

Updating classical theory: Merton on modern developments

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Abstract

Science is a quest for knowledge guided and characterized by reliable procedures and skepticism. Scientific misconduct occurs when individuals knowingly present false information which they erroneously claim has been obtained as a result of following accepted scientific procedures. This paper aims to provide a theoretical framework of scientific misconduct on the basis of several recent articles that describe the current situation in society as well as in science, along with Merton's classical theory.

Keywords: scientific misconduct, Merton's classical theory.

Introduction

We now live in an era in which society is impregnated with science and technology (Harbers, 2002). Traditionally, scientists distanced themselves from 'ordinary civilization', with their ideal that science should be ensconced in an 'ivory tower' and engaged in a quest for truth unhampered by governmental restrictions, personal interest, and other extraneous factors. This conservative ideal upheld the purity of science. Such an ivory tower concept proved to be a fallacy. Science is no longer sharply demarcated from other societal institutions, and the increase of scientific misconduct has raised doubts in some quarters about the purity of science.

In addition, we also live in a society which is dominated by a capitalistic philosophy. It has become desirable to earn and own as much as possible, and society has thrown itself into the atmosphere of competition, a phenomenon which has both positive and negative aspects. This paper examines how the structures of scientific culture are influenced by the dominating structures in society, and how this can serve to explain the increase in scientific misconduct. To do so, first a general definition of science and scientific misconduct will be presented, followed by an examination of several developments in

society as well as in science. An attempt will be made to provide a theoretical explanation of the increase of scientific misconduct by using Merton's theory of strain and anomie. The purpose of this exercise is to show that Merton's classical theory can still be useful to explain the development of fraud in modern science.

Methods

Two articles by Robert K Merton, both published in 1938, served as the foundation of this paper. Besides these two articles, recent literature is used about scientific misconduct and the developments in science as well as in society, and how these two constructs influence each other.

I have used several search engines for the literature utilized in this study. Among these search engines were Google Scholar, PsychInfo, Picarta and Scopus. Some examples of the keywords I have used are: modernization, science; modernizing, society; science, social context, and scientific misconduct.

Merton on the social order of science

In 1938, the sociologist Robert King Merton published a paper on science and the social order. Using the example of totalitarian states as an illustration, he explained how the esteem in which science

is held changes according to how society and political bureaucracy influence scientific directions. Merton's paper on science and the social order is of relevance for this article because recent cases of academic fraud are possibly an effect of the changing normative consensus in society and politics, as well as science.

In Merton's view, the social world ought to be strictly and functionally divided into a multitude of specialized domains. (Merton, 1938a) This functional differentiation demands that society's institutions (e.g. science, politics and economy) not interfere with each other, and that each make its contribution to society as a whole. In this way, all institutional domains of specialty are, in Merton's view, able to function at their full potential.

In line with this traditional functionalism, Merton states that science should preserve its autonomy by not letting itself be guided by external factors such as other social institutions or personal interest. (Merton, 1938a) Merton therefore developed *four scientific norms: universalism, communalism, disinterestedness, and organized skepticism*. By following these norms, science demarcates itself from the rest of society. These norms can be summarized as follows: *universalism* means that an individual's scientific work may only be judged independently from personal characteristics; *communalism* demands open communication concerning results and methods of research in order to make knowledge a collective asset; and *disinterestedness* means that research should only be driven by curiosity and should never be guided by self-interest. Finally, *organized skepticism* demands that scientists critically discuss findings, and not rely on dogmatism. (Merton, 1957)

Defining science and scientific misconduct

The first point that needs to be made clear concerns definitions of science and

scientific misconduct. The following statement by Merton is highly relevant in this respect: "The ethos of science involves the functionally necessary demand that theories or generalizations be evaluated in [terms of] their logical consistency and consonance with facts" (Merton, 1938a, p. 326).

Science and scientific misconduct are topics that have filled entire libraries. However, due to limited space, this section needs to be relatively short.

Science comprises many disciplines, and all these different disciplines are constructed upon different foundations. Because constructing definitions suitable to all disciplines is itself such a complex task, a general, bilateral description will be used. Science is both a product of knowledge and a process which aims to expand human knowledge of the world we live in. (Abma, 2011) Abma focuses on the process behind science which makes it 'scientific.' This process includes the quest for latent structures and mechanisms which govern observable manifestations, and as well as testing theories against this reality. (Abma, 2011) In order to be considered scientific, this quest needs to be guided by reliable research procedures, and its results should be judged by their replicability.

Now the following question arises: Is every scientist who violates the norms stated above a fraudulent scientist? All literature seems to agree on the point that the so called 'FFP', of *falsification, fabrication and plagiarism* represent the three worst sins in science. (Drenth, 2010; Goodstein, 2005; Komter, 2012)

Fabrication is making up results and recording or reporting them. Falsification is manipulating research processes or changing or omitting data. Fabrication and falsification can also arise in the reporting of [an]other researcher's results, in the reporting of expert opinion and in the public

dissemination of science. A third category of misdemeanor is plagiarism in proposing, performing, or reviewing research, or in reporting research results. Plagiarism is the appropriation of another person's ideas, research results or words without giving appropriate credit. (European Science Foundation; ALLEA, 2011)

It should not be necessary to present a complicated argument about why this kind of behavior is objectionable.

The boundaries of FFP's seem to be quite clear. Another issue of concern is *questionable research practices (QRP's)*, and how these are defined. Komter (2012) gives us some examples: to omit or to remove unwanted data, reformulating hypotheses until the researcher finds results which are in line with these hypotheses. According to Komter, these QRP's are "quite subtle forms of misconduct and the scientists who engage in them do not necessarily have to be conscious of their own misconduct" (Komter, 2012). Indeed, wherever humans are at work, errors will occur and therefore the lines between 'honest errors' and questionable research practices can sometimes be fuzzy. But in most forms of scientific misconduct an intention to deceive is a central aspect (Budd, 2001; Komter, 2012; Sikes, 2009)

Summarizing the above points, we come to the following definitions. Science is a quest for knowledge characterized by using established scientific methodology to increase human knowledge. We speak of "scientific misconduct" when a researcher, perhaps in order to assure publication of his or her work, violates codes of conduct by intentionally presenting false information. While errors can occur unconsciously, misconduct happens consciously.

Some recent international developments

In society

What is happening at present is, so to speak, redistribution and reallocation of modernity's 'melting powers'. They affected at first the extant institutions, the frames that circumscribed the realms of possible action-choices, like hereditary estates with their no-appeal-allowed allocation-by-ascription. Configurations, constellations, patterns of dependency and interaction were all thrown into the melting pot, to be subsequently recast and refashioned; this was the 'breaking the mould' phase in the history of the inherently transgressive, boundary-breaking, all-eroding modernity. (Bauman, 2000, p. 7)

Modernization comprises a few key-elements: differentiation, individualization and rationalization. (Blokland, 2001) Differentiation refers to the fact that human activity tends to increasingly be organized in a specialized manner. In other words, 'Renaissance Men' are a dying breed. It is now only realistically possible to choose one or two professions. And those who have a competitive nature will often try to outshine their peers.

Differentiation is closely connected to individualization; as the number of specializations rise, so does the number of contexts in which we participate and therefore the number of roles we play. (Blokland, 2001) One possible consequence of this individualization is that people pursue goals related to their personal interests, instead of pursuing common interest goals.

Rationalization then, "means an increase of what Karl Mannheim (1940) has named, functional rationality... we speak of functional rationality when series of actions are coordinated in such a way that the predefined goal is reached at minimum costs" (Blokland, 2005). The opposite of functional rationality is substantial rationality, a concept which involves methods of reasoning about why

reality is the way it is that are based on personal interpretation. An example of “substantial rationality” in action is when an individual makes decisions and judgments by deliberately considering values relevant to his or her personal situation. Note that substantial rationalism is closely connected to personal autonomy. As functional rationality becomes more dominant, substantial rationality becomes blurred and therefore personal autonomy declines.

According to Max Weber (1905) a consequence of rationalization is that people who live in an institutionalized society let themselves be captured in the ‘iron cages’ of bureaucracies and markets, which are governed by the aforementioned functional rationality. (Blokland, 2001) These systems impose their realities upon society, forcing individuals to ‘think in line with the system’.

When we combine the three aforementioned aspects of modernization with the idea of capitalism, which is accompanied by commercialism, societal institutions tend to impose the goal of becoming the best in one’s own specialty. After all, this is one of capitalism’s functional rationalities. (Ritzer, 1975) This is because a logical consequence of being the best is to obtain relatively higher paying jobs and thereby accumulate more personal capital. What follows from the logic of the capitalist system and its goals is a permanent competition among participants in Western society.

In science

Every once in a while, the scientific world is shaken to its foundations when renowned researchers are found to have engaged in fraudulent behavior (Komter, 2012) Forms of scientific misconduct vary from data fabrication, falsification or plagiarism, three of the worst sins imaginable in science, to not acknowledging authors who had vital roles in research. This subsection will discuss two examples of fraudulent scientific

conduct by placing them in a social context, presenting an overview of current explanations, and examining them in the context of Merton’s strain theory.

Most scientists who admit to having engaged in fraud have generally been prolific researchers with a long list of published articles and books. Such individuals often claim to have made overwhelming discoveries.

The first example I want point out is Hwang Woo-suk, who claimed in the prestigious journal *Science* that he had cloned human embryos. (Hondius, 2012) This claim turned out to be fraudulent.

The second example involves Diederik Stapel; a prolific Dutch social psychologist. After years of research, he was suspected of fraudulent practices by one of his colleagues. Three different committees conducted a review of Stapel’s published work, and found that at least 55 out of 130 articles and 10 book chapters appeared to be fraudulent. (Levelt Committee, 2012)

To quote Robert Merton: “scientific research is not conducted in a social vacuum” (Merton, 1938a). The cultural changes in society described in the previous subsection are reflected in the culture of science. Science, like other social phenomena, is subject to the process of modernization. As people, we constantly shape and reshape the culture we live in by our actions. In return, our actions take place in the context provided by our culture. (Rogoff, 2003)

First of all; science has become increasingly specialized. Every discipline within the scientific umbrella has its own culture, with its own norms and viewpoints. (Abma, 2011; Komter, 2012) These different viewpoints can be noticed in paradigms which govern the way scientists, who are committed to this paradigm, conduct their research. Hence, science too is institutionalizing. But research has shown that views on appropriate behavior in research, and the extent to which scientific honesty is seen

as a shared responsibility, vary between disciplines. (Martinson, Anderson, & De Vries, 2005) Besides this, research is more and more often being conducted in response to commercial demand, and it is harder to secure funding for research which is not conducted for commercial purposes. (Koninklijke Nederlandse Akademie van Wetenschappen, 2005)

Because of the career pressure that comes with the capitalistic philosophy in Western societies, the need to achieve results and to publish has increased dramatically (Goodstein, 2005; Komter, 2012; Sikes, 2009). While the scientific population grows as the number of individuals with higher education rises, there is an increasing overlap between disciplines. On top of this, there seems to be a tendency to aim for positive results, partially due to the fact that positive results are more likely to be published. (Komter, 2012) According to research conducted by Fanelli this confirmation bias occurred significantly more often when an author worked in a competitive environment. (Komter, 2012)

The figures of scientific misconduct presented in several articles differ (from 0.1 percent to 2 percent based on self reports and to 14 percent based on surveys about fraudulent colleagues), which indicates that these data are not reliable. However, surveys conducted in European committees indicate an expansion of scientific misconduct (Drenth, 2010). Specified causes are: increasing pressure to publish, competition for subsidies and contracts, career-pressure embedded in scientific culture, increased opportunities to engage in deceptive practices (e.g., because of the internet) and commercialization of scientific results. (Franzen, Rödder, & Weingart, 2007; Goodstein, 2005; Komter, 2012)

Merton's perspective

No attempts have yet been made to place scientific misconduct within a theoretical framework. In the present paper, we will

use Merton's theory of anomie (Merton, 1938b) to put this phenomenon in a theoretical perspective.

Merton derived his theory from Durkheim's concept of anomie. According to Durkheim, the industrial economy caused traditional bonds in society to be severed due to the individualization that characterizes capitalist societies (Barnes, 1966; Featherstone, 2003). Capitalism then, created chaotic competition, and individuals who were not capable enough ended up taking menial jobs that led to a generalized moral disorientation. This moral disorientation would manifest itself in increasing lawlessness.

Merton used the idea of anomie to explain deviance, and he speculated that societies susceptible to deviancy are the ones where achievement of specific goals is desirable (Merton, 1938b). According to Merton, anomie arises when individuals believe they can accomplish the goals set by society but, in reality, are unable to do so (Featherstone, 2003; Merton, 1938b). Consequently, they experience strain between their internalized goals, which are actually imposed by the dominant social structure in society, and the legitimate sources at their disposal to accomplish these goals.

Merton redefines anomie as a confused and lawless state which results from the above-described dilemma and for which he suggests several adaptive possibilities: conformity, innovation, retreatism, ritualism, and rebellion. The lower social classes will usually choose innovation and, according to Merton, the innovative coping strategy correlates with signs of deviance. This means that deviance is determined by social inequality, which is caused by social structures. (Featherstone, 2003; Merton, 1938b)

One might notice that this theory contains a social class bias. However, anomie is present in the scientific community as well, and can result in scientific misconduct. As was mentioned

earlier, true science is characterized by reliable scientific methodology, and guided by norms presented in several universal codes of conduct, which can be seen as legitimate resources that can be used to secure publication of one's research. Usually, scientists will follow these norms when conducting their research.

However, this scientific methodology is not the only thing characterizing modern science. The scientific culture has changed into a competitive arena where intellectual gladiators compete for subsidies and contracts in order to make their research possible, or to secure publication of their research. This competition is driven by increasing career-pressure in general society, pushing the pressure to publish. On top of that, in order to have a successful career in science, one needs to earn the respect of one's colleagues. The intellectual gladiator emerges triumphant by constructing paradigm-shattering ideas and/or by reporting startling results, and this in turn leads to publications, better impact-scores (measured by how many times dissertations get cited) and increased status in one's field (Komter, 2012).

Together with the tendency of journals to publish positive results more often (Komter, 2012), the goals which are set by the culture ruling the scientific arena create an enormous pressure on the scientist, demanding a great deal of intellectual production. When these goals are internalized, some individuals will be necessarily be incapable of managing the amount of pressure that comes with achieving these goals by appropriate means. A strain is produced within the individual as a result of the tension between his goals and the legitimate resources available to do.

At this point, those who cannot publish their research might feel like they are engaged in useless activity. The career that they had imaged appears to be elusive, but their belief in their personal abilities has not yet vanished. Despite working

extremely hard and conducting honest research, papers keep on being rejected. The experienced strain will pile up and, at that point, the individual might feel victimized by dishonesty of the world and become morally confused.

Innovative types will possibly try to find some way to publish by using illegitimate procedures that seem to involve a low risk of detection: they start to change and make up data, reformulate hypotheses and copy ideas without reference. As a result, their papers are suddenly acceptable for publication. Most importantly, these individuals are now reaching the goal of creative innovation, which has been imposed upon them externally by capitalism and the dominant scientific culture.

Conclusions and discussion

Despite being a classical theory and being subject to criticism on a number of grounds, such as a class bias, Merton's theory of anomie can still be useful in explaining modern-day developments. It seems reasonable to say that social structures have an influence on such behavior. In societies where success is valued, and where success is measured by what is accomplished or earned, individuals who do not have the capacity or resources to obtain this success will nevertheless internalize these values too. Some of these individuals will turn to objectionable methods to attain that success.

However, this theory mainly focuses on social structures, and personal factors are undeniably relevant here as well. Among the factors of concern in this paper were honesty and capability which are surely not only socially determined.

First of all: some persons capable of doing research worthy of publication will also engage in fraud to make better and faster 'progress' or to achieve more fame. On the contrary, many who realize they do not have the ability to "make their mark" by conducting research in a

particular field will often choose to act honestly and simply function as (for example) university professors who do not produce a great deal of original research, and who are not academic superstars. These persons may both follow intrinsic values such as success and wealth or simply the comfort of living in honesty . Because success and wealth do not have an intrinsic moral code or value which needs to be followed in order to be achieved fraudulent activities can be used. Something that cannot be done when living in honesty because this is a moral value by itself.

And last: a lot of the less capable people in a given society will gravitate to less-demanding occupations instead of using fraudulent methods to get on top of the intellectual ladder. To illustrate with a ridiculous example: A person capable of nothing better than wiping tables at MacDonalds is unlikely to be admitted into a doctoral program and eventually end up with a faculty position at a university, faced with all the intellectual demand and competition such a position entails.

A more complete explanation of the phenomenon might be provided by combining the theory of anomie with the *theory of self-control* constructed by Gottfredson and Hirschi (1990) or with the theory of *self-concept maintenance* (Mazar, Amir, & Ariely, 2008)

Another weakness of this article is that it is rather speculative in nature. But it should be noted that any explanation of why scientific misconduct occurs is likely to remain speculative as long as those engaging in such behavior are not examined in terms of personal traits, personal social environment and several other factors that might be of influence.

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