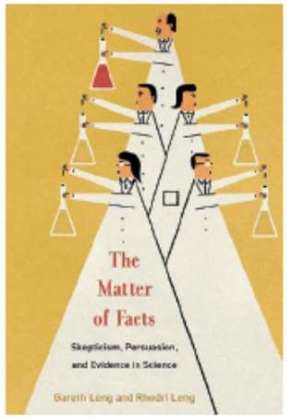
Book Review

The Matter of Facts: Skepticism, Persuasion, and Evidence in Science

by Gareth Leng and Rhodri Ivor Leng

Philip Lewis
University Hospital of Cologne, Germany



Gareth Leng and Rhodri Ivor Leng
The MIT Press (2020)
ISBN: 9780262043885

"If a chapter was to be sampled at random, one's belief in the scientific process could be decimated"

Scientists are inherently involved in every part of the scientific process from research to peer review and the journal editor, to directing research institutions, and assessing prospective scientific staff. The job description can be summarised as something noble – the pursuit of new knowledge with utility. Yet, despite scientists' control over scientific processes and the virtuous job description, science is riddled with issues. The "publish or perish" paradigm, the injustice of impact factors, the autocratic reign of the p-value, publication bias, citation bias, and data replication issues are to name but a few. At the core of these problems is that scientists are only human and, thus, flawed. But, there is hope. *The Matter of Facts* by Gareth Leng and Rhodri Ivor Leng meets these issues head on from the combined perspective of an experimental scientist and sociologist (and, indeed, as father and son), respectively, and makes for a captivating read. As appropriately prefaced by the authors, this book is about "what it means to be a scholar" and that "science, as a human endeavour, is beset by all the flaws humans have, but is endowed with their virtues too".

The stall is set with references to the great scientific philosophers, Popper and Kuhn, and questioning how science progresses. What follows is a persuasive vivisection of the scientific process that – in my opinion at least – should make this book compulsory reading on all science courses.

This is not literature to be skimmed through lightly or wherein chapters could be sampled randomly. This is not because the prose is difficult to penetrate. On the contrary, the authors elegantly explain complex issues. But if a chapter was to be sampled at random, one's belief in the scientific process (especially the young scientist who is perhaps not yet battle-hardened by the wear and tear of criticism and rejection) could be decimated. Rather, this book should be read like one reads fiction, from start to finish, where science as the virtuous and heroic protagonist is doubted, shown to be flawed, and beaten down, before rising up to prevail in the end. But boy does science ever take a hammering in 21 of 25 chapters; and the authors are persuasive! Even the chapter titles – including "Is the Scientific Paper a Fraud ...", "Exaggerated claims, semantic flexibility, and nonsense", and "Where are the facts?" – take no prisoners; but the arguments presented are fair.

The tenet of science that it is self-correcting is consistently found wanting – brought into question from various angles and with various examples in the various chapters. While their arguments are persuasive and important issues are highlighted, the conclusion that science is not self-correcting is, perhaps, incorrect. That the authors can identify cases where science is not self-correcting implies that these cases can be corrected now. Thus, in nice Popperian logic, the hypothesis that science is self-correcting is not falsified. Simply, there is a lag time to correction. Indeed, true peer review begins after publication.

Nonetheless, in many cases, my eyes were opened, particularly in regard to citation practices. For instance, that a "made-up" reference (Van der Geer J *et al.*, 2010. The art of writing a scientific article. *Journal of Science Communication* **163**(2) 51 – 59) intended to illustrate a journal's preferred style was apparently cited more than 480 times, including in some 79 journal papers, and to support the claim that the compound rutin affects blood pressure is so far beyond belief that one can only laugh (nervously). Indeed, I considered the possibility that the authors, as proof for the flaws in science that they state, included "made-up" examples to "test" if they would be taken at face value rather than the readers checking the primary evidence and interpreting for themselves. No such luck. And this is terrifically disheartening. (Disclaimer: I did not check 480 papers but I was quickly able to find a case of the "made-up" reference cited as evidence of rutin affecting capillary permeability).

In the end, it is clear that science is no paragon. There are innumerable pitfalls to be aware of. Importantly, though, at no point do the authors completely write science off. The hero prevails in the end. How do we know? Simple – science progresses.

https://doi.org/10.36866/pn.118.48