

Opinion Science

## There's far more scientific fraud than anyone wants to admit

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Despite recent scandals of research misconduct and error, the academic world still seems determined to look the other way

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✪ Marc Tessier-Lavigne, the president of Stanford, announced in July that he would resign, after an independent review cleared him of research misconduct but found flaws in other papers authored by his lab. Photograph: Patrick Tehan/AP

Scientific misconduct has enjoyed some limelight lately. The president of Stanford, Marc Tessier-Lavigne, resigned last month after a series of investigations exposed serious problems in his research; an independent review of Tessier-Lavigne's work found no evidence that he falsified data himself but **concluded** that his research failed standards "of scientific rigor and process" and that he failed to correct the record on multiple occasions.

And in June it was revealed that a scholar at Harvard Business School, Francesca Gino, was **accused** of having falsified research about - wait for it - honesty.

Of course, scientific misconduct does not happen only at Stanford and Harvard. Of the nearly 5,500 retractions we catalogued in 2022, and the thousands of cases we have reported on since **launching** our watchdog website **Retraction Watch** in 2010, the vast majority involve researchers at institutions without anywhere near Stanford and Harvard's pedigrees.

The number of retractions each year reflects about a tenth of a percent of the papers published in a given year - in other words, one in 1,000. Yet the figure has grown significantly from about 40 retractions in 2000, far outpacing growth in the annual volume of papers published.

Retractions have risen sharply in recent years for two main reasons: first, sleuthing, largely by volunteers **who comb** academic literature for anomalies, and, second, major publishers' (belated) recognition that their **business models** have made them susceptible to **paper mills** - scientific chop shops that sell everything from authorships to entire manuscripts to researchers who need to publish lest they perish.

■ Paper mills - scientific chop shops - sell everything from authorships to entire manuscripts

These researchers are required - sometimes in stark terms - to publish papers in order to earn and keep jobs or to be promoted. The governments of some countries have even offered cash bonuses for publishing in certain journals. Any surprise, then, that some scientists cheat?

And these are not merely academic matters. Particularly when it comes to medical research, fakery hurts real people. Take the example of Joachim Boldt - the German anesthesiologist who, with 186 retractions, now sits atop the **Retraction Watch leader board** of scientists with the most pulled papers.

A specialist in critical care medicine, Boldt studied a blood substitute that was used in hospitals across Europe. His results, which were published between around 1990 and 2009 and widely cited, suggested that the product - used to help keep blood pressure and the delivery of oxygen to cells adequate - was saving lives. After his fraud came to light and researchers reanalyzed all of the available data while leaving Boldt's results out, it turned out the opposite was true: the substitute was "associated with a **significant increased risk of mortality and acute kidney injury**".

The truth, however, is that the number of retractions in 2022 - 5,500 - is almost definitely a vast undercount of how much misconduct and fraud exists. We estimate that at least 100,000 retractions should occur every year; some scientists and science journalists think the number should be even higher. (To be sure, not every retraction is the result of misconduct; about one in five involve cases of honest error.)

The lengths to which scientists go to fight allegations of fraud is part of the reason the rate of retraction is lower than it should be. They punish whistleblowing underlings, sometimes by blaming them for their misdeeds. They **sue critics**. Although they **rarely prevail in court**, the threat of such

