

Correcting the record

A paper published in *Nature Ecology & Evolution* has recently become the journal's first retraction. We take the opportunity to reflect on a kinder and more open way of maintaining scientific rigour.

Earlier this year, neuroscientist Ben de Haas described the collegial process that led to the retraction of one of his earlier publications. When a friend at another institution requested data, they began a collaborative effort to explain why they were getting contradictory results, which turned out to be due to a statistical artefact in the published article. De Haas describes how he was never treated as a suspect by the other researchers, and how they interacted as peers with a common goal. He also talks of the relief at finding that his PhD supervisor and co-authors openly engaged with the prospect of retracting the article, which he contrasts with the culture that still occurs in places, in which mistakes are punishable offences.

Nature Ecology & Evolution is almost 5 years old and has published nearly 800 primary research articles, so it is no great surprise that one of them has recently needed retraction. Rather than look on this as a sad inevitability of the sheer numbers, we should embrace it as a sign of a healthily functioning system. Like de Haas's retraction, this instance arose when independent researchers dug into the analysis in an attempt to understand it, and identified a coding error that undermined the main conclusions. An important catalyst was that the data and code were publicly available in repositories, so there was no need for the third-party researchers to contact the authors to request access, a step which can introduce a semblance of conflict and distrust into the interaction or prevent it happening at all because of inertia. This is among the reasons that *Nature Ecology & Evolution* requests that all authors upload data and code to recognized repositories that are permanent and accessible, except where there are legitimate obstacles to doing so, such as confidentiality or legal concerns.

Of course, improved openness in science facilitates more than just retractions. Data and code availability make it easier for other researchers to build positively on earlier research, speeding up new discovery. They also enable corrections to published work where full retractions aren't necessary — we have published several corrections over the years that have arisen when data concerns have been noticed by other researchers. A recent example (albeit one where there are some proprietary restrictions on the data, but not the code) is the substantial correction to a study on moth biomass in Britain. Many corrections are clarifications that do not alter any of the conclusions of a study, but that was not the case here. Although the primary conclusion of the study was unaltered, one of the secondary conclusions was affected in a way that necessitated many textual changes and even a change of title. It was not a retraction, however, because the main conclusion — and primary reason for publication — remained intact, as did the overall conceptual message of the study.

It's important to note the role of peer reviewers in correcting the record. Even in a case where all parties agree on a retraction or correction, we will almost always involve expert reviewers. This is to help assess the technical accuracy of the correction itself, so that it can have a positive effect on the use of the data in the future, as well as cancelling the earlier error.

In the examples above, all parties agreed on the nature of the problem and the need for change. This is not always the case, sometimes because of fundamental scientific differences of opinion and sometimes because of less-welcome non-scientific factors that can cloud judgements. Where there is genuine, honest disagreement, and editors and peer reviewers are unable to come down firmly on one side or the other,

we encourage the use of our Matters Arising criticism-and-response format. This allows the discussion to happen in public for the community to make their own decision (although see an earlier editorial that explains why not all Matters Arising should be viewed as disputes). When a dispute moves beyond the specific science of a single paper, and issues of potential misconduct or personal interactions are involved, resolution may take a long time and usually involves institutions and possibly lawyers, as well as the publishing journal.

As de Haas argues in his World View article, what is needed is a cultural shift that makes retraction a less risky business — one that is seen more as part of the scientific process rather than a tarnish on an author's reputation. Such a shift would hopefully also trickle down to more minor levels of correction and disagreement, reducing the proportion that descend into squabbles over blame. However, many authors are justifiably afraid of correcting the record in such a conspicuous way, especially junior authors who don't have tenure or reputation behind them, and for whom the article in question is a bigger proportion of their research output. Shifting to a culture in which mistakes are discussed and corrected openly requires senior scientists to lead the way, especially those who can shift the perception in hiring and funding committees that retractions are necessarily a sign of weakness or misconduct. As journals, we need to continue to promote data and code openness and consider potential corrections to the published record as fairly and meticulously as possible. We also need to work with authors to ensure that retraction and correction notices are specific and detailed enough for the entire community to learn from mistakes together. □

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