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Brief reflections on the current debate about *research integrity**

Breve reflexión en el debate actual acerca de la integridad científica

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Abstract

Recent world conferences on research integrity are evidence of a concern for the reliability of current scientific work: the paper summarizes both the charges and the epistemological context of skepticism that have motivated such an international surge.

Keywords: Scientific Integrity; Truth; Neglect; Misdemeanor; Crime

Resumen

Los recientes congresos sobre integridad en la investigación evidencian una preocupación por la credibilidad de los trabajos científicos: este artículo resume tanto las obligaciones como el contexto epistemológico de escepticismo que han motivado este movimiento internacional.

Palabras clave: Integridad científica; Verdad; Negligencia; Delito; Crimen

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One mustn't tell lies

We have learned it from childhood: it is trite to say that speaking the truth is essential to the harmony of social life. We all need to trust our banker, our dentist, our greengrocer, our car mechanic... Moreover, in case we happen to learn that a service provider has cheated on the quality he had promised (see the recent Volskwagen affair), we are outraged and cry out for penalty. Indeed, we all occasionally use little lies to get out of sticky situations, but such a strategy may only work to the extent that other people spontaneously believe the speaker and do not suspect a lie – further evidence that the rule is commonly accepted. The functioning of the scientific community depends eminently on the rule above, since the scientist, as a matter of principle, is looking for the truth. For that reason the mathematician Henri Poincaré, in 1910, wrote that "science could not possibly be immoral". Moreover, from his perspective, the discipline required for a fruitful scientific quest and proof can "play an important role in moral education".

A century later, however, the belief that science can eminently be trusted seems to have dramatically faded. There is now a widespread concern about the honesty of researchers. Do our scientists lie?

A series of world conferences *on research integrity*

A first world conference on research integrity met in Lisbon in 2007, at the initiative of the European Union, then presided by Portugal. It was jointly organized by the European Science Foundation (ESF) and the United States Office of Research Integrity (ORI, belonging to the US Department of Health and Human Services). A plurality of activities related with scientific research were represented there: "researchers, research administrators, research sponsors, journal editors, representatives from professional societies, policymakers, and others". The objective was to "foster responsible conduct in research", and a practical discussion of the strategies to deal with cases of research misconduct. In other words, it was explicitly recognized that some members of the scientific community worldwide behaved badly.

A second conference on the same topic took place in Singapore in 2010. It brought together three hundred and fifty delegates from fifty countries: Asia had joined Europe and America. They worked out a set of rules of proper behavior for individual researchers (see the *Singapore Statement on Research Integrity,* online). A third conference met in Montreal in 2013 and elaborated a set of rules relating to

the integrity of collaborative research (see the *Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations,* online [Responsible Conduct of Research, 2013]). The period between conferences then shortened, from three to two years. The 4th World Conference on Research Integrity met in Rio de Janeiro (2015) and debated, among other topics, on the ways universities should train doctoral students, so they may become decent researchers. A fifth conference is announced for 2017, to take place in Amsterdam.

Scientific reliability in question

As a matter of fact, science nowadays looks discredited. A journalist of good reputation recently wrote in a serious journal, under the title "the illusive authority of science", a severe article saying that "a number of papers published in prestigious scientific journals are worse than biased"(Postel-Vinay, 2015); to support his denunciation he quoted, of course, the research work of John Ioannidis, a professor at the prestigious medical school of Stanford University, who showed that, in his medical specialty, 80% of the research findings that were published could not be reproduced (Ioannidis, 2005).

Such a situation is often ascribed to the famous imperative "publish or perish". That is, when around 1980 in the United States university administrators started measuring the merits of their professors and researchers, assuming that it may be proportional to their number of publications, and when salaries and research funding depended on such measures, then obviously the zeal for publishing was boosted. Researchers started slicing their results to nourish several papers rather than one, scientific journals multiplied to absorb the flood, and in order to attract the attention of overloaded reviewers, some authors here and there surreptitiously indulged in image editing, or smoothing out their curve points.

The production of scientific papers has now inflated so much that no researcher can read all the available literature, even strictly limited to his specialty. It is therefore hard to say whether the noticeable increase of suspected fraud should be attributed to an intrinsic corruption of the research profession, or to the mere fact that the number of researchers, and of their publications, has increased enormously. The Chinese indeed are accused of having made cheating a national sport. But in fact cases of questionable behaviour have been detected within virtually all research centres worldwide. What is currently going on is that instead of dissimulating them under a blanket of silence, there is a new interest in scrutinizing them.

What sort of fraud? What to do when fraud is suspected?

One may safely guess that those people or institutions who finance scientific research, or who publish scientific journals, have no desire to waste their money, and/or to shamefully publish false or doubtful scientific results. Learning how to detect fraud is therefore on the agenda. A paper published in *Nature* (Martinson, Anderson, & de Vries, 2005) suggested that the cases of scientific misconduct can be classified in three main groups: (a) major misconduct, (b) common fraud, (c) mere negligence.

(a) The serious misconduct has three aspects: "fabrication, falsification, plagiarism". Fabricating data is inventing them. Falsifying data is altering them, usually to make them look better. Plagiarizing is borrowing from someone else without citing the reference. Such serious faults are qualified as criminal acts, even though they are not exactly similar, the first two causing a direct damage to science, while the third one is a theft that does less harm to science than to the original author.

(b) The ordinary fraud may be qualified as a misdemeanor: cooking data (slightly arranging them, so that they will favour one's hypothesis), borrowing an idea from a colleague the name of whom will not be mentioned, delaying the publication of a rival paper (the temptation of the *referee*), are examples of common fraud.

(c) The notion of **neglect** refers to the difference between good practices and bad habits. The unsound conducts here in question may be publishing one and the same result in three journals (to flesh out the corpus of publications), enriching the list of authors with the names of colleagues who did not contribute (it being understood that the favor will be returned) or keeping logbooks messy or poorly archived, etc.

What happened in recent years was that research institutions attempted to clarify what a "responsible research" should be, and (last but not least) they specified what to do when a case of fraud is denounced or suspected. As an example, the ethics committee of the CNRS (French National Centre for Scientific Research) edited a detailed guide entitled 'Promoting honest and responsible research' (Comité d'éthique du CNRS, 2014). The US went further: at the federal level, all research agencies have an Office of Inspector General (OIG), in charge of "preventing and detecting fraud, waste, and abuse"(US NSF); and each institution that applies for a research grant must "describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in

the proposed research project" (US NSF). The possibility has been envisaged that any research funds awarded by the National Science Foundation would imply the commitment, for the receivers, to give the money back in case they are convicted of malpractice; that would lead to the necessity of including the cost of an insurance against fraud in the provisional research budget.

Is scientific truth endangered?

Let us not too fast press charges against scientists. We may remember that, at the Oxford conference in 1961, when Thomas Kuhn introduced his thesis on scientific revolutions, assuming that scientific progress did not consist in a patient accumulation of data, but rather in a brisk conceptual revolution and a paradigm shift, the chemist Michael Polanyi answered that most researchers, far from being heretics or paradigm-breakers, are peaceful people, patient and meticulous, formatted by the discipline of a laboratory, the manager of which has as a main objective, not to break away from what is already known, but to complete it, and have their best results published in what is considered to be the best journals. Big breakthroughs are rare, they may earn a Nobel price, which however does not signify that science gets revolutionized.

Yet there are deep evolutions that may go hardly noticed. Let us say that, busy and lured with a myriad of factual discoveries, scientists failed to conceptualize the paradigm glide that developed in the course of the 20th century. They listened to 'merchants of doubt' (Oreskes & Conway, 2010). They believed that a thesis cannot be scientific, as long as there remains the slightest doubt. They heard that smoking tobacco is not dangerous for the human health, since a percentage of smokers does not die of lung cancer after all; or that global warming may be due to many other factors than the demographic explosion of human populations and the use they make of their planet. About the influence of human activities on climate change there is a doubt, proclaim the climate sceptics. What climate sceptics omit to acknowledge is that the doubt on the side of their negationist thesis is even higher. No thesis in the natural sciences is immune from doubt, and that is a sign of good health for science.

What quietly occurred in the course of the twentieth century is that the hypotheticaldeductive paradigm of what science should be was replaced by a more empirical and factual model. The hypothetico-deductive ideal viewed perfect science as being built on a set of axioms, from which theorems could be deducted, that is, logically

proved, and therefore, unshakeable. From the empirical perspective, science is based on a multitude of detailed observations; as observation fails to be exhaustive, and as the course of nature itself is moving, our generalizations are tentative on what is true about the world, and they remain accessible to being amended on the face of more information.

Has this evolution made scientific truth more fragile? The desire for absolute certainty was expressed by Descartes: "those who want to find the right way to the truth should take an interest in no other objects than those from which they can get a certainty equal to the certainty drawn from the demonstrations in arithmetic and geometry". (Descartes, 1908) Four centuries later, however, even mathematics may be exposed to uncertainty, with the construction of proofs that partly rely on the use of digital tools, and the manipulation of big data, that are beyond what the human mind can explicitly control. Natural and social sciences may, short of the possibility to make their observations exhaustive, can evaluate their accuracy from the capacity they offer to reshape or improve natural processes. We don't want to say that scientific 'truths' are false. We have to acknowledge the fact that scientific truths are neither absolute nor sacred and eternal. They are not shaky or capricious either. Scientific truths are grounded on facts, and their robustness is put to the test as our observations mature.

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