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AI-Assisted Peer Review Responses Present Emerging Challenges for Reviewers and Editors: Proposal for a Reviewer Evaluation Framework

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During my role as a peer reviewer for the one of the Journal of science , I encountered a troubling case highlighting the potential misuse of large language models (LLMs) in academic publishing. The manuscript under review was an original research article in neurosurgery, and after my initial assessment, I recommended "major revisions." The authors were expected to address my critiques with detailed responses, a standard practice to enhance scholarly work.

However, the revised manuscript raised suspicions. The authors' replies were unusually generic and lacked the depth expected from experts in the field. Instead of engaging with specific critiques, the responses included broad, noncommittal statements, reminiscent of AI-generated text. Frequent use of terms like underscore , realm , and landscape further hinted at LLM involvement.

Inconsistencies were also evident. While some sections were adjusted based on my feedback, others remained unchanged, creating contradictions. Most alarmingly, the authors agreed to modify key methodological aspects postdata collection—an implausible scenario for a completed study. This suggested either superficial engagement or reliance on automated tools for revisions.

The Role of Generative AI in Academic Writing

The case above reflects a broader trend: generative AI, particularly LLMs, is increasingly integrated into academic writing. While these tools can aid legitimate tasks, their misuse poses significant risks. AI is now employed not only for assistance but also to produce fraudulent content [1].

Similarly, peer reviews themselves may be generated by LLMs. These models can process vast amounts of text and produce coherent summaries, making them useful for organizing ideas. However, issues arise when reviewers rely entirely on AI-generated critiques without applying their expertise. Such practices undermine peer review integrity, as AI lacks the critical insight essential for scholarly evaluation.

Potential Solutions

Addressing these challenges requires innovative approaches to uphold academic rigor.

1. **AI Detection Tools:** While AI detectors exist, their effectiveness is limited by the rapid evolution of LLMs, which quickly adapt to bypass detection. False positives and negatives further complicate their use [2]. Thus, detectors must be supplemented with ethical guidelines and human oversight.

2. **Enhanced Reviewer Incentives:** Journals should prioritize selecting and training qualified reviewers. Incentive systems, such as awards or rankings, could encourage more engaged participation. Stricter ethical guidelines for AI use in research, coupled with penalties for misconduct, are also necessary [3].

Proposal: A Reviewer Rating System

A robust solution is the implementation of a standardized reviewer rating system. This framework would evaluate reviewers based on criteria such as feedback quality, thoroughness, and timeliness. Cumulative scores could create a "reviewer profile," reflecting their contributions to peer review.

Integrating this system into academic metrics (e.g., h-index) would formalize peer review as a scholarly activity. Institutions and funding bodies could consider these ratings for promotions or grants, incentivizing high-quality reviews. While implementation may increase editorial workload, automation could assist by flagging ethical concerns or incomplete reviews.

Such a system would elevate reviewer recognition, address submission pressures, and mitigate issues like AIgenerated responses by promoting deeper engagement.

Previous Initiatives

Several systems have been proposed to recognize reviewers:

Open Review: Godlee advocated for transparency, suggesting open reviewer identities to enhance accountability. Journals like BMJ have piloted this with positive outcomes.

PubCreds: Fox and Petchey proposed a "reviewer currency" model, where reviewers earn credits for their contributions, redeemable for their own manuscript reviews [4].

Reviewer Index (RI): Kachewar and Sankaye introduced a directory to track reviewer contributions, aiming to integrate peer review into academic recognition [5].

R-Index: Cantor and Gero proposed quantifying reviewers' impact based on the influence of papers they evaluated [6].

Reputation Algorithms: Gao et al. developed a ranking system based on the citation impact of reviewed papers, aiding editors in identifying high-quality reviewers [7].

Platforms like Elsevier’s Reviewer Recognition and Publons document reviewer contributions but lack standardized metrics to assess quality.

Could AI Replace Human Reviewers?

Advancements in AI raise the possibility of fully automated peer review. AI could assess manuscripts for methodological rigor, statistical validity, and clarity, offering rapid, standardized feedback. However, challenges remain in evaluating novelty, ethical dilemmas, and subjective insights, which may still require human judgment.

Conclusion

A reviewer rating system could address multiple peer-review challenges, from AI misuse to inconsistent feedback. By incentivizing excellence, it would foster a culture of accountability and expertise, benefiting both journals and the academic community.

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