How to help scientists own their mistakes

Daniele Fanelli et al.

METRICS

META·RESEARCH INNOVATION CENTER AT STANFORD

SCIENTIFIC INTEGRITY

Self-correction in science at work

Improve incentives to support research integrity

By **Bruce Alberts**,[1] **Ralph J. Cicerone**,[2] **Stephen E. Fienberg**,[3] **Alexander Kamb**,[4] **Marcia McNutt**,[5*] **Robert M. Nerem**,[6] **Randy Schekman**,[7] **Richard Shiffrin**,[8] **Victoria Stodden**,[9] **Suzanne Suresh**,[10] **Christine Laura Kline Pope**,[12] **Vaughan Turekian**[13,14]

ber 2013 *Economist* headline proclaimed "Trouble at the lab: Scientists like to think of science as self-correcting. To an alarming degree, it is not" (*1*). Yet, that article is also rich with instances of science both policing itself, which is how the problems came to *The Economist's* attention in the first place, and addressing discovered lapses and ir-

activities of scientists are subject to rigorous policing, to a degree perhaps unparalleled in any other field of activity" (*2*). As a result, as Popper argued, "science is one of the very few human activities—perhaps the only one—in which errors

POLICY

are systematically criticized and fairly often, in time, corrected"

Published online: October 14, 2015

Editorial

THE EMBO JOURNAL

When things go wrong: correcting the scientific record

Bernd Pulverer

WORLDVIEW *A personal take on events*

DANIELE FANELLI

Set up a 'self-retraction' system for honest errors

Notices should make obvious whether a withdrawal of research is the result of misconduct or a genuine mistake, says **Daniele Fanelli**.

Retracting, Replacing, and Correcting the Literature for Pervasive Error in Which the Results Change but the Underlying Science Is Still Reliable

Stephan Heckers, MD; Howard Bauchner, MD; Annette Flanagin, RN, MA

Original articles

Retraction and republication—a new tool for correcting the scientific record?

Hannah Cagney, Richard Horton, Astrid James, Sabine Kleinert, Zena Nyakoojo, Laura Pryce
The Lancet, *London, UK; hannah.cagney@lancet.com*
Emma Grainger, Diana Stanley
The Lancet Respiratory Medicine, *London, UK*
Helena Wang
The Lancet, *Beijing, China*

Innovating retractions to reward self-correction

Stanford, Dec 2016. Workshop participants:

- Patricia Baskin (Council of Science Editors)
- Philip Campbell (Nature)
- Catriona Fennell (Elsevier)
- Jennifer Lin (Crossref)
- Emilie Marcus (Cell)
- Ana Marusic (European Association of Science Editors)
- Ivan Oransky (Retraction Watch)
- Kathy Partin (US Office of Research Integrity)
- Iratxe Peubla (PLoS ONE)
- Bernd Pulverer (EMBO)
- Jason Rollins (Thomson Reuters)
- Elizabeth Moylan (BioMed Central)
- Hilda Bastian (National Library of Medicine)
- Ijsbrand Jan Aalbersberg (Elsevier)
- Annette Flanagin (JAMA)
- Virginia Barbour (COPE)

Guiding principles for literature amendments

1. **The scientific literature should be amended as promptly and efficiently as possible.** Speed and efficiency may be optimized if journal amendment procedures were diversified and tailored to each case, in order to strike an optimal balance between resources invested in a specific amendment and the benefits to be accrued for the literature and for the process of self-correction.
2. **Amendments should be communicated transparently and clearly.** With modalities and extents appropriate to each case, and in proportion to the magnitude of the problem being corrected, amendments should be accompanied by information concerning: 1) nature of the amendment and its consequences for one or more publications; 2) who was responsible for the problem being amended; 3) where appropriate, who should be credited for identifying and amending the problem.
3. **Amendments should be documented and traceable**. Each step of an amendment process should be documented in notices that are publically available, dated and connected as directly as possible to the publications concerned. All changes made should be clearly visible, ideally in the text of the original publication.
4. **Amendments should be widely and freely accessible, independently of the amended publication**. All notices tracing an amendment process should be accessible online at no cost to the reader. Ideally, articles' amended version should also be made freely accessible.
5. **Scientists and editors should take responsibility for their mistakes and earn credit for amending them, particularly when such mistakes were made unintentionally.** Individuals who actively operate to amend the literature should be credited and ideally rewarded – just as those engaging in misconduct and gross negligence should incur fair and proportionate reputational costs.

(Fanelli et al. under review)

How these principles can be implemented

- **Authors** of scientific publications can commit to amend, in full or in part, their publications if and whenever they have new evidence that warrants such action. Authors canmake available to the scientific community all the necessary and sufficient information that ensures a maximally transparent, efficient and fair amendment, and cando so with the same care and attention that they dedicate to original publications.
- **Readers** of scientific publications can support the amendment process with commitment and responsibility. Whenever they detect the possible presence of an error or a flaw in a publication, they can in first instance contact the authors of the publication and/or the editors of the journal in which the publication appears. Online commenting may represent an alternative mean to contact both author and journal as well as informing the public about a possible flaw, but only when such online commenting is immediately associated with a publication (i.e. comment section below the online version of a publication, or official platforms like PubMed Commons), allowing the entire communication process to be represented accurately. Commentaries posted on third-party websites are not visible to the entire community. Alternative courses of actions, such as contacting the authors' employing institution, should only be taken when other attempts to communicate about an amendment have failed.
- **Academic, research and funding institutions** can incentivize, support and sustain, financially when necessary, all valid initiatives to amend the literature. When assessing individuals for recruitment, promotion or grant applications, they can encourage applicants to describe amendment activities they have been involved with. They can take into consideration all relevant information concerning the nature, causes and authorship of the amendment (see Table 1) and give credit for demonstrated initiatives of amendment.
- **Science journalists and communicators** can commit to report fairly and responsibly about amendments to the literature. While amendments may be of interest to journalists because they demonstrate how science works, reporters should refrain from making inferences or speculations and could ensure that their coverage is based on available evidence, rather than speculation.
- **Publishers** can invest efforts and resources to ensuring that journals have updated policies and that editors are adequately trained to handle amendments in a timely, consistent, fair and efficient manner.
- **Bibliometric and library information services** can cooperate with publishers to develop and adopt technologies that allow the most effective and accessible interlinking and updating of amendments of scientific publications. Ideally, they can collaborate on developing a unified and comprehensive approach to indexing amendments to the literature.
- **Journal editors** can support and encourage authors who wish to correct or retract their own publications. After appropriate consultation with institutions and/or funders, and in the form most appropriate to each case, journal editors could ensure that requests of amendment are processed promptly and collaboratively. Communication between journals is important to ensure a consistent response in cases where multiple papers are affected.

(Fanelli et al. under review)

Nature of the problem being amended → Suggested amendment procedure → Benefits for: → Current or proposed category names

issue	effects on pub.	caused	reported	retracted?	format	peer-rev?	author	literature	community	names
error	null	editors/ publishers	anyone	no	notice	no	editors	efficient amendment	credit to journal	erratum
error	does not substantially affect results and conclusions	authors	anyone	no	notice	no	authors	efficient amendment	credit to author	correction/ corrigendum
missing information	does not substantially affect results and conclusions	authors	anyone	no	notice	maybe	authors	efficient improvement	credit to author	addendum/ clarification
new data	does not substantially affect results and conclusions	authors	authors	no	article	maybe	authors	effective and traceable improvement	credit to author	version/ edition
error	significantly affects parts, without completely refuting it	authors	anyone	partially	article	maybe	authors	effective amendment	credit to author	partial retraction, retraction with replacement
methodological flaw	refutes publication	authors	not authors	no	short article	yes	not authors	efficient methodological progress	rewards critics	refutation, matters arising
methodological flaw	substantive implications for broader literature	authors	authors	fully	short article	yes	authors	efficient methodological progress	rewards author	withdrawal
outdated information	substantive implications for applications of results	na	anyone	fully	notice	maybe	authors/ editors	effective progress	no one discredited	retired
error	invalidates publication	editors/ publishers	anyone	fully	notice	no	editors	effective correction	author not discredited	cancelled
error	invalidates publication	authors	authors	fully	notice	no	all original authors	efficient retraction	credit to author	self-retraction
alleged error or misconduct	may invalidate publication, if allegation is corroborated	authors	anyone	no	notice	no	editors	responsible communication	credit to journal	expression of concern
misconduct or other ethical failure	invalidates publication	authors	editors/ institution	fully	notice	no	editors/ authors	effective retraction	credit to journal	retraction
any	serious public risks	authors/ editors	anyone	fully	notice	no	editors/ authors	responsible retraction	credit to authors/ journal/ publisher	removal

- Tool to classify retrospectively
- Guideline for editorial practices, or policies
- Standard for tagging/classification

(Fanelli et al. under review)

Particular novelties

- **Withdrawal**: this is a peer-reviewed paper in which the authors retract one or more of their previous publications based on presenting detailed new evidence, data, methodologies, results or theoretical arguments that invalidate previously published claims.
- **Retired**: a guideline or recommendation article is retired when its content is deemed outdated and its authors are unable to update them.
- **Cancelled**: this is a full retraction of a paper due to an editorial, production or publishing mistake. It is, in essence, the retraction equivalent of an erratum.
- **Self-retraction**: a short retraction notice signed by all co- authors of the original paper and issued if and only if the co-authors make a joint and unsolicited request of retraction to the journal.
- **Removal**: under exceptional circumstances a publication may be entirely removed from the public record if its content presents a serious and substantial risk for society, individuals or the environmental

Key messages:

- **Raise awareness of diversity amendments, and current limitations in tackling them**
- **Urge experimenting with new approaches, see what works in context**
- **Share experiences**

(Fanelli et al. under review)

Workshop agenda:

8:00-08:30	Continental Breakfast
08:30-09:00	Welcome and introduction of all participants *(Steven Goodman, John Ioannidis)*
09:00-09.30	Background, scope of the workshop and overview of the agenda *(Daniele Fanelli)*
09:30-10:30	Moderated discussion I: **Overall scoping and critical points**
10:30-10:45	Break
10:45-12:00	Moderated discussion II: **Principles and commitments to support self-correction**
12:00-1:00	Lunch
1:00-2:15	Moderated discussion III: **Innovating retractions to support self-corrections**
2:15-2:30	Break
2:30–3:20	Moderated discussion IV: **Versioning and the future of scientific publication**
3:30-4:00	Wrap up: **Concluding remarks and further courses of action**