Why Reading and Reviewing, Not Writing, Define Scientific Rigor in the Age of AI

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In scholarly publishing, writing has long been assumed to be the central skill in research communication. The rise of generative artificial intelligence (AI) and large language models (LLM) shifts the center of value in scholarly publishing away from writing itself and toward perceptual skills such as reading, reviewing, observing, and generating original insight. For researchers, editors, and peer reviewers, insight develops through sustained engagement with ideas and evidence.

Wide reading and thoughtful reviewing strengthen the originality of research questions and interpretations. Researchers who read deeply across their field develop a richer sense of context, allowing them to situate their work more precisely and make contributions that are both relevant and distinctive. Reviewers who read with care identify conceptual gaps, methodological weaknesses, and overlooked implications before publication, thereby improving the quality and integrity of the scientific record.

Scientific writing, by contrast, is largely a technical and formal activity. Its purpose is not to discover, but to communicate discovery within established frameworks, conventions, and formats. Clarity, structure, logical flow, and adherence to disciplinary norms are essential, but they are not creative in the same sense as the acts of observation and insight that precede them.

This is where AI is especially powerful. When researchers provide clear intent, well-defined context, and a coherent understanding of their findings, AI tools can assist in expressing those discoveries effectively. They can help organize arguments, refine language, ensure consistency, and align manuscripts with the formal expectations of scientific articles. What AI cannot supply is the insight itself. The irreplaceable human contribution lies in observation, judgment, and awareness, which must guide the scientific writing process even when AI is involved.

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Understanding AI's Capabilities and Limitations

To understand AI's limitations and value, it helps to examine the nature of thought itself. The first type of thought originates in belief, ideas, knowledge, and memory. It is a reaction to what is already known, a borrowing from existing patterns. This is mechanical intelligence: highly capable of processing, organizing, and recombining information, but operating entirely within the boundaries of what has already been recorded.

The second type arises from the observation of fact: realization, contextual awareness, and insight into what is actually happening in the present moment. This indicates real intelligence, requiring discernment, observation, and awareness that cannot be derived from stored data alone.

AI is modelled on the thinking process, particularly thought that originates from knowledge and stored memory. It replicates verbal and visual abilities, along with predictive, logical, and reasoning capabilities within that domain, and it does so at a speed and scale far beyond normal human capacity. AI excels at representing the first type of thought: the continuation, recombination, and expansion of accumulated knowledge, and the training of that knowledge into skill. What AI cannot do, however, is access insight that arises from a total perception of a fact, or from the moment when thought itself comes to a stop after sustained engagement with a problem. In other words, AI cannot say, "I don't know," and remain in that state until insight emerges. That capacity, the ability to suspend knowledge and allow insight to arise, lies at the heart of the creative process.

This distinction explains why AI is extraordinarily useful yet not true intelligence. Its value lies in reducing mechanical cognitive effort and helping humans manage

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complexity and scale that otherwise not be possible or would take enormous human effort and time. AI can amplify, but it cannot originate, what is genuinely new. Originality arises from observation that is independent of recognition. Recognition can follow for the purposes of storing, analyzing, and communicating, and that is the role of memory and AI.

Can AI Replace Researchers as Authors?

This question can only be answered by clearly distinguishing between the mechanical and nonmechanical dimensions of scholarly work. At the core of research lies observation and discovery. It is through direct engagement with data, phenomena, and existing literature that insight arises. The expression and communication of that insight are secondary, though still essential, because they allow knowledge to be shared and advanced.

Observation, together with the insight that follows from it, constitutes the nonmechanical dimension of research and cannot be substituted by AI. AI, as we have noted, operates entirely within the domain of knowledge. Knowledge, by its nature, belongs to the past and is always incomplete, as it can continually be added to. AI can reorganize, predict, and generate text based on existing patterns, but it cannot observe. Observation is always new and grounded in the present moment. It involves awareness, contextual understanding, and judgment, all of which remain distinctly human.

In scientific writing, what ultimately matters is not who composes each sentence, but whether the original insight, interpretation, and intent of the research are faithfully expressed and rigorously validated by the researcher. This responsibility includes critical review, revision, and final approval of the manuscript prior to submission and publication. Researchers do not need to author every word or determine every phrase. Tools that assist with the mechanical aspects of writing, such as structure, clarity, consistency, and language, should be welcomed if they allow researchers to devote more attention to what cannot be automated: observing, understanding, interpreting, and generating original insight.

This raises an important question: why do we insist that a scientific article must reflect an author's "voice"? In scientific communication, clarity, rigor, and objectivity matter far more than stylistic expression. Writing, in this context, is not the primary site of thinking but a practical means of communicating thinking that has already taken place. The core intellectual work is completed during research, analysis, and interpretation. The article itself is an artifact of standardized and objective communication.

Scientists should, of course, strive to communicate clearly, as this advances science. Yet it is neither realistic nor necessary to expect every researcher to be an accomplished writer. Language barriers, limited training, time constraints, and differing skill sets are common realities. The role of publishers should therefore be to support researchers in bridging this gap, not to penalize them for it.

From this perspective, the use of AI in scientific writing is acceptable, provided the researcher takes full responsibility for the content, interpretation, and conclusions presented. AI cannot replace the researcher as the source of insight, but it can legitimately assist in expressing that insight. The researcher's irreplaceable contribution lies in observation and interpretation. Writing is the instrument through which that contribution is communicated.

Why Concerns About AI in Scientific Writing Are Misplaced

A common counter-argument in debates about AI-assisted writing is that writing is how people process ideas, and that clear thinking requires clear writing. While this may hold true in reflective or exploratory forms of writing, scientific writing operates differently. In science, the primary work of thinking occurs during observation, experimentation, analysis, and interpretation, not during writing.

Scientific ideas are formed through engagement with data, methods, literature, and phenomena. Hypotheses are tested, results are examined, anomalies are questioned, and conclusions are drawn before the writing stage begins. By the time a scientific manuscript is drafted, the core intellectual work has already been done. Writing, in this context, is a structured method for communicating discoveries within established conventions.

This is precisely why scientific writing is especially amenable to automation. Drafting sections such as methods, results summaries, literature overviews, or standard introductions is largely mechanical. These sections follow predictable formats and prioritize precision, clarity, and reproducibility over personal expression. AI can assist effectively with organizing content, refining language, ensuring consistency, and aligning manuscripts with disciplinary norms, particularly for researchers managing heavy workloads and increasing publication demands.

What matters is not whether AI assists with writing, but whether the underlying observation, interpretation, and judgment remain authentically human. When a researcher uses AI to help draft or refine a manuscript, only the mechanical layer of communication is being supported. Responsibility for defining the research question, interpreting results, contextualizing findings, and validating conclusions remains entirely with the researcher.

The real risk lies not in using AI for scientific writing, but in relying on AI for activities that require perception and evaluation. Reading, reviewing, and assessing research demand attention, discernment, and contextual understanding. Automating writing can free time

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and cognitive energy for these nonmechanical tasks, strengthening rather than weakening scientific thinking.

Seen this way, AI-assisted writing does not undermine scientific rigor. When used appropriately, it supports efficient communication while preserving the essential human role in discovery, judgment, and understanding.

Why Human Review Remains Essential

The value of peer review does not depend on its ability to perfect language or smooth prose. These are mechanical tasks that AI can increasingly handle. The true value of review lies in a reviewer's capacity to detect nuance, challenge assumptions, identify blind spots, and evaluate whether a manuscript contains genuine originality.

Human review thrives when certain conditions are in place, including cognitive diversity, appropriate recognition, manageable workloads, and a meaningful review process. When these conditions exist, reviewers provide something no model can offer: discernment grounded in real-world experience, disciplinary understanding, and perceptual insight.

Peer reviewers also carry an untransferable responsibility. They must stand behind their judgments about the validity, originality, and significance of a study. AI cannot assume this responsibility. It can summarize or rephrase, but it cannot evaluate what matters most or bear accountability for those judgments.

Tasks requiring review and evaluation must therefore remain human responsibilities. AI may assist with summarization or initial sorting, but it should not read for meaning or contextualize arguments. Review is where interpretation, judgment, and insight are applied, and these capacities remain uniquely human.

What This Means for Scholarly Publishing in the Age of AI

The rise of AI does not diminish the role of human expertise in scholarly publishing. It clarifies it. Authors remain fully responsible for the accuracy, integrity, and originality of their work, even when AI assists with drafting or language refinement. Reviewers remain responsible for evaluation, which depends on disciplinary knowledge, judgment, and perceptual attention that cannot be automated.

The priority for scholarly publishing should not be to restrict AI-assisted scientific writing, but to strengthen the conditions under which human insight can emerge. These conditions include sufficient time for reading and review, diversity of perspective, fair recognition of editorial and review labor, and workloads that allow sustained attention. Without these foundations, the quality of the scholarly record deteriorates, regardless of how advanced writing technologies become.

AI changes the speed and ease with which scientific text can be produced, but it does not change the responsibility to ensure that this text carries meaning, validity, and insight. The quality of scholarship depends not on who drafts the words, but on whether those words faithfully express rigorous observation, sound interpretation, and genuine understanding.

AI can recombine what has already been recorded, but it cannot perceive. Originality arises when researchers read deeply, review carefully, and attend closely enough to notice what others have overlooked. This perceptual clarity advances disciplines, strengthens scientific rigor, and distinguishes meaningful research from superficial novelty.

In the age of AI, writing will no longer define the unique contribution of researchers or reviewers. Insight will. And insight emerges from the human capacity to observe, question, interpret, and perceive with clarity and care. AI is a powerful tool for the mechanical work of scientific expression, but it cannot replace the perceptual work of understanding. Reading and reviewing, not writing, are where the irreplaceable human contribution to scholarship truly resides.