an integral part of structural crisis suggested by B.K. Sovacool[12]. What arguments and evidence we have for this statement to be true?

We begin with a rational argument. One form of it is the so called Campbell's law.

> "The more any quantitative social indicator is used for social decision-making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it is intended to monitor"[13].

Closely related ideas are known under different names, such as Goodhart's law and Lucas critiques.

---

[12] Sovacool, B.K. Exploring Scientific Misconduct. *Bioethical Inquiry*. 2008, 5:271-282

[13] Campbell, D.T. Assessing the Impact of Planned Social Change. *Occasional Paper Series*, Paper #8, The Public Affairs Center, Dartmouth College.1976: 70.

That this kind of law may be a universal one is demonstrated by the extensive former Soviet Union literature on the harmful effects of setting quantitative industrial production goals as noted again by D.T. Campbell and also known as an anecdote. Suppose that several indices were useful in summarizing factory productivity, e.g. total weight of all products produced, or number of items produced. Each of these indices when used as the official goal in terms of which factory production was evaluated, created dysfunctional distortions of production. If weight, then factories would produce only their heaviest item, e.g. the largest nails in a nail factory. If number of items, then only their easiest item to produce, e.g. the smallest nail. All these distortions led to overproduction of unneeded items and underproduction of much needed ones.

Coming back to the science sociology, if some indicator of a socially sensitive phenomenon is made as a target than inevitable it will be corrupted. If so, under the influence of the "publish and perish" culture one may expect distortion in presenting research results and inflation of bibliometric indicators.

Next we look at a qualitative research in sociology of science to find out the possible effects of a competition among scientists. Competition is inherently related to the *publish or perish* culture. In general competition is considered as a desirable arrangement since it is expected to be a most effective form of organization at least in economics. However, the well known side effect of such behavior, like secrecy, suggests that competition may act in an opposite direction to collaboration among scientists the other desirable feature in science. Nevertheless the competition is considered as a unique driving force in science in many countries.

M. S. Anderson et al.[14] arranged focus group discussions with 51 mid- and early-career scientists in the USA. They were asked about the effects of a competition among scientists for funding, positions and prestige, among other things.

---

[14] Anderson, M.S., Ronning, E.A., De Vries, R., Martinson, B.C. The Perverse Effects of Competition on Scientists' Work and Relationships. *Science and Engineering Ethics*. 2007, 13: 437-461

According to these scientists, competition contributes to strategic game-playing in science, a decline in free and open sharing of information and methods, sabotage of other's ability to use one's work, interference with peer-review processes, deformation of relationships, and careless or questionable research conduct. The authors reviewed the reasons why competition has intensified and concluded that the side effects may jeopardize the progress, efficiency and integrity of science when competition is pervasive.

Finally we turn on statistical analysis of the *publish and perish* culture effects on research Ethics. Recently D. Fanelli[15] showed that pressures to publish increase scientists' bias. The study is based on the fact that papers are less likely to be published and to be cited if they report "negative" results (results that fail to support the tested hypothesis). Therefore, if publication pressures increase scientific bias, the frequency of "positive" results in the literature should be higher in the more competitive and "productive" academic environments.

The study (logistic regression) verified this hypothesis by measuring the frequency of positive results in a large random sample of papers (1316) published between 2000 and 2007 with a corresponding author based in the US. These papers declare to have tested a hypothesis, and it was determined whether they concluded to have found a "positive" or a "negative" support for the tested hypothesis. Across all disciplines, papers were more likely to support a tested hypothesis if their corresponding authors were working in states that, according to National Science Foundation data, produced more academic papers per capita. The proportion of "positive" results was then compared with (regressed against) the number of articles published per-capita in each US state, controlling for possible effects of per-capita research expenditure.

The result of the study showed that the probability of papers to support tested hypothesis increased significantly with the per capita academic productivity of the state of the corresponding author. The proportion of papers published between

---

[15] Fanelli, D. Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States DATA. *PLoS ONE*. 2010, 5(4): 1-7

2000 and 2007 that supported the tested hypothesis was completely uncorrelated with the total number of doctorate holders, total number of papers and total R&D expenditure.

According to our description, selective reporting, reinterpreting and altering results should be considered as questionable research practice (or QRT). Positive results should be treated with the same care and rigour as negative ones, but most likely they are not. Such form of neglect may be one of the main sources of bias in science.

We hope that these two selected analyses convincingly show the existence of a strong correlation between the *publish or perish* culture and science misconduct. Next, in the light of these findings we discuss the situation in Lithuania.

ETHICS IN LITHUANIA

First we would like to note that European Science Foundation made a survey on existing policies and procedures to foster good research practice in ESF Member Organizations and their partners in their respective research communities[16]. Lithuania is not covered in this survey. But the written response from Lithuania was obtained saying that the new law of science and studies "foresee the establishment of the institution of the "Ombudsmen", a government official whose function will be to examine complaints on contraventions of academic ethics and procedures in Lithuania".

The law on higher education and research (2009) mentioned in the response has

``Article 18. Supervisor of academic ethics and procedures

1. Supervisor of academic ethics and procedures shall be a state officer who examines complains and initiates investigation regarding the violation of academic ethics and procedures. [...] The first task of the ombudsmen: to foster institutions [sic] to comply with Ethics … ".

[16] ESF. Stewards of Integrity. Institutional Approaches to Promote and Safeguard Good Research Practice in Europe. *Survey report*. 2008

The institution of the "Ombudsman" is not available yet, but it is expected to be established by the end of this year, 2011. The reason of delay may be due to some misunderstanding among politicians in Lithuania. However this shows that the system of supervision of science Ethics in Lithuania is already discussed and established by the law.

Usually, a system should be chosen on the base of facts describing a phenomenon the system is supposed to handle. In the case of Ethics one needs evidence showing availability of cases of misconduct, their frequency and, most importantly, a suggested list of possible causes the system supposed to deal with. However, there is no statistical or any other research on research misbehavior in Lithuania as far as we know. Even more, only plagiarism is officially recognized as existing kind of scientific misbehavior in Lithuania. As it was already mentioned, the term *academic ethics* is mainly related to higher education rather than to science research. To see this, one can look at the order of minister of Education and Research 05.12.2005 No ISAK-2485 "on recommendations…".

On the other hand, the *publish or perish* culture in Lithuania is supported by using the so called "formal evaluation" for distributing financial resources among science institutions. This shows that policy makers do not relate the *publish or perish* culture with a possible misconduct. Even more, officially it seems as if Lithuania is an island of responsible conduct of research in the sea of FFP and QRP available in other countries.

CONCLUSIONS

1. M. S. Anderson et al[17] and D.Fanelli[18] suggest that "structural crisis" and "publish or perish" culture may be among causes of misconduct.

[17] Anderson, M.S., Ronning, E.A., De Vries, R., Martinson, B.C. The Perverse Effects of Competition on Scientists' Work and Relationships. *Science and Engineering Ethics*. 2007, 13: 437-461.

[18] Fanelli, D. Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States DATA. *PLoS ONE*. 2010, 5(4): 1-7

2. There is no reason to discard a possibility that the same causes may have the same effects in Lithuania.
3. The burden to prove the converse lies on those who believe that serious misconduct in Lithuania is rare and therefore not a major concern.

REFERENCES

- Anderson, M.S., Ronning, E.A., De Vries, R., Martinson, B.C. The Perverse Effects of Competition on Scientists' Work and Relationships. *Science and Engineering Ethics*. 2007, 13: 437-461.
- Campbell, D.T. Assessing the Impact of Planned Social Change. *Occasional Paper Series*, Paper #8, The Public Affairs Center, Dartmouth College.1976: 70.[žiūrėta 2011-08-16] http://www.eric.ed.gov/PDFS/ED303512.pdf
- ESF. Good scientific practice in research and scholarship. *ESF Science policy briefing* 10, 20.12.2000. [žiūrėta 2011-08-16] http://www.esf.org/publications/science-policy-briefings.html
- ESF. Stewards of Integrity. Institutional Approaches to Promote and Safeguard Good Research Practice in Europe. *Survey report*. 2008. [žiūrėta 2011-08-16]

  http://www.esf.org/publications/corporate-publications.html
- Fanelli, D. Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States DATA. *PLoS ONE*. 2010, 5(4): 1-7.
- Frankfort, H.G. *On Bullshit*. Princeton University Press. 2005.
- Price, D.J. *Little Science, Big Science*. New York. 1963.

- Resnik, D.B. What is Ethics in Research and Why is it important? [žiūrėta 2011-08-16] http://www.niehs.nih.gov/research/resources/bioethics/whatis.cfm
- Sovacool, B.K. Exploring Scientific Misconduct. *Bioethical Inquiry*. 2008, 5:271-282.
- Steneck, N.H. Fostering Integrity in Research. Science and Engineering Ethics. 2006, 12: 53-74.