

SCIENTIFIC MISCONDUCT: A BRIEF INTRODUCTION TO ITS VARIOUS ASPECTS

Jameel-un Nabi*[†] &
Sheharyar Pervez*

ABSTRACT

Scientific misconduct has various causes, from mere ignorance of authors to the outright deceptive tendencies of perpetrators. It thrives in an atmosphere of indifference, collusion, secrecy and lack of accountability. It is necessary to acquaint the public of the numerous guises, in which scientific misconduct is affecting good and authentic research in a plethora of irrelevant and misleading ones. Among the most common kinds of misconduct are: fabrication, manipulation and plagiarism. With the passage of time, the exact nature of academic fraud has become subtle and is often very difficult to detect. This paper touches upon various aspects of scientific misconduct and briefly suggests possible solutions.

Keywords: *Scientific Misconduct, Plagiarism, Falsification, Fabrication.*

1. INTRODUCTION

One of the two cardinal sins in scientific research is 'laxity'. Many of us have experienced lax colleagues, collaborators or students who embrace it as a way of life. However, deplorable as it may be, we quite readily accept the possibility of lack of care or lapses in concentration in even the most methodical of researchers. The other sin in scientific research is 'scientific misconduct'. Laxity implies sloppiness; misconduct implies deviousness. The latter is more difficult to spot because, unlike laxity, it requires intent and deliberation on the perpetrator's part, and not just that but also finesse and sophistication in the attempt to hide it.

The exact definition of research misconduct is a matter of some debate but the U.S. Commission on Research Integrity defines it as follows:

"Research misconduct is significant misbehavior that improperly appropriates the intellectual property or contributions of others, that intentionally impedes the progress of research, or that risks corrupting the scientific record or compromising the integrity of scientific practices. Such behaviors are unethical and unacceptable in proposing, conducting, or reporting research, or in reviewing the proposals or research reports of others." (U.S. CRI, 1995)

It is now a global phenomenon (Hoag, 2010; Cyranoski, 2014; Haq, 2014; and Neelakantan, 2009) and the resignation of David Wright, Director of Office

of Research Integrity, USA, in March 2014, was out of frustration with the bureaucracy and an atmosphere that was 'secretive, autocratic and unaccountable' (Kaiser, 2014). This indicates that the fight against scientific misconduct is not being as diligently pursued as it should be. The true extent of scientific misconduct will never be known fully, certainly not in quantitative terms because these statistics assume honesty in reporting on part of the working partners. Statistics like those reported by Fanelli (2009), wherein up to one third admitted to having engaged in questionable research practices, are therefore at best conservative estimates. Nevertheless, many teachers who have had any reasonable experience of qualitative analysis of research work feel and can relate to a gradual loosening of standards both in researchers, as well as in students. The news items such as the one on world record of 172 retractions (Normile, 2012) by a single author only serve to confirm such suspicions. Fang, Steen and Casavedall (2012) analyzed 2,047 articles on biomedical and life sciences indexed by *Pub Med* that were retracted, to reveal that 67.4% of the retractions were attributable to misconduct that included fraud, suspected fraud, plagiarism, duplicate publication, fabrication (Figure-1). Indeed with the lack of any objective and clearly defined moral order, individuals committing scientific misconduct or specifically plagiarism might not even consider themselves to be doing something wrong (Fish, 2010).

Nevertheless, the fact remains that with the lowering of barriers to publication, the percentage of scientific retractions has increased (Steen, Casadevall and Fang, 2013). But instead of quibbling over numbers it might help us to briefly study those cases of scientific misconduct that have come to the forefront, and see the causes that lie behind them. It may be stated at the outset that any notion that scientific misconduct will now or ever be totally or virtually eradicated is ill founded. As long as the realm of knowledge has economic underpinnings in the form of patents, research grants and tenure-tracks this is highly unlikely. As long as financial constraints exist, such incentives shall also be ever present and misconduct will most likely appear in increasingly sophisticated disguises.

2. CATEGORIZING MISCONDUCT

Scientific misconduct may broadly be categorized as (i) those pertaining to the actual content, the visible and the hidden text so to speak (category 1); and (ii) those pertaining to circumstances in which the said

* GIK Institute of Engineering Sciences and Technology, Topi, Pakistan. [†] Corresponding Author's Email: jnabi00@gmail.com

Scientific Misconduct: A Brief Introduction to its Various Aspects

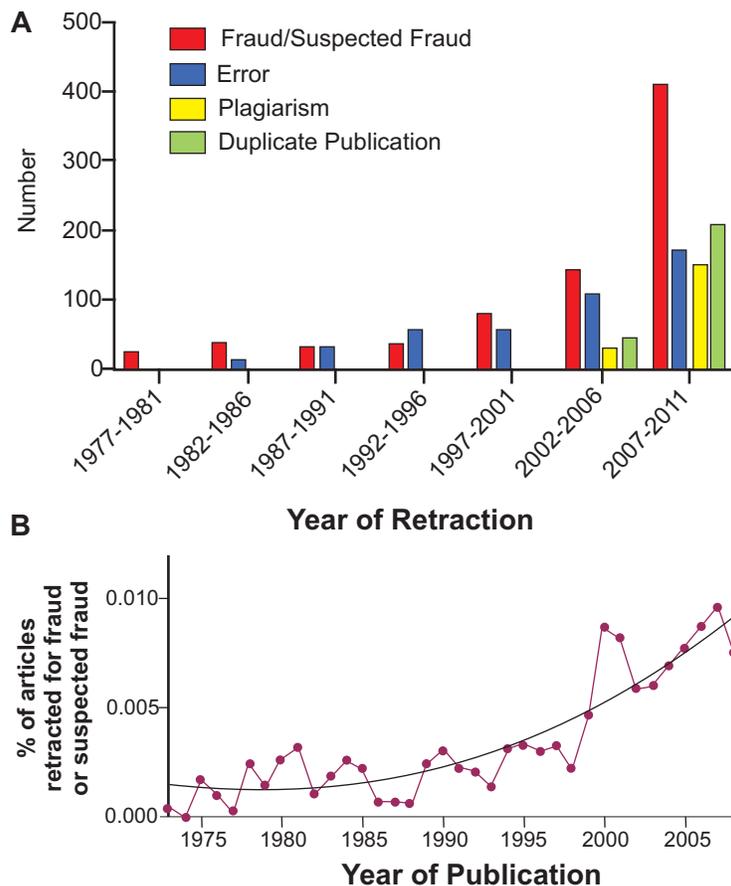


Figure-1: Number and Percent of Articles Retracted for Fraud or Suspected Fraud Over the Years

Source: Fang, F. C., Steen, R. G., Casadevall A., 2012

research was carried out (category 2). The former includes things like fabrication and manipulation of the data, the text and the results - things that negatively affect the factual accuracy of the text. The case of Jan Hendrik Schon is a fascinating and embarrassing account of how by fabrication and falsification of his data, using, in some cases, the same graph in different contexts, this multi-award winning researcher could dupe members of his community for as long as he did.

The second category is related more to the circumstances surrounding the creation of the scientific text in question than the text itself. It is possible that while the academic worth of the research might never be in doubt, one might ask whether ethical standards were upheld in case of production of some results, for instance in cases involving stolen data and research. Several students have over the centuries accused their mentors of having stolen or exploited their research for forwarding their own careers. There are following common cases:

- Ghost writing;
- Receiving funds for research that could cause a conflict of interest (for instance with religious groups or pharmaceuticals). Not citing that conflict of interest can also be considered misconduct;
- Human exploitation and animal testing that goes beyond the standard of what is considered humane, the definition of humane being a topic of great debate of course;
- Failure to protect the anonymity of human subjects and respondents;
- Plagiarism: It may include text that is taken from other sources without proper citation, as well as self-plagiarism, repeated publications of one's own text without much difference; and
- Improperly defined authorship: There are two aspects to this. It may be a misconduct in the active sense, wherein authors are listed despite having contributed little to nothing to the text, something that is very difficult to detect. On the other hand contributions and acknowledgements

are withheld is the second aspect. Perhaps the most famous example of the latter case are of Jocelyn Bell and that of Rosalind Franklin.

This kind of plagiarism has not been placed in Category-1 because falsification and fabrication, even when used to support a thesis that may turn out to be correct as some researchers do on the basis of gut feeling, necessarily have a negative impact on the scientific worth of the thesis in question. On the other hand, while plagiarism may impact the scientific worth of a paper, the questions that are raised are usually concerned with intellectual property rights. A good news about plagiarism is that with the development of softwares like Turnitin, plagiarism has become relatively easier to detect, although as one might expect, the 'intent' to malpractice is slightly more difficult to pin down. The most significant sources of establishing that there has been misconduct are in the case of fabricated and falsified research, the natural replaceability of research; but when that is not possible the source is more often a whistleblower.

Category-1 is also different from Category-2 in its moral aspects since the victims of fabrication and falsification generally exist ex-post facto. The victims of Category-2 may suffer either way. This is not to say that either of these is less serious. Indeed a 'miracle cure' developed on the basis of some fabricated data that could endanger the lives of all those who use it is no less serious than the exploitation of unwitting individuals. For instance, concerning the ethical standards in life sciences, Dr. Beaumont's landmark study of Alexis St. Martin (the man who survived a shooting incident with an open stomach wound) may have been scientifically perfect, but there have been questions whether the patient was later exploited for the sake of scientific knowledge. Should Dr. Beaumont's case seem to belong to a distant and savage past, then consider the case of Dr. D.E. Cameron, who receiving funding from the CIA, carried out several psychic driving experiments on unwitting subjects during the 1950s (Guardian, 2007). Equally ill-conducted and ethically transgressing was Tuskegee syphilis experiment carried out for 40 years starting in 1932, in which the U.S. Public Health Service studied the development of syphilis in the Afro-American community despite Penicillin having become the standard cure for the disease (CDC, 2013).

Of course not all cases will fall under these two categories. One example is 'sabotage' - willfully tampering with the results and experiments of another

scientist. The case of Vipul Bhargu, an Indian postdoctoral researcher at the University of Michigan, who under the psychological pressures of competition tampered with the experiments of a colleague and was only caught with a hidden camera, points to an altogether different side of research where the misconduct did not affect the perpetrator's research (Maher, 2011).

Collectively, these scandals have a negative economic impact on scientific research. Funds for scientific research are limited and, in view of the economic crises, are being cut the world over. These scandals not only result in a waste of resources but also taint the profession as a whole, making it increasingly difficult for good researchers to secure these funds.

3. CAUSES

We must ask ourselves why people commit misconduct and why is it increasing. Like all crimes, scientific misconduct is carried out when the incentives outweigh the risks. Naturally, if the stakes are high then the number of occurrences of such misconduct can only be expected to rise. A good analogy would be sports where the relatively easier detection of outright fixing of the result has led to more sophisticated mechanisms involving detection of spot fixing. Economics and common sense tell us that in order to eradicate a vice, one should remove the incentive that the said vice provides. The solution is not always in the doubling of the police force.

The incentive is primarily the attainment of financial and political benefits, such as research grants and tenure-tracks via corrupt means, etc. Weaknesses in the organizational structure open means of exploiting them. Lysenko's case is a remarkable example of how the insight of one man into the flaws of the political system of Stalinist Russia helped him forge not only a career out of it but also exercised undue influence on his government's agriculture policy. Indeed, so long as incentives exist so will temptations (Huxley, 1949). The flaws in the political systems can be of a wide variety in themselves. For instance, United States Patent and Trade Mark Office (USPTO) approved controversial Korean scientist, Hwang Woo-Suk's patent on a method for creating embryonic stem cells (Retraction Watch, 2014). The method was based on fabricated data. However it seems that Mr. Suk does not have to prove the efficacy of his method because of lax patent standards. Mr. Suk's case may be a high-profile one, but one can imagine how the desire to add

Scientific Misconduct: A Brief Introduction to its Various Aspects

patents might lead many to produce patentable trash. The judicial systems around the world need to get their act together and realize that every such incident is for them and their country an embarrassment at the international level.

Scientific misconduct exists because of our obsession with statistics, numbers, and the meaningless indices. Given our inability to judge the quality of a person's worth in any meaningful term, a person with a hundred patents is more likely to be looked up to than a person with one patent, but these numbers do not judge quality. Even indices such as Impact Factor, which are supposed to judge quality are highly susceptible to manipulation (Arnold and Fowler, 2011; Casadevall and Fang, 2014). Goodhart's law arising out of the world of economics says that when measures become standards, they cease to be good measures. Not too different is Campbell's law: "The more any quantitative social indicator (or even some qualitative 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".

The more we use sheer numbers for assessing the worth or worthlessness of a particular research, turning statistics, which are really means to ends the less likely are these numbers to reflect the truth.

4. LOCAL ISSUES

Now what is the standard procedure that is to be followed when a researcher is suspected to be guilty of misconduct? There are a few documents on the website of the Higher Education Commission (HEC) of Pakistan pertaining to this, along with guidelines about Turnitin (plagiarism detection software), but it comes with its own ethical and legal issues.

There is also an HEC declared blacklist of faculty members available on its website (HEC, 2014), consisting of those "listed on the grounds that their respective university has not taken appropriate action against them as per Plagiarism Policy". These members are ineligible for any financial benefit until the conclusion of their cases. As of April 14, 2014, the number of researchers listed is seven. Very disheartening is the fact that 30 per cent of the content of a research paper authored by former Higher Education Commission (HEC) Chairperson Javed Laghari was plagiarized from a European Union (EU) report (Haq, 2014). But the blame does not rest solely with the HEC and in certain cases it did do a commendable job (Interface, 2008; Aftab, 2011), but if

incidents like this carry on, HEC will lose significant moral ground in its fight against plagiarism.

5. WHAT CAN BE DONE

So how then do we prevent misconduct from happening? Given the abstruseness of much research, spotting and catching it eventually depends largely on whistleblowers. How then do we encourage more and more people to come forward? This will not be easy. As always, the implementation of the law is more difficult than its formulation and appealing to the conscience of the community to turn themselves into the model and virtuous researchers not going to be enough. Severe punishments could act as a deterrent but without a general will to carry them out, as is the case in our country, it will rarely work. Scientific misconduct is looked upon as a rather minor offense in our community. One needs only look at the high-profile cases of plagiarism in our own country to vouch for that. Of course, the erosion of morals is not limited to the academia nor does it originate from it, it is merely refracted by the prism of scientific research. Cleansing the system of misconduct would require serious initiative, some concerted effort on part of its practitioners, and a sense of collective responsibility. Of course, any such call is bound to seem naive and hopelessly idealistic. Some may inquire as to what happens to those that do risk going the whistleblowers' way. Indeed certain cases of misconduct are notable not so much for the deed itself but for their consequence on the whistleblowers. Our academic communities are small, even more so considering their specialization fields. Given the moral apathy that many in academia have become used to (which is perhaps it is the sequestered nature of the educational institutions that does it, which is perhaps a reflection of our times) whistleblowers take a massive amount of risk concerning their professional and perhaps even personal lives. As 'tattletales' they risk losing their jobs and the trust of the academic community. A whistleblower might only be acting on a hunch, some might be willing to report misconduct if their anonymity is guaranteed, which of course in most cases is not possible. Yet there is the other side to be considered too. We certainly do not want people whistle blowing on the basis of a hunch; needless to say that the falsely accused have suffered enormously as well.

What the academic community can do is to force their universities to enter an international ethics committee, the rulings of which on various plagiarism cases will be binding. Such a committee will not be effective unless the universities have a vested interest in staying in that committee. Therefore strict rules should be instituted,

such as the prohibition on universities over accepting students from other universities that are not actively pursuing cases against their faculty members who have been found guilty of misconduct. Moreover, respectable university ranking organizations might be compelled to withhold the good ranking of such universities. This is not an ideal solution since a few global organizations tend to have power across borders. Plus rulings that are binding will almost certainly have a negative effect on universities that already suffer from limited resources. Nevertheless this could be a first step – a much needed one.

REFERENCES

- Aftab, N., 2011. HEC received 104 plagiarism cases since 2006, The News [Online]. Available at: <<http://www.thenews.com.pk/Todays-News-6-81725-HEC-received-104-plagiarism-cases-since-2006>> [Accessed April 21, 2014].
- Arnold, D. N., and Fowler, K. K., 2011. Nefarious Numbers. *Notices of the American Mathematical Society*, 58 (3), pp. 434–437. arXiv:1010.0278.
- Casadevall A., Fang F.C., 2014. Causes for the persistence of impact factor mania. *mBio* 5(2), e00064-14. doi:10.1128/mBio.00064-14.
- CDC, 2013. "Tuskegee Study - Timeline". NCHHSTP. Centers for Disease Control and Prevention [Online]. Available at <<http://www.cdc.gov/tuskegee/timeline.htm>> [Accessed on April 24, 2014]
- Cyranoski, D., 2014. Stem-cell scientist found guilty of misconduct, *Nature* [Online] Available at:<<http://www.nature.com/news/stem-cell-scientist-found-guilty-of-misconduct-1.14974>> [Accessed April 14, 2014]
- Fanelli, D., 2009. How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data. *PLoS ONE* 4(5), e5738. doi:10.1371/journal.pone.0005738
- Fang, F. C., Steen, R. G., Casadevall A., 2012. Misconduct Accounts for the Majority of Retracted Scientific Publications, *PNAS*. doi: 10.1073/pnas.1212247109
- Fish, S., 2010. Plagiarism is Not a Big Moral Deal, *NY Times* [Online]. Available at <<http://opinionator.blogs.nytimes.com/2010/08/09/plagiarism-is-not-a-big-moral-deal>> [Accessed April 5, 2014]
- Guardian, 2007. Ewen Cameron: further reading, *Guardian* [Online]. Available at: <<http://www.theguardian.com/books/2007/sep/08/naomiklein1>> [Accessed on April 27, 2014]
- HEC, 2014. QA Division. Higher Education Commission [Online]. Available at: <<http://www.hec.gov.pk/InsideHEC/Divisions/QA/LI/QADivision/Pages/Plagiarism.aspx>> [Accessed on April 23, 2014]
- Haq, R., 2014. Plagiarism probe: CTRL+C, CTRL+V, Javed Laghari found 'guilty'. *Tribune*, [Online]. Available at: <<http://tribune.com.pk/story/663781/plagiarism-probe-ctrlc-ctrlv-laghari-found-guilty/>> [Accessed April 13, 2014]
- Hoag, H., 2010. Canada urged to tackle research misconduct [Online]. Available at: <http://www.nature.com/news/2010/101021/full/news.2010.555.html> [Accessed April 13, 2014]
- Huxley J., 1949. Soviet genetics and World science: Lysenko and the Meaning of Heredity. Chatto & Windus, London. In USA as Heredity, East and West. Schuman, N.Y.
- Interface, 2008. Well Done HEC!, *Interface* [Online]. Available at: <<http://www.interface.edu.pk/students/March-08/HEC-plagiarism.asp>> [Accessed April 21, 2014]
- Kaiser, J., 2014. Top U.S. Scientific Misconduct Official Quits in Frustration With Bureaucracy, *Science Insider*, [Online]. Available at: <<http://news.sciencemag.org/people-events/2014/03/top-u.s.-scientific-misconduct-official-quits-frustration-bureaucracy>> [Accessed April 7, 2014]
- Maher, B., 2011. Lab Sabotage Deemed Research Misconduct, *Nature* [Online]. Available at: <http://blogs.nature.com/news/2011/04/lab_sabotage_deemed_research_m_1.html> [Accessed April 21, 2014]
- Neelakantan, S., 2009. In India, plagiarism is on the rise, *Global Post*. [Online]. Available at: <<http://www.globalpost.com/dispatch/india/090921/did-you-write-yaar-india-plagiarism-the-rise>> [Accessed April 11, 2014]
- Normile, D., 2012. A New Record for Retractions? (Part 2), *Science Mag* [Online]. Available at: <<http://news.sciencemag.org/education/2012/07/new-record-retractions-part-2>> [Accessed on April 14, 2014]
- Retraction Watch, 2014. Fraud, retractions no barrier to US cloning patent for Woo-Suk Hwang, *Retraction Watch* [Online]. Available at: <<http://retractionwatch.com/2014/02/16/fraud-retractions-no-barrier-to-us-cloning-patent-for-woo-suk-hwang>> [Accessed on April 10, 2014]
- Steen, R.G., Casadevall. A., Fang, F.C., 2013. Correction: Why Has the Number of *Scientific Retractions Increased?*, *PLoS ONE* 8(7):

Scientific Misconduct: A Brief Introduction to its Various Aspects

10.1371/annotation/0d28db18-e117-4804-b1bc-e2da285103ac . doi : 10.1371/annotation/0d28db18-e117-4804-b1bc-e2da285103ac

- U.S. CRI, 1995. Integrity and Misconduct in Research, U.S. Commission on Research Integrity, page 15

BIBLIOGRAPHY

- Bonito, A. J., et al., 2012. Preparing Whistleblowers for Reporting Research Misconduct. *Accountability in Research*, 19(5).
- Shenon, P., 1988. C.I.A. Near Settlement of Lawsuit By Subjects of Mind-Control Tests, NY Times [Online]. Available at: <<http://www.nytimes.com/1988/10/06/world/cia-near-settlement-of-lawsuit-by-subjects-of-mind-control-tests.html>> [Accessed on April 23, 2014]