

pp368, £14.21) how the current scientific publication system beautifully presents falsified and misleading information as facts. The obstacle is not with science itself but rather with the way we do science.

Ritchie begins by showing that science is a social process in which the scientists' job evolves as researching, analysing and examining hypotheses without providing ways for other scientists to verify the accuracy of their study outcomes. One of the approaches for examining academic publication findings is by replicating the study with the same data and methodology used to produce the same results. However, whilst study replication is an essential mechanism for the verification of information within published research, it is seldom carried out due to lack of interest from funding and research institutions to redo old studies. Ritchie calls this 'The replication crises' where scientific studies are seldom reproduced, yet acquire a de facto validity due to their initial publication, even though they may be invalid.

Considering then, that most scientists aim to publish as many papers as they can for a variety of reasons unrelated to truth-seeking, Ritchie then takes the reader on a tour of various scientific studies that do not reflect the reality of the world. Some academics publish papers for the sake of reaching the safe zone for securing their job at universities. Others publish their studies to seek financial incentives from top institutions like journals or government authorities. However, Ritchie argues that scientific progress is not measured by the quantity but rather by the quality of these scientific studies. Another traditional approach for evaluating science work is by peer-review, where other experts in the study field review scientific knowledge credibility before it can be published in "peer-reviewed journals". Ritchie identifies many barriers to improving trust in science which are created by the system of publication. First, some scientists mislead readers by eliminating details in the study that do not align with their views, manipulating the data until are validated by tests as statistically significant to meet publication criteria.

Worryingly, the book claims that fraud in science is now widespread as the whole scientific environment is built on trust and many scientists will abuse this trust to advance their own research. Publication bias is where scientists conduct a study to prove a given hypothesis by doing whatever it takes to show results supporting their claim even if that means creating fake data during the study. The main idea of publication bias is to publish positive results and hide away null and ambiguous results. Scientific bias originates as most scientists aspire to publish flawless, astonishing results to add to their accomplishments. Even typographical errors may eventually have an impact on the study's findings. What happens is that unethical scientists tend to allow numerical mistakes that support their theory without checking or correcting them. Finally, the most deceiving element for covering up the truth occurs when scientists are themselves overhyping the results of their scientific publication to get it into the media or journals. This kind of promotion for studies that do not rely on substantial evidence can mislead people and consequently reduces their trust in all science.

So, what can be done to enhance the authenticity of the scientific system? Ritchie recommends a couple of solutions to repair or mitigate the effects of this scientific wrongdoing. One solution is to expose those scientists who perpetrated scientific misconduct to the general public and that there should be an independent organisation whose sole responsibility is to assess and investigate research misconduct. Ritchie also suggests creating journals focused on publishing null results to help challenge publication bias. Scientists usually conduct a study with the aim of proving a given hypothesis. If the experiment does not go their way and support their initial claim, they may run the study multiple times until they find an interesting finding to substitute their original hypothesis with. That is why Ritchie advocates pre-registering studies as a practical solution to avoid such manipulation in the process. Overall, Ritchie does an excellent job of explaining and presenting controversial issues and problems within science. It is an essential book for everyone to understand how the current scientific methodology works and how to find out the truth, which in essence is the ultimate goal of science.

Both of these books are timely entries in the growing discussion of this essential topic for the 21st century, the search for the truth in a world full of fallacy. Among the riches of information now available from big data and scientific research does the public require some understanding of what is really *significant*. All of the authors are keen to stress the lesson that *correlation does not imply causation*, especially when this is so easily misused in the media when reporting science, as well as being misused by researchers themselves. Both authors mention the now infamous Wakefield study on the effects of vaccinations and the lasting damage this has done. The small study reported vaccinations as a cause of autism, a diagnostic tool for childhood conditions which has increased rapidly in use at the same time as the mass use of vaccinations, a correlation between the two. The fact that signs of autism