



The Collection of Open Science Integrity Guides (COSIG): Expanding participation in post-publication peer review

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Abstract

Investigating the integrity of the published scientific literature is a crucial part of the scientific process. However, such investigations often require specialized knowledge. COSIG is an open source collection of guides written and maintained by publication integrity experts to distribute this knowledge.

Text

The number of scientific articles retracted annually has recently reached record highs [1]. This trend has bolstered concerns about the reliability of the published scientific literature and about a general “reproducibility crisis” across scientific fields.

Two opposing trends underlie this recent increase. One trend is the apparent rise of research paper mills, organizations that facilitate and profit from systematic publication fraud [2]. On the other hand, recent years have seen developments in the popularity and recognition of post-publication peer review (PPPR), the practice by which the published scientific literature is revisited and reappraised, often with a critical lens. A community of prolific PPPR practitioners, often called “sleuths”, has emerged around this practice [3, 4]. Many recent high-profile retractions and revelations of research misconduct were the direct result of volunteer work on the part of this community, as have been thousands of retractions due to paper mill involvement. PPPR mostly occurs on platforms like PubPeer, where users can leave comments pseudonymously or under their name on any article. PubPeer now hosts more than 300,000 comments [5].

This burgeoning community gathered in Paris in September 2024 for a meeting on “decontamination of the scientific literature”. There, we arrived at the consensus that:

1. The great majority of problematic papers persist in the scientific literature without being detected, let alone retracted.
2. It is a strong possibility that systematic scientific fraud is responsible for an increasing proportion of the scientific articles published annually [6].
3. Detection of problematic papers is bottlenecked by the number of concerned individuals performing PPPR.
4. To better maintain the scientific literature and better understand the scope of systematic scientific fraud [7], we should seek to rapidly expand participation in PPPR.
5. Although working scientists are the best prepared to perform PPPR, anyone is capable of being a steward of the scientific literature. Indeed, several of the most prolific PPPR practitioners are non-scientists and retired scientists working outside of their career field.
6. There are barriers to participation in PPPR, including but not limited to not knowing where to start, unfamiliarity with PPPR platforms, lack of domain-specific knowledge and fear of career consequences.

Following on this consensus, we began developing the Collection of Open Science Integrity Guides (COSIG), now available at <https://doi.org/10.17605/OSF.IO/2KDEZ> or cosig.net. COSIG is an open source, constantly expanding collection of accessible guides maintained by publication integrity experts and PPPR practitioners sharing best practices and tutorials for conducting PPPR in topics across scientific disciplines. At the time of writing, COSIG features 27 guides, summarized in **Box 1**.

Box 1: Summary of guides currently available in COSIG.

General guides

- [PubPeer commenting best practices](#)
- [Extracting vector graphics from a PDF](#)
- [The vertical line test](#)
- [Image duplication](#)
- [Image compression artifacts](#)
- [Software for image forensics](#)
- [Reporting publication integrity issues to publishers](#)
- [Citations](#)
- [Citations to retracted publications](#)
- [Formulaic research](#)
- [Plagiarism of text](#)
- [Common dismissive responses to integrity concerns](#)
- [Suspicious venues](#)
- [Ethical approval of human subjects research](#)

Biology and medicine

- [Antibody validation](#)
- [Misidentified and non-verifiable cell lines](#)
- [Nucleotide sequence reagents](#)
- [Tumor burden](#)

Materials sciences and engineering

- [X-ray diffraction patterns - Scherrer's equation](#)
- [X-ray diffraction patterns - data duplication](#)
- [Energy dispersive X-ray spectroscopy](#)
- [Elemental composition](#)
- [Tauc plots](#)

Mathematics, statistics and computer science

- [Evaluating the performance of binary classifiers](#)
 - [Evaluating the performance of multiclass classifiers](#)
 - [Standard deviation versus standard error](#)
 - [Multiple hypothesis correction](#)
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All content in COSIG can be distributed freely under a Creative Commons Attribution - Noncommercial - Share Alike 4.0 International (CC-BY-NC-SA 4.0) license, either individually in standalone PDFs or as a part of one, textbook-like document containing all COSIG entries. Because the project is open source, anyone can make contributions or suggest changes to COSIG. All past versions of COSIG are maintained and new versions of entries prominently feature the last revision date.

The primary goal of COSIG is to be an eminent, comprehensive starting point for those wishing to take part in PPPR. However, we anticipate that COSIG will be useful for a variety of stakeholders including institutional research integrity officers, funding organizations, journal editors and educators.

As a community-led open source project, we welcome contributions from anyone interested in PPPR. Such contributions might include feedback and revisions on existing guides, ideas for new guides and drafting new material for COSIG. Suggestions to improve COSIG can be submitted by opening an issue on COSIG's GitHub repository at <https://github.com/cosig-pppr/cosig> or by emailing admin@cosig.net.

COSIG was initially conceived during discussions between Boris Barbour, Elisabeth Bik, Jennifer Byrne, Jana Christopher, Kevin Patrick, Reese Richardson and Maarten van Kampen. At the time of writing, the following individuals have contributed to COSIG: Anna Abalkina, René Aquarius, Lonni Besançon, Elisabeth Bik, David Bimler, Jennifer Byrne, Guillaume Cabanac, Jana Christopher, M.V. Dougherty, Yagmur Ozturk, Kevin Patrick, Solal Pirelli, Reese Richardson, Nicholas Ritchie, Matt Spick, Stefan Stender and *Nerita vitiensis* (pseudonym).

COSIG launches amidst sweeping cuts to public scientific infrastructure in the United States [8-9] and widespread questions about the prevalence of untrustworthy science [6, 7]. To safeguard the integrity of the scientific literature and to conserve the global public's strong trust in science [10], we maintain that science (and review thereof) is best done out in the open [11]. To that end, we are excited to launch COSIG and we extend an open invitation to take part in the stewardship of the scientific literature.

References

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