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Peer Review Fostering Research Integrity

Exploring the AI Routes to Reliable Reviewing

Preface

Dear Reader,

Sometimes researchers wish to consider being the backbone of research and its integrity, by playing a pivotal role in the publishing world — by becoming a peer reviewer. Touted for being a task that's at the helm of the publishing mechanism, peer reviewing is daunting and time-consuming. Furthermore, submitted manuscripts often outnumber the count of willing peer reviewers. However, with the assistance of AI-based tools, it is expected that the peer review process could advance and would assist reviewers in providing quicker assessments with ethical judgements on the research studies.

Through this e-book, we would like to provide a brief description of how peer reviewers are the torch bearers of upholding research integrity and how their continuous assistance helps research evolve and assist in better knowledge dissemination.

We hope this e-book helps you understand the peer review process better as we unveil some lesser known facts of this dynamic mechanism of scholarly communication.

You can also visit enago.com/academy for more information and insightful resources about the research and publishing industry.

Happy Learning!

Regards,
The Enago Academy Team

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PEER REVIEW PROCESS IS DYNAMIC

Despite being one of the most pivotal processes in the publishing industry, there are some unknown facts about peer review that require unravelling to explore the possibilities of moving towards a reliable system. The purpose of peer review is to encourage authors to meet the expected discipline-specific research and publishing standards, and govern the dissemination of research data.

> **Peer reviewers inspect the unauthorized claims, unacceptable interpretations or personal views in research publishing, playing a pivotal role which may sometimes go unacknowledged.**

Incessantly criticized by some on being the reason for prolonged publishing processes, it's an undeniable fact that a peer reviewed scientific literature is considered most reliable by all.

Peer Review: Its Indispensable Need in the Publishing Industry

Peer review ensures that the papers published in scientific journals address meaningful research questions and draw conclusions based on ethically executed experiments.

Peer review intends to serve two major purposes;

- It is a filter that allows only high quality research to be published, especially in reputable journals and
- It intends to improve the quality of manuscripts as reliable sources for future literature review.

The Inception and Evolution of Peer Review

The concept of peer review developed even before scholarly journals came into existence. The origin dates back to the times in ancient Greece, wherein the peer review process was followed as a method to evaluate any form of written work. Later, a Syrian physician named Ishaq bin Ali al-Rahwi, 854-931 CE, first described the process in his book *Ethics of the Physician*.

Later, the invention of the printing press in 1453 became a turning point for peer review advancement.

As printing presses allowed written documents to be distributed to the general public, regulating the quality of written material became all the more crucial. Eventually, the prevalence of editing by peers with subject-matter expertise increased. As time flew, there came many intermittent advancements for creating a robust and structured method to generate and assess new research. But it was in 1665, when *Journal des sçavans* in French and *Philosophical Transactions of the Royal Society* in the English language became the first scientific journals to formalize the peer review process.

The peer review process was developed to help journal editors decide which manuscripts deemed suitable for publishing. Eventually, the process evolved and transitioned from its initial unidirectional purpose of assessing papers for accuracy to evaluating papers with an intent to uphold the integrity of research study before publication. The peer review process saw a systematized and institutionalized development since the Second World War, due to the surge in scientific research then.

> **Today, the peer review process is at the helm of ensuring that a scientific manuscript is experimentally and ethically correct.**

Furthermore, it determines which papers meet a journal's standards of quality and confirms originality before publication. It is now a standard practice by most credible scientific research journals and plays an imperative role in determining the credibility and quality of submitted work.

Peer Review: An Ever Changing Process

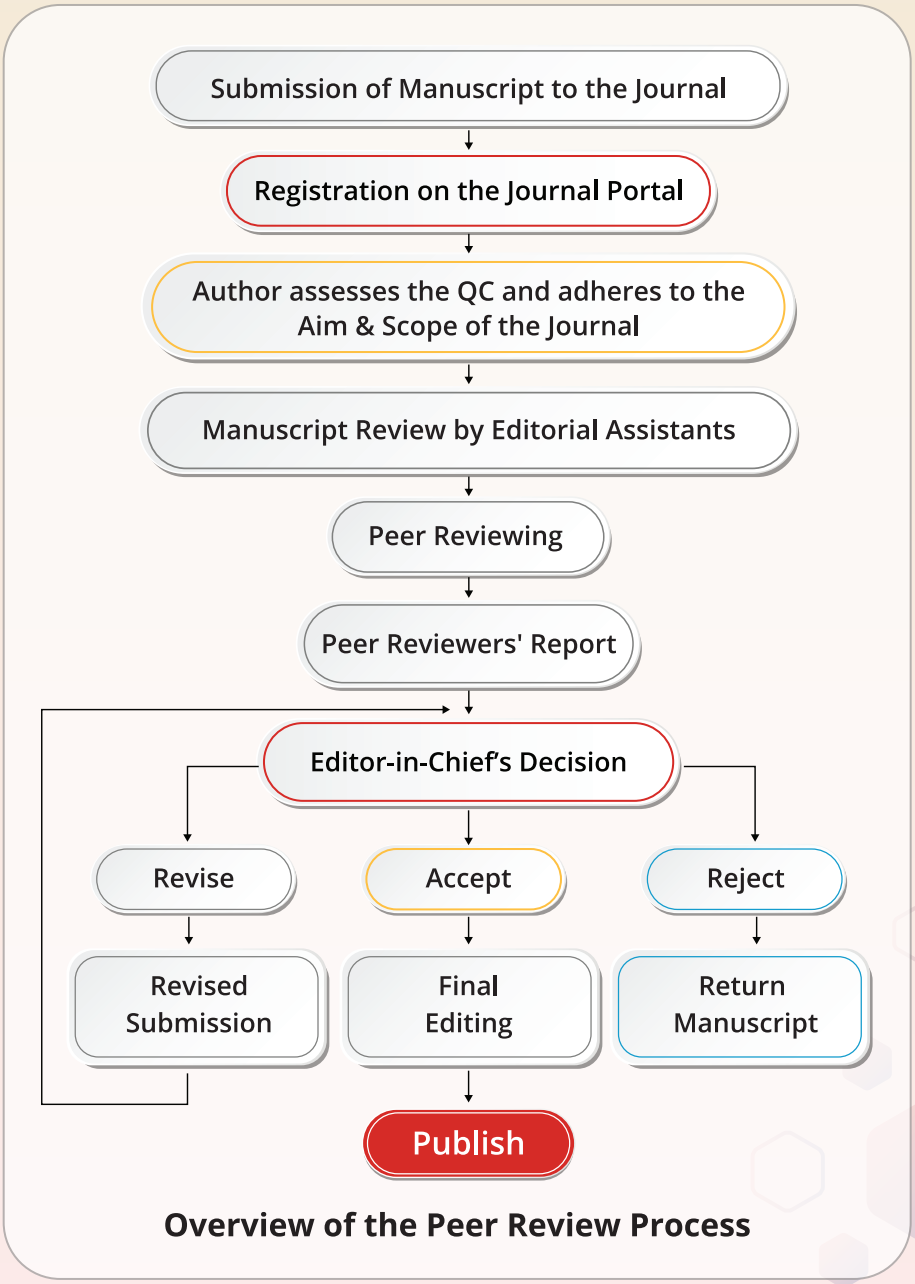
Peer review has become the foundation of scholarly publication system because it encourages authors to strive to produce high quality research data, which will ultimately advance the field of research. Furthermore, it also supports and maintains integrity and authenticity in scientific advancements. While the time senstitives on research, especially during the COVID-19 phase has augmented preprint and repository publication, some institutions still insist on publishing in peer-reviewed journals.

Peer review is a well-developed process that has been a formal part of scientific communication for over 300 years now. Started as an aid to editors, the peer review process evolved from helping the editors to ensure the validity of research in submitted manuscript. Sooner than later, the peer review system has become a systemized mechanism of the research publishing process, wherein a peer reviewer, also referred to as a referee, scrutinizes the paper to evaluate the quality of experiment, the appropriateness of the methods used, and its relativity to science.

Overview of the Peer Review Process

Peer reviews are conducted by scientific experts with specialized subject knowledge of the manuscript's research area or allied domains. Broadly termed, peer reviewers are those who have competence and expertise in the subject areas of the assigned journal.

Review process begins once the manuscript is submitted to the publishing platform. The editor of the journal reviews the paper to ensure that the subject matter is in line with the scope of the journal. Most papers pass through this initial evaluation as the scope of the journal is defined on every publishing platform's website. If the editors are satisfied with the relevance of the submitted manuscript to that of the journal, and assess it for preliminary requisites such as formatting, citing, inclusion of cover letter, author details, and so on, they will send the paper to one or more researchers or scholars with expertise in the same or allied field for peer review.



Overview of the Peer Review Process

When a reviewer is presented with a paper, they read through the paper and identify scientific errors and references that are missing or incorrect. After creating a thorough peer review report, the reviewers submit their opinion of whether the paper should be accepted, rejected, or improved before publishing in the journal.
The editor is chiefly responsible for author-referee discussion in order to clarify the priority of certain recommendations from the peer reviewer/s. The editor mediates the discussion over reviewer requests, suggested areas of improvement, and overrules reviewer comments that are beyond the scope of the study. If the paper is accepted, as per the peer reviewers' suggestions, it goes in to the production stage, and finally gets published in the journal.

The Definitive Role of Peer Reviewers: It's More than Being a Critic!

Peer reviewers are one of the most important stakeholders of the scholarly research publication system. The reviewers must be aware of the paper selection policies and procedures of the journal they work/review for. They must believe the reported results based on logical reasoning and scientific evidence. Furthermore, they should care about the fact that the research work for their scrutiny will add value to the existing literature.
Reviewers are not paid to conduct peer reviews and the process takes considerable effort. Therefore, the incentive a reviewer gets is being a part of following an academic duty, keeping oneself up-to-date with the latest developments in their field, and always being a learner. Some scientists take peer review as an opportunity to advance in their own research as it stimulates new ideas and allows them to explore new experimental techniques. Alternatively, other reviewers are keen on building connections with prestigious journals and editors, and becoming part of their community with more collaborations.
In terms of career development, becoming a peer reviewer can be a desirable achievement for a researcher, because many institutions consider a researcher's involvement in peer review while assessing their performance for promotion.

Publishing in Peer Review Journals: Is it Worth the Wait?

Although developed as a process that maintains the integrity and authenticity in scientific advancements, most researchers struggle with publishing in peer-reviewed journals due to their time-consuming peer review system. Researchers resort to the belief that peer review may be hindering the pace of science and its advancement. However, the dread of "Publish or Perish" is not helping researchers either, as the haste in getting their manuscript ready for publishing could lead to overlooking of the required aspects for publication.
Researchers agree and struggle with the fact that publishing in a peer-reviewed journal is a hurdle to cross, with many awaiting the responses from the journal editor about their submitted manuscript. Given the reliability on papers published in peer reviewed journals, this robust process consumes time of almost half a year or sometimes even more. Should this be the case? Are researchers questioning the system?

02

AT THE FOREFRONT OF MAINTAINING RESEARCH INTEGRITY

Peer review is one of the most widely used systems that originated in early times and is still relevant and practiced to optimize reporting and publishing of research. However, the traditional system of pre-publication peer review is known to have many flaws. In the standard model of peer review system, reviewers/referees comment on the manuscript presenting selected analyzed data. Although a meticulous process, this system could be ineffective at detecting incomplete or falsified findings. And if poorly implemented, the peer review process may be termed bias and could eventually result in delayed publication.

What Is Research Integrity?

> **The term 'research integrity' describes the ideal system in which research achieves rigorous standards and produces trustworthy and useful results.**

Research integrity must be maintained through the entire research process from planning and designing experiments to executing research methods and reporting the derived results.

The responsibility to ensure research integrity is borne by many; including researchers, supervisors, funders, institutional leaders, peer reviewers, and journal editors. Thus, the reliability of a published research depends not only on an individual, but also on the systems that affect it; such as academic rewards, incentives, and pressures.

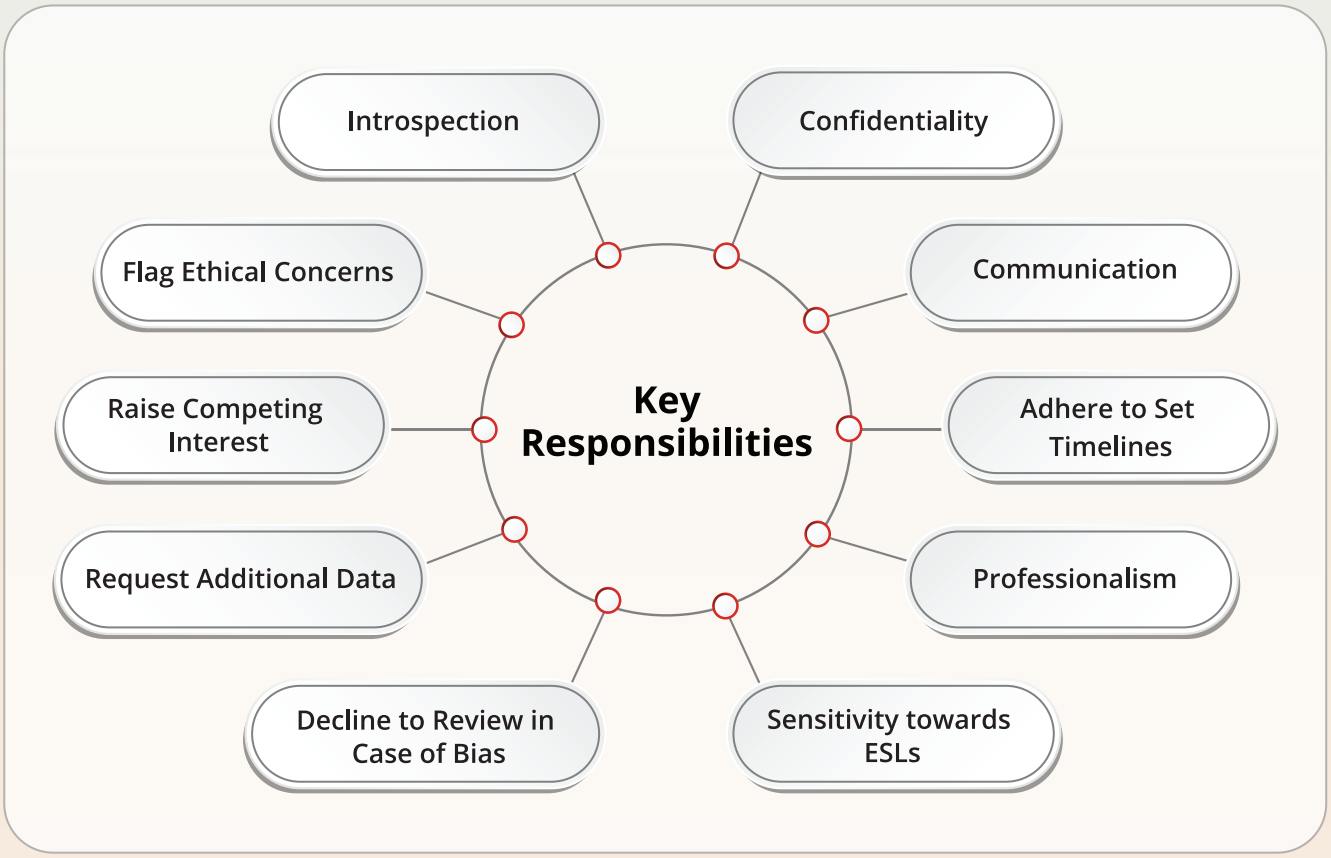
Is Research Integrity at Risk?

Though peer review is responsible for deciding the manuscripts to publish and making sure that the published literature adheres to the logical methods and publishing standards, today, it does much more than simply deciding between accepting and rejecting a manuscript. The scientific community is focusing on the reproducibility of results and transparency of data. Reproducibility of results is the foundation of a scientific method, as it establishes future prospects of scientific advancements. Whereas, transparency of data means making raw data accessible to whoever wants to see it. Both reproducibility and transparency of published work are supported by a well-structured peer review process.

Ensuring a professional and objective review requires adherence to certain fundamental yet critical principles of reviewer responsibility. Failing to abide by these could lead to an impending risk of maintaining research integrity and questioning the peer review process.

What Are a Peer Reviewer's Fundamental Responsibilities?

A peer reviewer is involved in quality control mechanism of the scholarly communication system. The International Committee of Medical Journal Editors (ICMJE) defines peer review as the critical assessment of manuscripts submitted to journals by experts who are usually not part of the editorial staff. Following are the key responsibilities for a peer reviewer:



Confidentiality

Reviewers must not disclose the contents of the paper they are reviewing to anyone else. However, it is alright to have a colleague co-review the contents of a paper, provided they agree to confidentiality too.

Communication

Reviewers must not communicate with any of the authors until the manuscript is reviewed and published. Editors are the medium of conversation between the authors and the reviewers.

Adhere to Set Timelines

Complying with requested turnaround times for a review is not only a courtesy to authors but also improves the rate of scientific progress. Although reviewers are caught up with their research and other academic responsibilities, it is expected of them to set realistic timelines and avoid delays.

Professionalism

Reviewers must avoid personal criticisms and disparaging remarks. If a reviewer thinks a method is flawed or a result is questioned, they must include objective evidence in the review to support the drawn conclusion.

Sensitivity towards ESLs

Many submissions from foreign countries exhibit evidence that English is not the authors' first language. Although authors must take responsibility of their academic writing skills, reviewers should be sensitive to the challenges some authors face due to language barrier and keep their remarks cordial.

Decline to Review in Case of Bias

Peer reviewers should decline to review a manuscript if they have bias regarding the paper or its authors before even reading the paper. It is difficult to distinguish between bias and professional opinion, but it helps one to remember that the professional opinion is backed by objective evidence, whereas bias is based on a notion.

Request Additional Data

Reviewers are allowed to request additional data or analyses if required to answer the question(s) being addressed by the authors. However, additional experiments to expand the science under investigation, even if of substantial interest, should be avoided.

Raise Competing Interest

Editors cannot know about the conflict permutations between author/s and reviewers. Thus, reviewers are responsible for alerting the editor about the conflicts and refrain themselves from review.

Common bases for conflict can be:

- Current/recent* co-authorship on another paper
- Current/recent collaboration for a research project
- An appointment at the same institution as one or more of the authors
- Financial conflict due to interests in methods or concepts used in the paper under review
- Being a recent mentor or mentee of one or more of the authors

*Recent meaning – 5 years of separation is preferred.

Flag Ethical Concerns

Reviewers have a responsibility to alert the editor of the possible ethical concerns. The journal relies on reviewer's inputs and has a well-defined process for following up on any concerns raised. Ethical concerns include manipulation of data (figures, numbers), plagiarism, duplicate publication, and inappropriate treatment to living subjects.

Introspection

Before sending a review back to a journal, a good reviewer could ask "How would I react to receiving these comments if I were the author?" And should be able to answer "These are useful, fair, and evidence-based comments and are presented cordially." As per the Journal of Applied Physiology, it has been observed that very few reviews fail. This displays the professionalism and diligence of peer reviewers. Furthermore, they mention that reviewer concerns about conflict of interest and ethics are also rarely encountered.

Is Peer Review Workflow Under Strain?

Global State of Peer Review 2018, survey report, undertaken by Publons, notes that finding peer reviewers is becoming harder, even as the overall volume of publications rise globally. The industry is suffering a reviewer fatigue. This is because the reviewers approached by journal editors is way more than the ones who willingly accept and complete the review.

Peer reviewers are under strain because of the constant increase in submission volume. Not to mention the gravity of issues researchers have to face while awaiting the response from the editor post manuscript submission. One crucial response to this situation could be to make initial screening of submission less time intensive.

Reducing the screening and review time would save millions of working hours and potentially increase academic productivity. Many platforms have begun the use of automated screening tools to prevent plagiarism and adhere to format requirements. Furthermore, some tools are even designed to flag the quality of a study or summarize its content, to reduce reviewers' load.

03

ADVENT OF AI EASING THE PEER REVIEW PROCESS

> **Even if individual researchers are prone to falling in love with their own theories, the broader process of peer review and institutionalized skepticism are designed to ensure that, eventually, the best ideas prevail.**
>
> *- Chris Mooney, "The Science of Why We Don't Believe Science" , 2011*

Supply and Demand of Peer Review

The Global State of Peer Review 2018, survey report, was conducted to observe the reviewing practices across different research areas. The investigation was carried out by categorizing article submission and peer review completion data.

> **On an average, 2.7 reviews are completed for each submission across all research areas.**

There is a wide range of review intensity, relative to submission rates, amongst research areas.

As per the study, Clinical Medicine was the largest research area by publication output on a review per submission basis. However, it produced the fourth lowest number of reviews per submission. This wide variety in review per submission rates indicates different cultures across research areas. However, it could partly be attributed to different approaches to peer review and is definitely impacted by rejection rates.

Uneven Contribution of Peer Review Across the Globe

Furthermore, the survey report states that scientists in developing countries are more likely to accept requests for peer review and complete their reviews sooner than those from developed countries. However, their reviews are also shorter than those from developed nations.

In 2013-17, the United States contributed nearly 33% of peer reviews, and published 25.4% of articles worldwide. In contrast, developing countries did 19% of peer reviews, and published 29% of all articles.

Data from Global State Peer Review Report for 2013-17

- **10% of reviewers are responsible for 50% of peer reviews**
- **75% of journal editors say the hardest part of their job is finding willing reviewers**
- **71% of researchers decline review requests because the article is outside of their area of expertise**
- **42% of researchers decline review requests because they are too busy**
- **39% of reviewers never received any peer-review training**

AI-assisted Peer Review

Demand for peer review has increased over time due to an unprecedented growth and considerable increase in retraction rates. Huge amount of time is spent every year on reviewing the manuscripts that were previously rejected and resubmitted to other journals. Therefore, the research community is willing to welcome developments that make the quality control/assurance process associated with research outputs, especially the peer review process, more efficient.

There have been many initiatives in making use of automated screening tools in areas such as plagiarism prevention, compliance checks, and reviewer-manuscript matching and scoring.

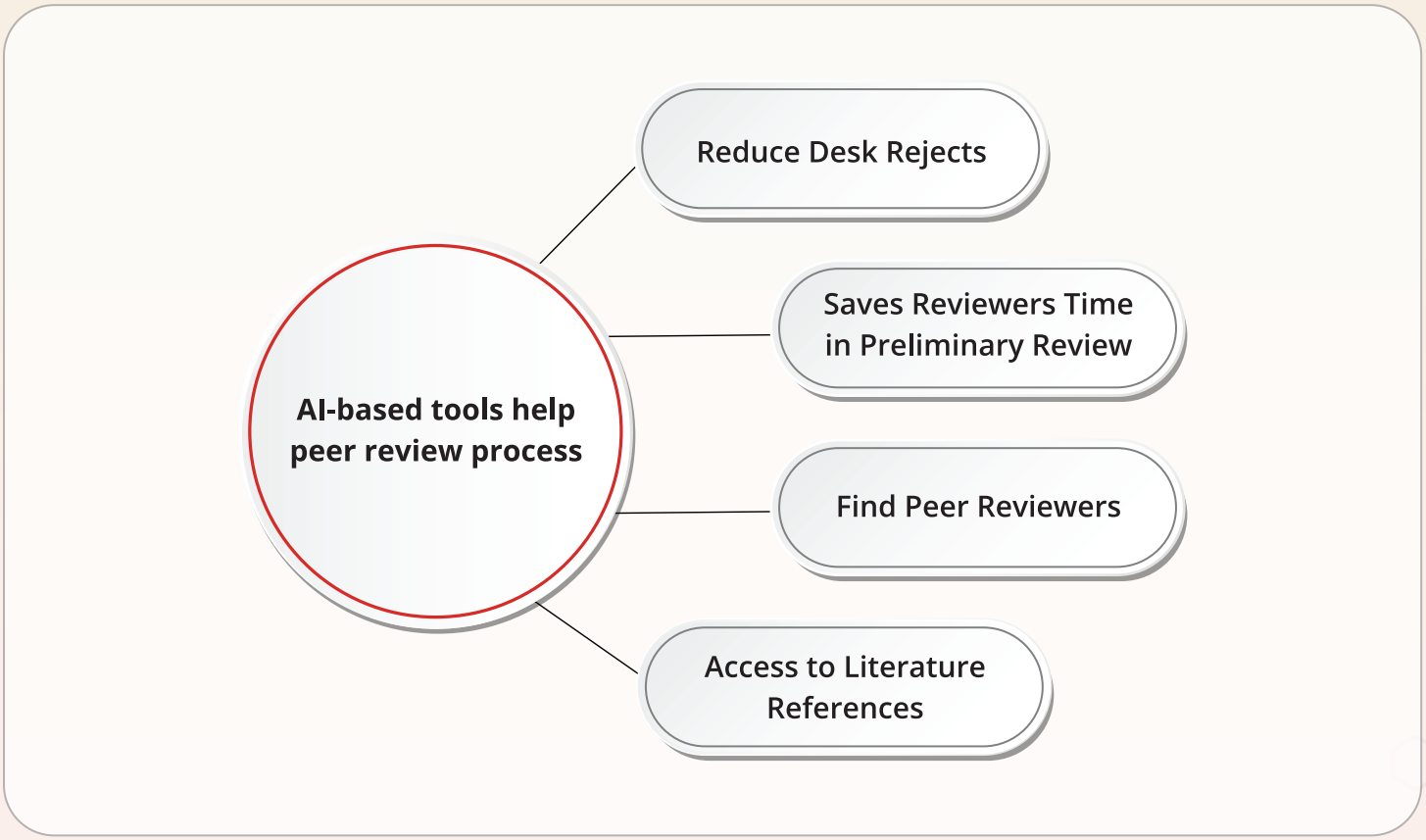
For example, RAx Review Assistant is a unique AI-powered tool that aims at making the peer-review process quicker yet efficient. It is a one-stop solution for peer reviewers to conduct reliable reviews and create effective reports.

Most of these tools use Artificial Intelligence (AI), machine learning, and natural language processing of datasets. Many research goals majorly focus on the potential, pitfalls, and uncertainties in the use of AI-based tools for human decisions in the quality assurance and the peer review process.

The question that AI researchers have been trying to ask is "Can we use AI-based tool to replicate human reviewer decision making?" The AI-assisted tools for peer review process are still under research and the attempt to replace human reviewers with AI is a futursitic vision. However, some components of the quality assessment and peer review process could be assisted by AI-based tools. Some tools are used for informed decision-making rather than determining the review outcomes. In particular, they might:

01 Reduce Desk Rejects

The assisted tools could screen papers prior to peer review, advising authors to rework on their paper. This might benefit authors for whom English is not a first language. The AI-based tool could be used to save the reviewer's time and avoid desk rejects.



02 Saves Reviewers' Time in Preliminary Review

AI-based tools could be used to perform initial screenings and then processing the manuscripts ahead to the right reviewers. Although individual reviewers will have their own opinions and conclusions about the paper, AI can be used to identify missing data and invalid conclusions. This will help the reviewers detect problem areas quickly and complete the review process faster.

03 Find Reviewers

One of the many challenges of a journal editor is to find peer reviewers. 75% of the journal editors say the hardest part of their job is to find willing reviewers. This is primarily because peer reviewing is a time consuming task. Using AI-based tools to create a directory of locating subject matter experts could solve one aspect of the issue. Alternatively, using AI-assisted preliminary peer review could attract reviewers to consider peer reviewing, instead of shying away from it.

04 Access to Literature and References

Another major hindrance reviewers face is getting no or limited access to the literature study that supports the research question. Reviewers have to do their own comparative studies between the existing literature and the manuscript supported literature. In fact, a reviewer has to confirm the uniqueness of a research study through a detail literature data analysis. This time-consuming activity could be taken up by an AI-assisted tool that helps with comparative study and provides a platform for existing literature study on the topic and easy access to references.

Using AI-assisted Tools for Review: But to what extent?

One of the most commonly talked about issues with machine learning techniques is their inherently conservative behavior. The AI-assisted tools are trained and tested with data since their inception. This could lead to bias and other unintended consequences when used for informed decision-making in the future. In application, this could lead to rejection of a manuscript because the AI-based tool would reflect the previous human reviewer's views on the subject and may not consider the quality of submission.

Furthermore, an author will find it difficult to trust an automated review, if there is no transparency on the rationale for the decision. Therefore, any tool created to assist decision-making in scholarly communication should be made considering the need for transparency in research.

We could also not deny the fact that the tools designed to assist reviewers can influence them, raising doubts in their mind about a paper's quality.

All these ethical concerns need to be considered before designing an AI-based tool and some ground rules must be set to determine the role of AI-assisted tools in decision-making. However, with the advancement of current research in the field of automation, the role of AI-based tools in peer review process is viewed in a positive light.

04

HOW PEER REVIEWER FOSTERS RESEARCH INTEGRITY

To reiterate, peer review remains the cornerstone of deciding which manuscripts to publish. Peer reviewers evaluate the manuscript and provide feedback and recommend the journal whether the work is suitable for publication. Despite being infamous as inconsistent and time-consuming, the peer review process and the reviewers benefit the scientific community in numerous ways :

They uphold the quality of the literature

Peer reviewers foster the quality of research with their advanced knowledge database. They serve to filter out poor quality research. Thus, readers put more faith in what they read in peer-reviewed scientific journals because the published work has already been vetted by subject experts. However, as peer reviewers cannot pick up all cases of fraudulent work and poor research, the onus still lies with the authors to submit good quality work with adherence to ethical practices.

They are involved in governmental policies

Scientific research has far reaching applications beyond academia. It is instructive in governmental policies, regional schemes, and in industry. All of these areas rely on high quality research, of which peer review is instrumental. Furthermore, the peer review process itself is utilized in the production and evaluation of governmental policies. An example of this is "Health Technology Assessment (HTA)" used by the World Health Organization.

They improve the quality of authoring

The purpose of peer review is not just to filter poor research, but also to improve it. Providing comments and suggesting revisions to authors, improves the research quality and ultimately ensures adding valuable literature. This is often an invaluable tool for authors since it allows them to produce a more polished and rigorous piece of work.

They are an essential aid to journal editors

A well peer-reviewed manuscript is essential for journal editors in deciding whether a manuscript is suitable for publication. Editors value reviews from experts in the field who can often advise if the work will make a contribution to the field and if the manuscript is formulated based on robust research.

Maintains the awareness of scientific literature

Peer review allows access to a broader spectrum of the scientific literature. It also enables reviewers to read the most recent research that others do not yet have access to and before it is put into the public domain. Sharing the latest developments in your research field can stimulate new ideas and encourage innovative solutions to existing research.

How Peer Reviewing Benefits the Reviewer

01 Being a peer reviewer is an honor

Being invited to peer review a paper suggests the reviewer's knowledge of the field and/or critical appraisal skills.They are respected and entrusted with gauging the quality of scientific research. Working as a peer reviewer; therefore, carries prestige that can be used in one's credentials.

02 A skill they develop through practice

The peer review process requires critical analysis of research. This is a skill that is developed through practice and experience in reviewing. This skill is often turned inwards to critically appraise and improve one's own research and writing. Furthermore, it provides some inside knowledge on the level of quality required for publication. There is now a push for increased standardization of training in peer review process to help peer reviewers develop these skills.

03 They are recognized for their tasks

Several platforms have emerged to recognize the work peer reviewers do. Publons emerged in 2012 as a service for academics to showcase their peer review and editorial contributions. This platform has now been adopted by many publishing groups. Publons' merits are a method of measuring peer reviewer contribution, whereby peer reviewers gain points on their profile for each peer review and further points if this review is verified and made publicly available. These points provide quantitative proof of a peer reviewer's contributions. There is a possibility that this could lead to peer review process being the latest focus of career advancement. However, given the important attributes required to peer review and the skills developed, this trend can easily be justified.

Final Thoughts!

This e-book only scratches the surface. There is so much more to learn about research from peer review. As review transparency increases, so will the opportunities to analyze the quality of peer reviews and reviewers. Also, there should be an expansion in understanding the concept of "reviewer recognition" beyond simply listing the number of completed reviews on a profile.

Because as much as we wish AI-based tools to come to the aid, peer review process will still be called as a human decision-making task, and peer reviewers and their valuable time is needed to sustain research and its integrity.

> Funders, institutions, publishers, researchers, and the organizations all together have a part to play in supporting peer reviewers to do what is best for research.

Not to mention we have some groundbreaking research in AI-assisted tools for a quicker, reliable, and robust peer review process.

Hope this information has helped you better understand the lesser known facts of this dynamic mechanism of the research and publishing world.

Happy Learning!

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