Standing on the shoulders of giants with feet of clay

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Review of: Nicolas Chevassus-au-Louis: Fraud in the lab: the high stakes of scientific research. Cambridge, MA: Harvard University Press, 2019, transl. Nicholas Elliott, xi+205 pp, $37 HB

Olivier LECLERC
CNRS, CTAD (UMR 7074), Université Paris Nanterre, 200 avenue de la République, 92001 Nanterre Cedex, France
olivier.leclerc@cnrs.fr
https://orcid.org/0000-0001-5148-7603

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In 15 short chapters, Nicolas Chevassus-au-Louis takes us on a panoramic journey through contemporary scientific practices in search of what underlies so many manifestations of 'fraud' in science. '*Malscience*', the original title of the book in French, probably best reflects the scope of the investigation, which extends beyond falsification, fabrication, and plagiarism to a wide range of questionable scientific practices (7). The stops on this journey take us on a tour of the writing of scientific articles, experimental practices, professional relations within research laboratories, the signatures on scientific articles, the constitution of scientific journals, article databases, and research funding bodies. Along the way, we come across data embellishment practices, statistical results that seem too good to be true, p-values strangely close to the 0.05 threshold, research hypotheses miraculously confirmed, experiments that could not be reproduced, scientists who plagiarise others, or who pay shadowy figures to write their articles for them (or even use software), experiments whose results have the good taste to please their funders, and scientists who willingly or unwittingly become the prey of predatory journals. On this journey, the reader visits a number of countries without lingering in any of them. The picture that emerges is rather pessimistic. The book can be summarised in three steps.

First, the book describes fraud in science and explains that it is pervasive and multifaceted. The time for denial is over: although not all disciplines are equally affected (at one extreme, biomedical research is hit hard; at the other, mathematics is only marginally affected), none is immune. Moreover, the use of the Internet and databases has made fraud easier and renewed its various forms. The trend is further exacerbated by the ever-increasing presence of emerging countries, especially China, in the global scientific landscape. Even though most countries have designated institutions to be responsible for collecting and investigating research misconduct, these do not function well, lack transparency, and ultimately fall far short of providing the desired results. Thus, a large proportion of frauds are not reported at all or are informally reported outside the designated procedures. This leads to tragic consequences in terms of a deterioration in the quality of the scientific literature, loss of researchers' time and associated costs, and even

risks to the health of those (estimated at 400,000 over one decade (117)) who enrol in clinical trials based on fraudulent models.

Secondly, Nicolas Chevassus-au-Louis endeavours to identify the causes explaining scientific fraud. Following Merton, he asserts that it is the social structures of science that explains deviance. The book therefore identifies a set of social structures that are considered "fraudogenic" (164), in the sense that they constitute possible drivers of scientific fraud. Some of these factors are psychological, such as conformism (35), or the desire to please one's superior and thus ensure favourable professional prospects (99). But the most important factor is elsewhere: "it seems that the real cause for the explosion in scientific misconduct lies in the increase in international competition, in the context of a global generalization of the practice of solely evaluating researchers on the basis of the prestige of their publications" (65). Under constant pressure to publish in high-impact journals in order to boost their careers and simply to secure funding for their laboratories (67), researchers are structurally exposed to the risk of yielding to fraudulent scientific practices.

Thirdly, in the light of these results, the book recommends striking at the root of the problem and thus changing the social structures of science. A series of complementary measures are outlined: strengthening data sharing within scientific communities (164); publishing raw data more systematically (169); using more varied and transparent forms of refereeing scientific articles (168); ceasing the practice of relying on impact factors and bibliometric analysis in evaluating researchers and research institutions (169); and finally, "publish less, publish better" (173). The book concludes with a call to scientists and their institutions to slow down the frenetic pace of scientific competition, based on the understanding that slowing down will not result in a degradation of scientific knowledge, but rather in better science. The book closes with the following encouragement: "Faced with the malscience that so closely resembles the junk food served in fast-food restaurants, we need to slow down. And take our time. The time to think" (175). 'Malscience' echoes junk food (*malbouffe* in French), just as slow science echoes slow food.

To further situate the book, it is useful to note that it was first published in French in September 2016 and then translated into English in 2019. While the translation was supplemented by a few updates, the book was essentially constructed on the basis of the pre-2016 situation within the international scientific communities, with the book being not particularly France-centric. This allows us to measure the road travelled since the mid-2010s. Indeed, many recent developments do go some way to meeting the author's wishes. The denial of research misconduct no longer really holds sway, open science is on the rise, as are data papers and a more qualitative evaluation of researchers. In France, the situation has undergone a radical change compared to that described by the author (144 ff.). Oddly enough, for this country, the version published in English, although appearing later, is less up to date than the one published in French. Since 2016, research integrity has entered the law, procedures for reporting research misconduct have developed considerably, research integrity officers have been appointed in most universities and research institutions, training in scientific integrity is compulsory for all

doctoral students, and these students even pledge an oath to uphold scientific integrity when defending their thesis. The author's pessimistic diagnosis is certainly far from being entirely disproved, but the progress made since the publication of the book still remains noteworthy.

Strictly speaking, the book is not a work of research, but rather a journalistic investigation and an essay. While well informed about the functioning of scientific communities and aware of the literature on scientific practices, it does not contribute anything new to this literature. The author of the book has been working as a science journalist for some years, after earning a PhD in biology and working in a research laboratory. This is reflected in the methodology, which is at times impressionistic, occasionally relying on common sense ("as every researcher knows" (31), "ask any researcher and you will learn of numerous examples…" (108)), the opinion of "all the physicists to whom I have spoken" (8), interviews published in popular science magazines (103), unpublished studies (56), rudimentary criminological assumptions on the supposed "interest in defrauding" (108) or the "temptation" to defraud (37). Throughout the pages, the author reports that he himself enjoyed successfully contacting a paper-writing agency in China (82) or generating fake scientific papers with the help of SCIgen and Mathgen software (86). Still on the same topic of methodology, the book also raises questions about how we use research misconduct "cases". Indeed, the book summarises numerous cases. The short format of the book justifies their succinct presentation. But it is above all the place of the cases in the argument that may seem objectionable, as they hover between illustration and evidence. As illustrations, the cases are apposite. But to use them as evidence for an argument would imply putting them in series and comparing them with other, possibly different, cases. For example, the Henri Korn case is presented as a "confirmation" that the stated reluctance of French institutions to deal with research misconduct is not "mere suppositions on my [the author's] part" (151). While this case undoubtedly illustrates such a reluctance, on its own it fails to demonstrate a more general trend.

In addition to these methodological limitations, the book is sometimes frustrating in that it skims over a number of interesting questions without delving into the issues or outlining answers. For example, the author echoes Peter Medawar's (Medawar 1964) point that standardised formats for writing scientific papers cause scientists to present their experiments in a way that does not correspond to the actual practice of their research, and concludes, "as every researcher knows, it is pure falsehood. In reality, nothing takes place the way it is described in a scientific article" (31). But if one acknowledges that scientific articles are texts following a narrative form – just like court rulings, for example – it would probably be less appropriate to see them as "pure falsehood", than to question what these writing formats achieve, how they have unfolded over time, how scientists are socialised to read them, what part they play in the possibility of accumulating knowledge. Other more specific questions arise as we read: does hoaxing constitute research misconduct (1)? Where do we draw the line between data embellishment and fraud (48)? How do we distinguish between errors, "accidental fraud", and research misconduct (113)? How can we reconcile the assertion that industry is more concerned with the reproducibility of results than academic research (60) and the identification of a funding effect that steers scientific results in a direction favourable to the funder (89)?

Beyond these limitations, the value of the book lies elsewhere. It offers anyone interested in scientific integrity and research misconduct an excellent point of entry into the field, enabling them to identify the relevant themes, the most high-profile cases, and the way in which scientists handle research misconduct (or not). These are all essential elements for approaching scientific integrity and research misconduct as a field of research.

Reference:

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