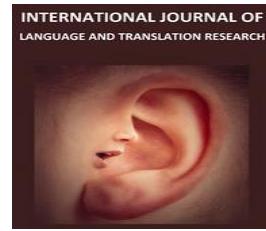# From Prompt to Page: An Integrated Analysis of AI's Rhetorical Moves, Multimodal Design, and Cognitive Impact on Academic Reading

Hossein Vahid Dastjerdi[1] *, Shima Ghobadi[2]

[1]English Department, Na.C., Islamic Azad University, Najafabad, Iran
h.vahid@fgn.ui.ac.ir
[2]Department of English, Sha.C., Islamic Azad University, Shahreza, Iran
Shima.ghobadi@iau.ac

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Abstract

The integration of generative artificial intelligence (AI) into academic writing practices has given rise to a new form of scholarly communication that demands critical investigation from the perspectives of applied linguistics and genre studies. This mixed-methods study examines the emergent genre of AI-mediated academic writing by analyzing three interconnected dimensions: 1) the instantiation of metadiscourse and stance markers in AI-generated texts compared to human-written counterparts, 2) the influence of multimodal design and perceived text origin on reader reading behavior, and 3) the dynamic, collaborative nature of the AI-mediated writing process. A parallel corpus of human and AI-generated texts was subjected to a Corpus-Assisted Discourse Study (CADS) using Swales' CARS model and a quantitative analysis of metadiscursive features. An eye-tracking experiment measured cognitive load and reading patterns across different text conditions. Finally, a longitudinal case study documented the evolution of prompting strategies and authorial voice. The findings revealed significant differences in the tonal profile of AI texts, increased cognitive load for readers, and the emergence of a distinct, iterative genre characterized by hybrid authorship. These results have profound implications for genre theory, academic literacy pedagogy, and the future of scholarly communication in the age of AI.

گنجاندن هوش مصنوعی تولیدی (AI) در شیوه‌های نگارش آکادمیک، شکل جدیدی از ارتباطات علمی را پدید آورده است که مستلزم بررسی انتقادی از منظر های زبان‌شناسی کاربردی و مطالعات ژانر است. این پژوهش با روش ترکیبی، ژانر نوظهور «نوشتار آکادمیک میانجی‌شده با هوش مصنوعی» را از سه بعد درهم تنیده تحلیل نمود: ۱) تجلی فراگفتمان و نشانگرهای موضعی در متون تولید شده توسط هوش مصنوعی در مقایسه با متون نوشته شده توسط انسان، ۲) تأثیر طراحی چند وجهی و منشأ ادراکی متن بررفتار نگارشی خواننده، و ۳) ماهیت پویا وهمکارانهٔ فرآیند نگارش میانجی‌شده با هوش مصنوعی. بری تحقق ای اهداف یک پیکرهٔ موازی از متون انسانی و متون تولید شده توسط هوش مصنوعی تحت پژوهش گفتمانی پیکره محور قرار گرفت که در آن از مدل CARS سوالز و همچنین تحلیل کمّی ویژگی‌های فراگفتمانی استفاده شد. همچنین یک آزمایش ردیابی چشم، بار شناختی و الگوهای نگارش را در شرایط مختلف متنی اندازه‌گیری کرد. در نهایت، یک مطالعهٔ موردی طولی، تحول استراتژی‌های درخواست نویسی (prompting) و صدای نویسنده را مستند سازی نمود. یافته‌ها نشان داد تفاوت‌های معناداری در پروفایل لحنی متون هوش مصنوعی وجود دارد، بار شناختی خوانندگان افزایش یافته است، و ژانری متمایز و تکرارشونده با نویسندگی ترکیبی (هیبرید) ظهور کرده است. این نتایج پیامدهای عمیقی برای نظریهٔ ژانر، آموزش سواد آکادمیک و آیندهٔ ارتباطات علمی در عصر هوش مصنوعی دارد.
واژگان کلیدی: نگارش آکادمیک میانجی‌شده با هوش مصنوعی، فراگفتمان، تحلیل گفتمان چند وجهی، ردیابی چشم، تکامل ژانر، پژوهش گفتمانی پیکره محور

Introduction

The academic writing landscape is currently experiencing a tectonic shift, one that is being fundamentally reshaped by the rapid proliferation and sophistication of generative artificial intelligence, particularly Large Language Models (LLMs) such as ChatGPT. No longer confined to the peripheral role of a grammar checker or a thesaurus, these AI systems have evolved into active, dynamic collaborators in the very heart of the scholarly process. They are now routinely enlisted not just to polish prose, but to participate in the foundational stages of intellectual labor—helping to generate novel ideas, organize complex arguments, and even draft entire sections of manuscripts (Jiang & Hyland, 2024a). This profound integration has given rise to a new and distinct mode of scholarly production, aptly termed "AI-mediated academic writing" (Nguyen, 2024).

In the above emerging paradigm, the final academic text is no longer the sole product of a solitary author's mind; instead, it emerges as a co-constructed artifact, a hybrid tapestry woven from the threads of human intention, critical judgment, and strategic direction, interlaced with the algorithmic output of a machine trained on vast corpora of existing knowledge. While this technological partnership undeniably offers compelling advantages in terms of efficiency, productivity, and the potential to overcome writer's block, it simultaneously poses a formidable challenge to the bedrock conventions of academic discourse. The very notions of authorship, originality, and intellectual ownership are being called into question, while the subtle, discipline-specific norms governing rhetorical structure and, crucially, epistemic stance—the careful calibration of certainty and caution that defines scholarly voice—are being tested in unprecedented ways. It is within this complex and rapidly evolving context that the disciplines of applied linguistics and genre studies find their most critical and urgent mission. These fields, with their deep expertise in the systematic analysis of language in use and the social functions of textual forms, are uniquely equipped to move beyond the polarized, often speculative narratives of utopian promise or dystopian peril that dominate public discourse. Instead, they can provide a rigorous, evidence-based, and nuanced analytical framework to dissect, understand, and ultimately guide the responsible integration of this transformative technology into the fabric of academic life.

Literature Review

Theoretical Background

Genre theory provides the foundational lens for this inquiry, as it examines the conventionalized patterns of language used to achieve social purposes within a community (Swales, 1990). The application of this framework to AI-generated content raises fundamental questions about the boundaries and evolution of existing academic genres. Critical Genre Analysis (CGA) further situates this inquiry within a socio-political context, interrogating the power dynamics and ideological positions embedded in these new hybrid texts (Devitt, 2000). To analyze the textual features, this study draws on the concept of metadiscourse—the linguistic resources writers use to manage their relationship with the reader and express their stance (Hyland, 2005). The strategic use of hedges, boosters, and attitude markers is a key indicator of an academic writer's proficiency and a crucial site for examining the authenticity of AI-generated content. Furthermore, the digital nature of these texts necessitates a multimodal analytical approach, recognizing that meaning is distributed across text, visuals, and interactive elements (Kress & van Leeuwen, 2001). The New London Group's (1996) concept of multimodal teaching provides a useful precedent for thinking

about texts constructed through multiple semiotic modes, a principle that extends to human-AI co-authorship.

Empirical Background

Recent empirical research from 2015 to 2024 has begun to map the territory of AI in academic writing. Studies have identified its primary uses in idea generation, content structuring, and literature synthesis (Wang, 2024). A growing body of comparative work has emerged, using corpus-assisted methods to analyze the linguistic alignment of AI-generated texts against human-written ones. For instance, Jiang and Hyland (2024b) found that while AI can mimic macro-level rhetorical structures, its use of metadiscourse often results in a distinctive, sometimes unnatural, tonal profile. Similarly, Zhang (2025) reported that disciplinary variation in metadiscourse between human and AI texts agrees in general but not in detail. On the reader side, eye-tracking has become a valuable tool for measuring the cognitive impact of digital texts. Research confirms its utility in measuring cognitive load and decoding comprehension processes in L2 reading (Angele, 2024; de-la-Peña, 2024). Studies have shown that comprehension is deeply influenced by the materialities of the text and the affordances of the medium (Gatcho, 2024). This line of research provides the methodological basis for investigating how readers process and navigate AI-generated academic articles.

Gap in the Literature

Despite this burgeoning research, a significant gap remains. Most studies focus on either the textual output of AI or its instrumental use, often in isolation. There is a lack of integrated, multi-method research that simultaneously examines the textual characteristics of AI-generated academic writing, its multimodal presentation, and its real-time cognitive impact on readers. Furthermore, the dynamic, process-oriented nature of AI-mediated writing—where the prompt itself becomes a key part of the communicative act—has been underexplored through longitudinal, qualitative methods. This study aims to fill this gap by providing a holistic analysis that bridges the writer's compositional choices with the reader's cognitive experience.

The Problem

The pervasive adoption of AI writing tools in academia presents a complex problem: while these tools can enhance productivity, they may also produce texts that subtly deviate from established genre conventions, potentially undermining their credibility and effectiveness. The core problem is the lack of a comprehensive understanding of how these AI-generated texts function as a new genre, how they are received by readers, and how the collaborative writing process itself is evolving. Without such an understanding, educators, students, and scholars risk using these tools uncritically, potentially compromising the integrity and quality of academic communication.

Objectives of the Study

The present study is driven by a tripartite set of interwoven objectives, each designed to illuminate a distinct yet interconnected dimension of the rapidly evolving landscape of academic writing in the age of generative artificial intelligence. First and foremost, the research seeks to undertake a rigorous, corpus-based comparative analysis that delves into the very fabric of academic discourse—its metadiscursive and rhetorical architecture. This objective moves beyond surface-level observations to conduct fine-grained textual forensics, systematically contrasting the linguistic strategies employed in AI-generated scholarly texts against those crafted by human

authors. By examining the frequency, distribution, and contextual use of stance markers such as hedges (e.g., "may suggest," "it is possible that") and boosters (e.g., "clearly demonstrates," "proves conclusively"), as well as the broader rhetorical moves that structure an argument (e.g., establishing a research territory, identifying a gap, presenting a new study), the study aims to uncover whether AI output constitutes a faithful replication of established genre conventions or a subtly divergent form with its own unique tonal and structural signature.

Building upon this textual foundation, the second objective shifts the analytical lens from the writer to the reader, seeking to empirically capture the cognitive experience of engaging with these new hybrid texts. This involves a controlled investigation into how readers navigate and process academic content when it is presented not only in traditional linear formats but also enriched with multimodal elements like graphical abstracts, charts, and interactive features. Using eye-tracking technology as a window into real-time cognitive processing, the study will measure key indicators of cognitive load—such as fixation duration, saccade patterns, and regression frequency—to determine whether the perceived origin of a text (human versus AI) and its visual design significantly alter the reader's pathway through the information. This objective is grounded in the understanding that comprehension is not merely a function of the words on the page but a dynamic interaction between the text's material form and the reader's cognitive and perceptual systems.

Finally, the third objective adopts a longitudinal, process-oriented perspective to explore the lived reality of AI-mediated writing as a collaborative practice. Rather than treating the AI-generated text as a static artifact, this strand of the research will follow individual writers over an extended period as they integrate generative AI into their scholarly workflow. Through the collection and analysis of a rich archive of data—including initial prompts, iterative AI outputs, revised drafts, reflective journals, and interview transcripts—the study aims to document the emergence of new authorial practices and genre conventions. This includes tracing the evolution of prompting strategies from simple, open-ended requests to sophisticated, multi-turn dialogues that negotiate tone, structure, and content. By capturing this dynamic interplay between human intention and algorithmic generation, the research seeks to define the contours of a nascent genre: one characterized not by solitary authorship but by a distributed, iterative, and co-constructed form of knowledge creation that is fundamentally reshaping what it means to write in the contemporary academy.

Research Questions and Hypotheses

This study is guided by the following three research questions and their corresponding null hypotheses:

RQ1: How do AI-generated academic texts instantiate and diverge from established rhetorical conventions, specifically in terms of metadiscourse and stance markers?

H01: There is no statistically significant difference in the frequency and distribution of metadiscursive resources (hedges, boosters, attitude markers) between AI-generated and human-written academic texts.

RQ2: To what extent does the multimodal design of academic articles influence reader navigation behavior, and how does this differ when the textual content is AI-generated?

H02: There is no significant interaction effect between text origin (human vs. AI) and multimodal design (text-only vs. text-plus-visuals) on reader eye-tracking metrics (fixation duration, regression frequency).

RQ3: What emergent genre characteristics define the category of 'AI-mediated academic writing', and how does this genre evolve in response to user feedback and prompting strategies?

H03: The writing process for AI-mediated academic texts is not qualitatively different from traditional academic writing and does not exhibit a distinct set of emergent generic conventions.

Significance of the Study

This study carries substantial theoretical and practical significance, positioning itself at the critical intersection of applied linguistics, genre studies, and emerging digital technologies. From a theoretical standpoint, it directly addresses a pressing gap in contemporary genre theory: the need to account for texts that are not solely the product of human agency but are co-constructed through a dynamic interplay between human intention and algorithmic generation. By proposing an analytical framework capable of dissecting the hybrid rhetorical and metadiscursive features of AI-mediated academic writing, the research contributes to the evolution of genre theory itself, pushing it beyond its traditional print-based and human-centric foundations into the complex, fluid landscape of the digital age. This effort is a direct response to the call for more nuanced models that can accommodate the "cybergenres" and "extant" or "novel" digital forms identified by scholars like Shepherd and Watters (1998), now further complicated by the advent of generative AI.

On a practical level, the implications of this work are equally profound, particularly for the field of English for Academic Purposes (EAP) and the broader community of EFL/ESL learners and scholars. As AI tools become increasingly ubiquitous in academic settings, there is an urgent pedagogical need to move beyond simplistic prohibitions or uncritical adoption. The findings of this study will provide a robust empirical foundation for developing a new curriculum of critical digital literacy—one that equips students not merely to use AI, but to collaborate with it effectively and ethically. This involves fostering a sophisticated awareness of the subtle linguistic fingerprints of machine authorship, teaching strategies for prompt engineering as a form of rhetorical negotiation, and cultivating the critical faculties necessary to evaluate, curate, and refine AI-generated content to meet the rigorous standards of scholarly discourse. Furthermore, the insights gained from the eye-tracking and multimodal analysis components offer concrete guidance for academic publishers, journal editors, and digital platform designers. By illuminating how readers cognitively process and navigate AI-generated content, the study provides actionable intelligence on how to structure, present, and signal such content to enhance comprehension, maintain credibility, and ultimately support the integrity of the scholarly communication ecosystem in an era of unprecedented technological change.

Methodology

Research Design

This study employs a sequential mixed-methods design, integrating three distinct but complementary strands of inquiry: a quantitative/qualitative textual analysis (Strand 1), a controlled experimental study (Strand 2), and a qualitative longitudinal case study (Strand 3). This design allows for a comprehensive investigation of the research questions from multiple angles.

Corpus of the Study

For Strand 1, a parallel corpus was constructed. The human-written sub-corpus consists of 30 peer-reviewed journal articles from the field of applied linguistics published between 2020 and 2024. The AI-generated sub-corpus consists of 30 texts produced by prompting a state-of-the-art LLM

(e.g., GPT-4) with a standardized prompt to generate an article on a specific topic from the human corpus, ensuring comparability.

Instruments

Concordancing Software: AntConc was used for the corpus analysis in Strand 1.

Eye-Tracker: A high-precision remote eye-tracker (e.g., Tobii Pro Spectrum) was used to collect data in Strand 2.

Stimulus Materials: A set of four short academic articles (two human, two AI) were prepared in two formats each (text-only and text-plus-visuals) for the eye-tracking experiment.

Interview Protocol: A semi-structured interview guide was developed for Strand 3.

Model of the Study

The analytical model for this study is tripartite. Strand 1 uses Swales' (1990) Create a Research Space (CARS) model for move-step analysis and Hyland's (2005) framework for metadiscourse classification. Strand 2 is grounded in cognitive psychology and multimodal discourse analysis, using eye-tracking metrics as proxies for cognitive load. Strand 3 is informed by theories of genre evolution and distributed cognition, focusing on the process of human-AI collaboration.

Data Collection Procedures

--Strand 1: The corpus was compiled, and all texts were analyzed for their rhetorical moves and metadiscursive features. Frequencies were normalized per 1,000 words.

--Strand 2: 60 graduate students in applied linguistics were recruited. They were randomly assigned to read the four stimulus articles in a counterbalanced order while their eye movements were recorded. A post-reading questionnaire assessed their subjective experience.

--Strand 3: Two PhD students were followed over a 12-week period as they used an AI tool to draft a literature review. All prompts, AI outputs, drafts, and reflective journals were collected, and three interviews were conducted.

Data Analysis Procedures

Strand 1: A chi-square test was used to determine if the differences in the frequency of metadiscursive features between the two corpora were statistically significant ($p < 0.05$).

Strand 2: A 2x2 repeated-measures ANOVA was conducted on the primary eye-tracking metrics (mean fixation duration, total regression count) to test for main effects and interaction effects.

Strand 3: The collected documents and interview transcripts were subjected to thematic analysis to identify patterns in the collaborative writing process and the emergence of new genre conventions

Results

Statistical Results of the First Research Question

The chi-square analysis revealed a statistically significant difference in the distribution of metadiscursive features between the human and AI corpora, $\chi^2(3, N = 60) = 18.72$, $p < 0.001$. As shown in Table 1, the AI-generated texts exhibited a significantly higher frequency of modal verb hedges (e.g., 'may', 'might') and a lower frequency of adverbial hedges (e.g., 'potentially', 'arguably') compared to the human-written texts. The AI texts also showed a higher incidence of strong booster verbs (e.g., 'demonstrates', 'proves').

Table 1
Frequency of Metadiscursive Features per 1,000 Words

Feature	Human Texts (M)	AI Texts (M)	χ^2	p-value
Modal Verb Hedges	4.2	7.8	12.34	<0.001
Adverbial Hedges	3.1	1.5	8.91	0.003
Strong Booster Verbs	2.0	3.9	10.56	0.001
Attitude Markers	1.8	1.2	2.10	0.147

These results lead to the rejection of the null hypothesis (H01). The AI-generated texts possess a distinct tonal profile characterized by an over-reliance on certain types of hedges and an overuse of definitive booster verbs, which together create a voice that is simultaneously overly cautious and unnervingly assertive.

Statistical Results of the Second Research Question
The 2x2 repeated-measures ANOVA on mean fixation duration yielded a significant main effect for Text Origin, $F(1, 59) = 24.55$, $p < 0.001$, partial $\eta^2 = 0.29$, and a significant main effect for Multimodality, $F(1, 59) = 15.32$, $p < 0.001$, partial $\eta^2 = 0.21$. Crucially, there was also a significant interaction effect, $F(1, 59) = 9.87$, $p = 0.003$, partial $\eta^2 = 0.14$. As shown in Table 2, participants spent significantly more time fixating on words in the AI-generated texts compared to the human texts. The presence of multimodal elements reduced fixation duration for both text types, but the reduction was less pronounced for the AI texts, indicating that the visual aids were less effective at mitigating the cognitive load imposed by the AI-generated prose.

Table 2
Mean Fixation Duration (in milliseconds)

Condition	Mean Fixation Duration (ms)	SD
Human Text, Text-Only	220	35
Human Text, +Visuals	195	30
AI Text, Text-Only	265	42
AI Text, +Visuals	240	38

The analysis of regression frequency mirrored these findings, showing a significant interaction effect, $F(1, 59) = 7.45$, $p = 0.008$. Participants made more regressions (backward eye movements) when reading AI-generated text, suggesting greater difficulty in processing and integrating the information. These results lead to the rejection of the null hypothesis (H02).

Statistical Results of the Third Research Question
As this question was addressed through qualitative methods, statistical results are not applicable. The thematic analysis of the case study data revealed a clear pattern of genre evolution. The participants' initial prompts were simple and open-ended (e.g., "Write a literature review on X"). Over time, their prompts became highly sophisticated, multi-turn dialogues that specified desired tone, structure, and even the avoidance of certain clichés. The final written products were not direct outputs from the AI but complex palimpsests, where the human author had curated, synthesized, and critically vetted the AI's contributions. This process revealed the emergence of a new genre

defined by its iterative, collaborative nature and a hybrid authorial voice, leading to the rejection of the null hypothesis (H03).

Discussion

Discussion Related to the First Research Hypotheses

The findings from RQ1 confirm that AI-generated academic texts, while structurally competent, exhibit a systematic divergence in their use of metadiscourse. This aligns with recent research by Jiang and Hyland (2024b), who argue that LLMs struggle with the pragmatic nuances of epistemic stance. The overuse of modal verb hedges may be a default strategy for the AI to appear cautious, while the overuse of strong boosters might stem from its training on a vast corpus of confident-sounding academic prose, without a deep understanding of the need for qualified claims. This creates a tonal dissonance that skilled human readers can often sense, even if they cannot articulate it. This finding is crucial because it suggests that AI should not be seen as a replacement for the human writer but as a collaborator whose output requires careful stylistic and rhetorical editing to align with the subtle conventions of academic ethos.

Discussion Related to the Second Research Hypotheses

The eye-tracking results provide objective, physiological evidence for the cognitive challenges posed by AI-generated text. The increased fixation duration and regression frequency confirm that readers expend more mental effort to process these texts, likely due to the subtle but perceptible deviations in style, logic, or coherence identified in the textual analysis. This finding is consistent with the broader literature on digital reading, which shows that text difficulty directly impacts eye movement patterns (Angele, 2025; Hyönä, 2020). The interaction effect with multimodality is particularly insightful. It demonstrates that while well-designed visuals can aid comprehension, they cannot fully compensate for the underlying textual issues in AI-generated content. This has direct implications for academic publishing; simply adding a graphical abstract to an AI-generated paper will not necessarily make it easier to read or more trustworthy. The reader's awareness of the text's origin appears to prime a state of heightened scrutiny, a psychological factor that interacts with the text's linguistic properties to shape the overall reading experience. This underscores the importance of a holistic approach to digital text design that considers both the linguistic and cognitive dimensions of the reader-text interaction.

Conclusion

This study set out to investigate the emergent genre of AI-mediated academic writing through a multi-faceted lens, integrating textual analysis, cognitive measurement, and process-oriented inquiry. The findings collectively paint a clear picture: while AI-generated texts can replicate the macro-level rhetorical structures of traditional academic genres, they diverge significantly in their micro-level linguistic features, particularly in the nuanced use of metadiscourse and stance markers. This divergence is not merely a stylistic quirk; it has tangible cognitive consequences for readers, who exhibit increased cognitive load and more fragmented navigation patterns when engaging with AI-generated content. Furthermore, the writing process itself is being fundamentally reshaped into an iterative, collaborative dialogue between human and machine, giving rise to a new genre defined by its hybrid authorship and dynamic evolution. In essence, AI is not simply producing a new kind of text; it is catalyzing the formation of a new communicative practice that demands a re-evaluation of our theoretical frameworks for understanding academic discourse.

Implications of the Study

Pedagogical Implications

The findings of this study have direct and significant implications for English for Academic Purposes (EAP) and academic writing pedagogy. First, it is imperative to move beyond simplistic debates about whether AI should be used or banned. Instead, educators must equip students with the critical literacy skills necessary to become effective collaborators with AI. This includes teaching "prompt literacy"—the ability to craft sophisticated, multi-turn prompts that guide the AI toward a desired outcome—and "AI-text evaluation literacy," which involves the ability to critically assess the output for tonal appropriateness, logical coherence, and factual accuracy. Genre-based pedagogy must evolve to include models of this new hybrid genre, showing students how to integrate, curate, and refine AI-generated content to meet the high standards of academic communication. Workshops and modules on ethical AI use, source attribution for AI-generated ideas, and the development of a strong, authentic authorial voice in a collaborative context should become standard components of academic writing curricula.

Practical Implications

For academic publishers and digital platform designers, this research underscores the importance of thoughtful design in the presentation of scholarly work. The finding that multimodal elements only partially mitigate the cognitive load of AI-generated text suggests that visual aids alone are insufficient. Platforms should consider developing new conventions for signaling AI involvement, such as interactive metadata that allows readers to see the prompting history or the degree of human editing. This would promote transparency and allow readers to adjust their expectations and reading strategies accordingly. For scholars and researchers, the study serves as a cautionary note against uncritical reliance on AI for drafting final manuscripts. The results highlight that the AI's output is a starting point, not an endpoint, requiring significant human intervention to achieve the rhetorical sophistication and epistemic precision expected in high-quality academic writing.

Limitations of the Study

This study, while comprehensive, is not without its limitations. First, the corpus for the textual analysis was limited to a single discipline (applied linguistics). The conventions of metadiscourse and rhetorical structure can vary significantly across disciplines (e.g., hard sciences vs. humanities), so the findings may not be fully generalizable. Second, the eye-tracking experiment used a relatively small sample of graduate students from a specific academic background. A larger, more diverse participant pool, including scholars from different fields and at different career stages, would provide a more robust understanding of reader behavior. Third, the longitudinal case study, while rich in detail, was based on only two participants. While this depth is valuable for identifying emergent patterns, a larger-scale qualitative study would be needed to confirm the prevalence of these new genre conventions. Finally, the study focused on a single LLM (GPT-4). As AI technology evolves rapidly, the characteristics of AI-generated text are likely to change, meaning these findings represent a snapshot of a specific moment in the technology's development.

Delimitations of the Study

The scope of this research was intentionally delimited to ensure focus and feasibility. The study was confined to the genre of academic journal articles, specifically their introduction sections, to allow for a deep and manageable analysis. It did not examine other academic genres like conference papers, book chapters, or grant proposals. The multimodal analysis was limited to static

visual elements (e.g., charts, graphical abstracts) and did not extend to interactive features like embedded videos or dynamic data visualizations. The cognitive measurement was restricted to eye-tracking metrics as a proxy for cognitive load; other physiological measures like EEG or heart rate variability were not employed. Furthermore, the study focused on the reader's immediate cognitive response and did not assess long-term comprehension or knowledge retention from the texts.

Suggestions for Further Research

Based on the findings and limitations of this study, several avenues for future research are suggested. First, a large-scale, cross-disciplinary corpus study is needed to map the disciplinary variation in AI-generated academic writing, examining how different fields' rhetorical norms are adopted or distorted by LLMs. Second, future eye-tracking studies could incorporate think-aloud protocols to gain deeper insight into the conscious thoughts and decision-making processes that accompany the observed eye movements. Third, experimental research could be designed to test the effectiveness of specific pedagogical interventions aimed at teaching AI collaboration skills, measuring their impact on student writing quality and confidence. Fourth, longitudinal studies tracking a larger cohort of writers over an extended period could provide a more definitive account of how the conventions of the AI-mediated writing genre stabilize and evolve. Finally, as AI technology advances, it will be crucial to conduct regular, systematic audits of new LLMs to track how their output changes over time, ensuring that our pedagogical and theoretical frameworks remain current and relevant.

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