

Exploring the potential and limitations of ChatGPT for academic peer-reviewed writing: Addressing linguistic injustice and ethical concerns

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ChatGPT is a language model created by OpenAI, utilising neural networks and the transformer architecture for Natural Language Processing (NLP) tasks. The model's popularity has been immense, gaining 100 million users in two months, and Microsoft announced a multibillion-dollar investment in OpenAI. This commentary explores the potential and limitations of using ChatGPT for academic writing for publication. It can assist in editing tasks such as spell and grammar checking, summarisation and translation, but raises ethical questions about the use of AI-generated text in academic work. The potential of ChatGPT lies in its ability to address the issue of linguistic injustice faced by non-native English speakers in academic publishing. With its support, researchers can communicate their findings in English more effectively. Moreover, writers can leverage ChatGPT's personalized feedback to improve their writing style and gain new perspectives to enhance their content. However, it is essential to note that the accuracy of ChatGPT's insights is limited by the quality of the information fed into it, and it can generate incorrect text. Thus, it is not advisable to rely solely on ChatGPT for writing assistance.

Keywords: ChatGPT; Natural Language Processing; Artificial Intelligence; Academic writing; Linguistic Injustice; Writing development

1. Introduction

ChatGPT is a large language model created by OpenAI, an American company conducting research in the field of artificial intelligence (OpenAI, 2023). ChatGPT uses neural networks, more specifically a transformer that is a type of architecture that is used for natural language processing (NLP) tasks such as language translation and text summarisation. This transformer architecture was introduced in a 2017 paper by Google ML researchers called, "Attention Is All You Need," and it quickly became the state-of-the-art model for many NLP tasks (Vaswani et al., n.d.). ChatGPT's popularity has so far been immense, gaining one million users within five days of launch, and 100 million users within two months (Entrepreneur, 2023; Reuters, 2023). Additionally, Microsoft expressed interest by announcing a multibillion-dollar investment into OpenAI over the course of the coming years (CNBC, 2023). This development has sparked discussions on how AI and GPT, specifically ChatGPT, may impact academia (e.g. Lund & Ting, 2023). This commentary explores the capabilities and limitations of utilising ChatGPT for natural language processing tasks in academic writing, specifically focusing on writing for publication. It is argued

that using AI for editing tasks such as spell and grammar checking, as well as text summarisation and translation-improvements might advance and facilitate research dissemination in the future, especially by researchers for whom English is a second or other language.

ChatGPT's strength lies in its text-processing powers, which can not only handle a variety of language-based tasks but is also capable of creating texts that can be hard to distinguish from human work. Importantly, ChatGPT can assist in the process of drafting a scientific manuscript. Most recently, researchers published preprints and editorials with ChatGPT listed among the authors (Blanco-Gonzalez et al., 2022; O'Connor & ChatGPT, 2022). The utilization of ChatGPT has ignited a discussion regarding its suitability as a tool for assisting academic work (e.g. Stokel-Walker, 2023). Furthermore, the use of ChatGPT raises a spectrum of ethical dilemmas. One question that has arisen is whether writers of peer reviewed academic texts should be permitted to use chatbots like ChatGPT to generate academic texts, knowing that the model has been trained on previous texts. A recent article in *Nature* highlighted the importance of this question by demonstrating that ChatGPT generated abstracts can pass traditional plagiarism checks with ease (Else, 2023). Additionally, there is debate over whether scholars should be allowed to use ChatGPT or other chatbots as editing tools for academic work, and if so, whether ChatGPT should be acknowledged (OliverWyman, 2018).

The main objective of this commentary is to explore the role of ChatGPT in academic writing for publication and address the ethical implications that arise from its use. Initially, we will showcase how ChatGPT can be utilized to assist with basic grammar, spelling and flow in academic writing. Then we dive into how ChatGPT has the potential to improve one's writing skills. Subsequently, we will delve into the potential pitfalls associated with ChatGPT. Finally, we will discuss the broader utilization of ChatGPT beyond the basics within the academic context, considering its ethical implications.

2. Unleashing the power: Nurturing AI literacy for a thriving future

In the rapidly evolving landscape of artificial intelligence (AI), it is becoming increasingly crucial for individuals in academic settings to cultivate AI literacy (Long & Magerko, 2020). Specifically, when utilizing AI models like ChatGPT, a comprehensive understanding of its capabilities, limitations, and ethical considerations is essential (Long & Magerko, 2020). AI literacy empowers researchers, educators, and students to make informed decisions, critically evaluate AI-generated content, and maximize the benefits while minimizing potential pitfalls (Long & Magerko, 2020).

AI literacy refers to the knowledge, understanding, and skills required to effectively navigate and engage with artificial intelligence technologies (Long & Magerko, 2020). It encompasses a range of competencies, including understanding the underlying principles and concepts of AI, being aware of its capabilities and limitations, and having the ability to critically evaluate and ethically use AI applications (Long & Magerko, 2020).

AI literacy involves gaining familiarity with AI terminology, concepts, and technologies, such as machine learning, neural networks, and natural language processing (Long & Magerko, 2020). It also entails understanding the different types of AI models and their specific functionalities, such as language generation, image recognition, or data analysis. AI literacy is not limited to technical knowledge alone. It also involves the ability to critically evaluate and interpret AI-generated outputs, recognizing potential errors or biases, and verifying information from reliable sources (Long & Magerko, 2020). It encompasses the capacity to make informed decisions about when and how to use AI technologies, considering factors such as context, purpose, and potential consequences (Long & Magerko, 2020). In an academic setting, AI literacy is particularly important for researchers, educators, and students who interact with AI models like ChatGPT (Adiguzel et al., 2023). It enables them to effectively leverage AI as a tool, understand its limitations, and ensure ethical and responsible use in areas such as writing assistance, data analysis, or research automation.

Furthermore, AI literacy promotes responsible and ethical use of AI models in academia (Liebrecht et al., 2023). It encourages users to consider the ethical implications associated with AI-generated content, such as plagiarism concerns, copyright infringement, and potential biases embedded in the training data. By being knowledgeable about these ethical considerations, users can uphold academic integrity by appropriately attributing sources, critically evaluating AI-generated content, and adhering to established guidelines and ethical standards in their respective disciplines (Hill-Yardin et al., 2023). AI literacy also empowers individuals to leverage AI tools such as ChatGPT effectively for enhancing their academic work. By understanding the capabilities of ChatGPT illustrated below, users can utilize it as a creative aid, exploring novel perspectives, generating ideas, and overcoming writer's block.

3. Revealing language disparities: Exploring the realm of linguistic injustice

There has been a significant amount of discussion surrounding the implications and possibilities that ChatGPT could offer to academic writing. Many have highlighted its ability to generate coherent and grammatically correct sentences, as well as its potential to provide assistance through revision and translation (Chen, 2023; Gordijn & Have, 2023; Salvagno et al., 2023; Wen & Wang, 2023). However, what has been largely overlooked is ChatGPT's potential to address issues of linguistic injustice.

Linguistic injustice is a concept that has gained traction in recent years, particularly in academic circles, and refers to situations where certain individuals or groups are unfairly disadvantaged due to linguistic factors such as language barriers, dialectal differences, or prejudice against certain languages (Soler, 2021). The concept of linguistic injustice has been debated in academic circles in the past years (e.g. Duszak & Lewkowicz, 2008) and entails a range of arguments and examples in which non-native speakers of English face greater challenges in academic publishing when compared to their native English-speaking colleagues (Politzer-Ahles et al., 2016). Academic injustice is particularly relevant when considering that currently approximately 6% of people worldwide are native English speakers (Cochrane, 2023), which is in stark contrast to the 98% of scientific publications which are published in English (Ramírez-Castañeda, 2020). This discrepancy is reflected in the number of English Additional Language (EAL) authors that feel a sense of inequality compared to Native English Language (NEL). For example, research conducted by Duszak and Lewkowicz (2008) in Poland, Kourilová (1998) in Slovakia, Hanauer and Englander (2011) in Mexico, Ferguson, Pérez-Llantada, and Plo (2011) in Spain, and Lillis and Curry (2010) in southern/eastern Europe, indicates that numerous authors for whom English is an additional language experience a perceived disadvantage compared to English-speaking scholars. Nevertheless, it should be acknowledged that there has been opposing factions that argue that linguistic injustice is a myth (Hyland, 2016). According to Coniam's (2012) findings, there was no significant difference in the acceptance rates between manuscripts with more standard English and those with less standard English (Coniam, 2012). While strong evidence supporting either case may be lacking, one aspect remains certain: ChatGPT, with its language comprehension and generation capabilities, holds the potential to bridge the communication gap and foster more equitable interactions. It can do this because it has the ability to facilitate understanding and expression across diverse linguistic backgrounds, thereby contributing to a fairer and more inclusive academic environment.

To address the challenges faced by international scholars in disseminating their knowledge within the academic sphere, ChatGPT can serve as a valuable tool. It can provide assistance to non-native English-speaking researchers who possess sufficient English comprehension but struggle with effectively articulating their scientific discoveries. ChatGPT can help mitigate the impact of language privilege by aiding in translation, spelling, grammar, and enhancing the overall flow of academic writing. EAL authors thus stand to benefit greatly from ChatGPT's potential as it supports the effective communication of their research findings in English.

4. Harnessing ChatGPT's potential: Exploring its role in copy editing

There is vast potential for AI language models to facilitate the editing process, and act as a vehicle to disseminate information from the non-English speaking world. In comparison, the functionality of other language models that utilise machine learning, like DeepL and Google Translate, is limited to simple and direct translation (Yulianto & Supriatnaningsih, 2021). On the other hand, established proof reading software such as Grammarly primarily focuses on grammar, spell-checking and plagiarism, but is not able to provide contextually nuanced edits (Ghufron & Rosyida, 2018). In contrast, ChatGPT can provide feedback on writing style, suggest improvements in flow, offer synonyms for better expression, summarize and elaborate on content, generate writing prompts, and provide related research topics (see the appendix as well as the examples below, for illustrations of each of these uses). In addition, ChatGPT can identify areas where additional information or examples might strengthen the argument.

Example 1 demonstrates how ChatGPT can improve grammar and text-flow of a basic statement. In this example, ChatGPT has strengthened the original argument for investing in renewable energy sources and gives additional supporting points and elaborates on the potential benefits of that investment.

Example 1:

Prompt: Can ChatGPT strengthen this argument “The government should invest more in renewable energy sources to reduce carbon emissions.” please?

Output: Given the pressing need to mitigate climate change and transition towards sustainable energy systems, a compelling argument can be made for increased government investment in renewable energy sources. By allocating substantial resources towards the development and implementation of wind, solar, and hydroelectric power, policymakers can effectively curb carbon emissions and promote a cleaner, more sustainable future. Furthermore, such investments have the potential to create job opportunities, foster technological innovation, and enhance energy security, thus yielding not only environmental but also economic and social benefits.

(Created June 28th, 2023 with ChatGPT, May 24th Version.)

5. Exploring the depths: Unlocking ChatGPT's potential beyond basics

ChatGPT's potential lies in its ability for content writing, and it can be used as an aid in all stages in writing for a well-informed researcher, who will be required to edit the output appropriately. Furthermore, ChatGPT can also enhance the growth of writers in multiple ways beyond just copyediting. One way it achieves this is by offering personalized feedback on a writer's writing style. This feedback includes suggestions on improving the clarity, coherence, and organization of ideas, thereby assisting in the long-term development of the writer's skills. The model can identify areas of writing that lack cohesion or are difficult to follow and provide recommendations for improving the text's flow. The example below demonstrates how ChatGPT can help the writer identify where to improve.

Example 2:

Prompt: I'm struggling with the clarity, coherence, and organization of ideas in my academic paper. Can you provide suggestions to improve these aspects?

Output: Certainly! To enhance the clarity, coherence, and organization of your academic paper, consider the following suggestions. First, ensure that your thesis statement is clear and concise, providing a roadmap for your paper. Next, review each paragraph's topic sentence to ensure it aligns with the overall thesis and provides a clear focus. Make sure that each paragraph develops a single idea or argument and transitions smoothly to the next. To improve

coherence, use transitional words and phrases like ‘however,’ ‘in contrast,’ or ‘on the other hand’ to establish logical connections between sentences and paragraphs. Additionally, consider using subheadings to guide the reader and create a more structured flow of ideas. Finally, revisit your paper’s overall organization, ensuring that sections and arguments are presented in a logical sequence that supports your main thesis. By implementing these suggestions, you can enhance the clarity, coherence, and organization of your academic paper, making it more effective in communicating your ideas.

In addition, ChatGPT can suggest synonyms for words in the writing to improve vocabulary and style (see Example 3 in the appendix).

In relation to ChatGPT’s capacity to give feedback on academic writing, according to a recent study, ChatGPT has demonstrated its capability to generate more detailed feedback for students in comparison to human instructors (Dai et al., 2023). Notably, ChatGPT’s ability to provide continuous feedback throughout the writing process offers a distinct advantage, addressing a potential limitation faced by human instructors (Dai et al., 2023).

Furthermore, the AI language model can aid in outlining a paper, providing structure to the writing process, and checking that all necessary topics are covered. Example 3 below shows how ChatGPT can lay the foundations of a brainstorming session on what to include in a paper on an academic topic like the opioid crisis.

Example 3:

Prompt: Can you help me brainstorm a paper on the opioid crisis and how to solve it?

Output: Certainly! Here are some key points and ideas you can consider while brainstorming your paper on the opioid crisis and potential solutions:

1. Introduction:
 - Provide an overview of the opioid crisis, its magnitude, and its impact on individuals, families, and communities.
 - Explain the importance of addressing the crisis comprehensively.
2. Background:
 - Discuss the rise of opioid use and misuse, including the role of prescription opioids, heroin, and synthetic opioids like fentanyl.
 - Highlight the factors contributing to the crisis, such as overprescribing, aggressive marketing, lack of awareness, and socioeconomic factors.
3. Understanding the Complexities:
 - Explore the multifaceted nature of the crisis, considering both the individual and societal factors that contribute to addiction and overdose.
 - Discuss the challenges of treating opioid addiction, including the physiological and psychological aspects.
4. Prevention:
 - Highlight the importance of prevention strategies, including education and awareness campaigns targeting healthcare providers, patients, and the general public.
 - Discuss prescribing guidelines, monitoring systems, and the responsible use of opioids in managing pain.
5. Treatment:
 - Discuss evidence-based treatment options, such as medication-assisted treatment (MAT), which combines medications like methadone, buprenorphine, or naltrexone with counseling and behavioral therapies.

- Explore the role of harm reduction strategies, such as naloxone distribution programs and supervised injection sites.
- 6. Access to Care:
 - Address the barriers to treatment, including limited access to healthcare services, stigma, and financial constraints.
 - Discuss the importance of expanding access to treatment through increased funding, improved insurance coverage, and telemedicine options.
- 7. Support and Recovery:
 - Highlight the significance of peer support networks, counseling, and community-based recovery programs.
 - Discuss the integration of mental health services and comprehensive care for individuals with co-occurring disorders.
- 8. Legislative and Policy Interventions:
 - Explore the role of legislation and policy reforms in combating the crisis, including prescription drug monitoring programs, regulation of pharmaceutical companies, and the enforcement of appropriate prescribing practices.
 - Discuss the potential benefits and challenges of alternative approaches, such as decriminalization or safe injection sites.
- 9. Collaboration and Coordination:
 - Emphasize the importance of a collaborative approach involving healthcare providers, policymakers, law enforcement, community organizations, and individuals with lived experience.
 - Discuss the need for coordinated efforts to ensure a comprehensive response to the crisis.
- 10. Conclusion:
 - Summarize the key points discussed in the paper.
 - Highlight the importance of addressing the opioid crisis through a multifaceted approach that combines prevention, treatment, support, and policy interventions.

Remember to conduct thorough research, cite relevant sources, and provide evidence to support your arguments and recommendations. Good luck with your paper!

(Created June 5th, 2023 with ChatGPT, May 24th Version)

[Comment: The authors believe that this is a good generalized outline. Its strength lies in its comprehensive coverage. Its weakness lies in its lack of individual physician perspective, limited focus on pain management, and overemphasis on policy interventions. In conclusion, it's important for authors to recognize that an outline provided by ChatGPT is a starting point and should be further developed and tailored based on their own research, insights, and in this case, consultation with healthcare professionals, including physicians.]

ChatGPT's abilities extend beyond feedback and correction; it can summarize or elaborate on prompts to generate text. For example, it can summarize texts, generate titles, and generate texts. With these abilities, ChatGPT can be a valuable tool for helping writers generate new ideas and perspectives to enhance their writing for specific contexts. Example 4 below shows how ChatGPT can summarize and create sentences that are more easily digestible for a lay audience, thereby helping researchers bring their research to the general public.

Example 4:

Prompt: Can you utilize lay language to simplify this scientific sentence please? "The proposed mechanism involves the confluence of hyperpolarization-activated cyclic nucleotide-gated channels and N-methyl-D-aspartate

receptors, leading to a cascade of intracellular events resulting in the potentiation of synaptic transmission."

Output: "The proposed process involves the interaction of specific channels and receptors in the brain, leading to a series of events inside the cells that enhance communication between neurons."

(Created June 5th, 2023 with ChatGPT, May 24th Version)

Example 5 below shows how ChatGPT can create a title from the first paragraph of this manuscript.

Example 5:

Prompt: Create a title for this text "<First paragraph of this paper>"

Output: Title: Exploring the Potential of ChatGPT for Academic Writing: Capabilities, Limitations, and Future Prospects.

(Created June 5th, 2023 with ChatGPT, May 24th Version)

[Comment: The authors of this publication utilized the provided title as a foundation for their work and selectively highlighted key topics within the provided commentary. The authors did not use the generated title because ChatGPT's understanding was limited to the information presented in the initial paragraph. Because of this, the title provided by ChatGPT did not adequately summarize this manuscript.]

In summary, by generating writing prompts or suggesting related topics for further research, the AI language model can be expected to facilitate the development of critical thinking skills and encourage academic researchers to become more independent and creative writers. The model can also assist with developing research questions by providing suggestions based on a given research topic (see Examples 6 and 7 in the appendix, and Pretorius, 2023). By using different prompts or keywords, writers can access a variety of question options and thus expand their research potential. Table 1 below summarizes ChatGPT's capabilities. Appendix A gives further examples of ChatGPT's capabilities.

Table 1. ChatGPT's capabilities.

Personalized feedback on writing style

Suggestions for improving flow

Synonym suggestions for better style

Summarization and elaboration

Writing prompt generation

Suggests related research topics

Research question generation

Paper outlining and structure

6. Navigating acceptability: Examining the ethical use boundaries of ChatGPT

The acceptability of different levels on the human-AI writing continuum (Table 2) may depend on various factors, such as the intended learning outcomes, ethical considerations, and academic integrity. It is crucial to differentiate between writing for coursework assignments and for

publications. While acceptability may vary depending on specific institutional or governing body requirements, this discussion will focus on the general application of ChatGPT in the context of peer-reviewed publications. For example, in the table below, levels 1–3 may be seen as acceptable because they still require significant input from the writer and do not compromise academic integrity. On the other hand, levels 7–9 may not be acceptable because they involve a higher degree of AI-generated content, which raises concerns about originality, plagiarism, and the writer's actual learning and writing abilities.

Table 2. The human-AI writing continuum (Rowland, 2023).

	Level
Entirely human written	1. Student does things in the traditional way: All topic analysis, reading, note-taking, planning, writing and editing done solely by the student. Only AI use is word processor's built-in spell and grammar checking.
	2. As per level 1, but student also uses Grammarly or a paid proofreader to correct and refine what they have written. No refinements add anything of substance to the student-generated text.
	3. As per level 1, but ChatGPT is asked for feedback on how the student written text can be improved / clarified / simplified and/or ChatGPT is asked for feedback on how well student-written text meets writing assessment criteria such as completeness of argument. Student adopts or adapts recommended changes.
	4. Student asks ChatGPT to analyse the assignment topic, i.e. to generate sub-topics / sub-questions to consider when addressing the assigned topic and/or asks ChatGPT to provide a possible outline for the assignment in the form of points to make / sub-topics to address / questions to answer. Student adopts or adapts the proposed plan but then does all required researching and writing themselves.
	5. Based on a plan or outline either generated by themselves or adopted/adapted from ChatGPT, student does all the required research and takes structured and referenced notes within the skeleton of the plan. ChatGPT is asked to convert the structured notes to properly cited paragraphs which the student then adopts or adapts.
	6. When note-taking from sources, an AI is asked to paraphrase text copied and pasted from the source. The student then uses these paraphrases to construct their assignment, either using them without modification or synthesising and expanding on them as they would with notes taken by themselves.
	7. Student has a "conversation" with an AI about a topic, refining their question prompts based on their assessment of the AI's responses, then identifies the best responses and compiles and edits these as needed. Any necessary fact-checking is completed by the student using "traditional" methods.
	8. Student refines / edits / adjusts / adds to a response to a prompt generated by an AI. A limited example of this level is asking an AI to suggest titles for a student-written essay or abstract. A more extensive example could include asking an AI to suggest a possible abstract in response to excerpts from a research paper.
Entirely AI written	9. Student adopts without change, a piece of writing generated by an AI in response to a prompt.

Although certain uses of ChatGPT may pose a potential threat to academic integrity, we contend that judicious utilization should be permitted. We assert this stance based on the premise that ChatGPT holds the potential to enhance writing skills without compromising academic integrity, provided it is employed in an appropriate manner. It can do this by providing feedback on grammar, syntax, and structure, helping writers to meet academic standards. For example, in Table 2 Level 3 on the human-AI writing continuum, where writers ask ChatGPT for feedback on their written text, they can learn how to improve their writing skills and understand how to meet the

assessment criteria for a research article. This level of human-AI writing can be promoted by instructors, and senior academics alike, to encourage writers to engage in critical thinking and reflect on their writing process, resulting in a deeper understanding of the research topic and better-written work. Notably, various working groups worldwide have developed AI guidelines, exemplifying the existence of initiatives that support and reinforce this approach (e.g. Munoz et al., 2023). Nevertheless, further investigation is required to understand the effects of using ChatGPT and similar language models on writers within the context of academic writing.

Another potential reason for allowing the use of generative AI tools to support academic writers is their capacity to support rather than undermine higher level critical thinking through cognitive offloading. Cognitive offloading involves transferring cognitive tasks from the human mind to external tools or resources, resulting in liberated mental resources and improved cognitive efficiency (Risko & Gilbert, 2016). In academia, cognitive offloading is particularly advantageous as it enables individuals to concentrate on higher-level cognitive activities, such as critical analysis and creativity (Morrison & Richmond, 2020). In this regard, ChatGPT, functioning as an AI language model, can contribute significantly to cognitive offloading by providing valuable support and assistance across a range of cognitive tasks. By leveraging ChatGPT's capabilities, individuals can obtain assistance in idea generation, writing refinement, summarization, information retrieval, research planning, structuring papers, and knowledge consolidation. Such cognitive offloading can be expected to empower academics to streamline their cognitive processes and allocate their mental efforts to more complex and creative aspects of their academic pursuits.

However, ChatGPT should not be used as a substitute for critical thinking or research skills. Using ChatGPT to generate content can be helpful, but copying it verbatim without appropriate acknowledgement is plagiarism. Moreover, it is essential to acknowledge that ChatGPT carries the potential for introducing fabricated answers through AI hallucinations. To maintain academic integrity, writers should use the generated content as inspiration and build upon it using their own words and ideas, while properly citing any sources used. It is crucial to teach writers about academic integrity and how to use AI language models ethically, while also addressing privacy concerns¹. Ultimately, the acceptability of different levels of AI language model usage depends on the specific context and goals of the writing task, as well as ethical and pedagogical principles. While it may be acceptable for a writer to use AI-generated content as a reference or a tool to enhance their writing, there should be a clear distinction drawn at Level 9, where the writer adopts an entirely AI-written piece of work. Such an approach violates the fundamental principle of academic integrity, as the writer has not contributed to the content creation process in any meaningful way. Therefore, it is essential to maintain a balance between utilizing AI technology to improve one's writing skills and ensuring that the content produced remains an original and authentic representation of the writer's knowledge and abilities. It is crucial to ensure that writers are using AI language models to enhance their work and not to replace their work entirely.

¹ Privacy concerns include: **Data Security:** When using ChatGPT, it's essential to ensure that any personal or confidential information shared during academic interactions is adequately protected. This includes taking measures to prevent unauthorized access, data breaches, or leaks that could compromise sensitive information. **Data Retention:** Institutions should establish clear policies regarding the retention of data generated during academic interactions. It's crucial to determine how long the data will be stored and whether any identifiable information will be retained beyond the immediate needs of the conversation. **Consent and Anonymity:** Students and participants should be informed about the use of ChatGPT and its potential implications on their privacy. Obtaining informed consent and providing options for anonymous interactions can help protect individuals' privacy rights and foster a sense of trust. **Third-Party Access:** If a third-party service or platform is utilized to facilitate the use of ChatGPT in the academic setting, it's important to review their privacy policies and terms of service. Understand how they handle data, whether they retain any information, and if they comply with relevant privacy regulations. **Ethical Use of Data:** Institutions must ensure that any data collected during academic interactions with ChatGPT is used ethically and solely for educational purposes. Data should not be shared, sold, or used for any unauthorized purposes that could infringe upon individuals' privacy rights.

Additionally, ChatGPT lacks the ability to give appropriate referencing of sources that it utilizes. As a result, writers must provide verified, original sources when using AI models, ensuring that the writer gives credit where it is due. It is crucial to teach writers about academic integrity and how to use AI language models ethically.

Additionally, using AI to replace or augment critical thinking and research skills, which are fundamental to academic writing, may undermine the writer's educational experience and potentially harm their future academic and professional development. Ultimately, the acceptability of different levels may depend on the specific context and goals of the writing task, as well as the ethical and pedagogical principles of the individual or institution involved.

7. Uncovering the drawbacks: ChatGPT's challenges

When discussing the boundary between acceptable use of AI language models and “plagiarism”, it is important to stress the importance of understanding the limitations of these tools. It is advisable for writers to view these tools as supplements to their writing rather than complete replacements. A recent article by Lim et al. (2023) sheds light on the challenges arising from the intersection of Generative AI and education, emphasizing the need for a balanced approach. These authors make the point that this intersection of Generative AI and education presents a range of challenges and opportunities, calling for proactive governance, distributed accountability, and a reevaluation of academic practices to facilitate its responsible and transformative integration.

Beyond “simple” copy editing applications, using AI language models as a starting point to brainstorm and develop ideas can be a helpful tool in writing, as they generate a wide range of content ideas and can help overcome writer's block or find fresh perspectives on a topic. One excellent illustration of this is using ChatGPT to inquire about potential topics and key points to include within your work. However, it is vital to refrain from directly copying the text generated in this way without any modifications or original ideas, as failing to do so can be considered plagiarism. To avoid this, it is crucial to incorporate original thoughts and ideas. Instead, writers can use the generated content as inspiration, building upon it using their own words and ideas, thus developing their unique voice while benefiting from the guidance provided by the AI language model. In academic writing, acknowledging any sources used is crucial for maintaining academic integrity and avoiding plagiarism, including any text generated by AI language models. Accurate citations are essential to show that research has been conducted, and information from various sources has been synthesized. Therefore, understanding the difference between paraphrasing and plagiarism is important. Encouraging writers to review and revise any text generated by AI language models is necessary to ensure that academic work meets standards in respect to the context for accuracy, clarity, and quality. It reinforces the importance of critical thinking and careful attention to detail, both essential skills for academic and professional writing.

While ChatGPT can provide valuable assistance in refining and expanding writing, it is essential to recognize the distinction between human-authored content and AI-generated suggestions. Citing ChatGPT itself as a source may not be appropriate, as it is an algorithmic tool rather than a scholarly or academic entity. The focus of citation should remain on the relevant scholarly sources and references used to support the arguments and claims made in the academic publication, upholding academic integrity and crediting appropriate sources of knowledge and expertise. Moreover, acknowledging ChatGPT as an author raises ethical considerations and challenges the traditional understanding of authorship. As an AI language model, ChatGPT lacks consciousness, intentionality, and creative agency. Thus, it is more appropriate to acknowledge the use of AI language models in the acknowledgments section, recognizing their contribution to the writing process without assigning authorship. The primary emphasis should still be on crediting the human authors who conducted the research and made critical decisions in the publication.

Finally, it is important to acknowledge that AI models are not infallible and, as they currently stand, should not be solely relied upon to generate text verbatim ab initio. In due time this will

change by further modularisation of these services and progress in techniques such as causal regularisation (Bevilacqua et al., 2023). This method integrates causal information into a neural network by adding a component that enforces consistency with established causal relationships. This can be done by penalising solutions that violate the assumptions of a causal model, such as the assumptions of no unobserved confounding or no feedback loops.

8. Conclusion

As it is unlikely that this technological leap will vanish in the near future, researchers and academic publishers should be quick to assess the need for a new author's statement of transparency regarding AI use. The American Psychological Association provides examples that cite the usage of ChatGPT (McAdoo, 2023). Just as statements on ethics and conflict of interest are a mandatory routine practice, a statement on the extent to which AI language models were utilised for the respective manuscript might be needed in the future. The current peer-review system is suited to uncover misinformation that might be generated by the misuse of AI models (i.e., the occurrence of AI hallucinations in the text when scholars generate completely new sentences with ChatGPT). However, other use cases of AI language models might be harder to identify and require the full transparency of the authors.

The authors suggest conducting additional research to investigate the potential of AI/NLP generalized language models in supporting diverse forms of academic writing, as outlined in this paper. Furthermore, the authors recommend that academics across all disciplines acquaint themselves with these emerging technologies to gain a competitive edge and effectively address the utilization of ChatGPT within an academic context.

In conclusion, ChatGPT can be a promising tool in academia if utilised correctly. ChatGPT holds great potential to assist researchers in editing their language and summarising their findings in scientific writing. By helping to facilitate research communication, ChatGPT can have an indirect impact on the academic world by promoting collaboration and supporting diverse authors. The advent of GPT-4, the most recent iteration of OpenAI's language model, holds promise for mitigating the existing opportunity gap, addressing the linguistic injustice and providing support for developing skills in writing (Clarck & Vincent, 2023). As AI models continue to evolve and advance, they offer new opportunities for facilitating more equitable communication and language use. Nevertheless, the utilization of the ChatGPT model for academic writing necessitates the transparency and comprehension of the model's capabilities and limitations by the author.

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Appendix. Concrete examples showcasing how ChatGPT can provide assistance in various aspects of writing

1. Personalized feedback on writing style:

Prompt: "Can you help me rephrase the sentence 'Your writing style lacks clarity and conciseness' to provide suggestions for improvement?"

Output: "To enhance the clarity and conciseness of your writing, consider providing more precise explanations and trimming unnecessary details."

2. Suggestions for improving flow:

Prompt: "Can you help me improve the flow between these paragraphs:

"Climate change is a pressing global issue that requires immediate action. Rising temperatures, extreme weather events, and melting ice caps are clear indicators of the planet's deteriorating health. Governments and policymakers must prioritize sustainable initiatives and implement effective strategies to mitigate the adverse effects of climate change.

Renewable energy sources offer a viable solution to combat climate change. Solar, wind, and hydropower are clean and abundant sources of energy that can reduce our dependence on fossil fuels. Investing in renewable energy infrastructure and technologies will not only reduce greenhouse gas emissions but also create new job opportunities and foster economic growth."

Output: Sure! Improved flow with transitional words using ChatGPT:

Paragraph 1: Climate change is a pressing global issue that requires immediate action. Consequently, governments and policymakers must prioritize sustainable initiatives and implement effective strategies to mitigate the adverse effects of climate change. In the face of rising temperatures, extreme weather events, and melting ice caps, urgent measures are needed to address the planet's deteriorating health.

Paragraph 2: Moreover, renewable energy sources offer a viable solution to combat climate change. By harnessing solar, wind, and hydropower, we can tap into clean and abundant sources of energy. Transitioning to renewable energy infrastructure and technologies is not only crucial for reducing greenhouse gas emissions but also holds significant economic potential. In fact, investing in renewables can create new job opportunities, stimulate economic growth, and pave the way for a sustainable future."

[Comment: It is important for authors to keep in mind that while ChatGPT suggested revisions may be an improvement on the original, there may be further room for improvement. In this case, "moreover" is a connective suitable for within a paragraph, not as a link between paragraphs, and the contents of paragraph 2 are not really a "moreover" anyway. A better opening to paragraph 2 to signal its purpose would be: "One important type of measures which can be taken are to increase the use of renewable energy sources, which offer ..."]

3. Synonym suggestions for better style:

Prompt: "Can you provide synonyms to improve the style of the sentence 'The experiment was conducted in a lab environment'?"

Output: "The experiment was carried out in a laboratory setting."

4. Summarization and elaboration:

Prompt: "Can you help me summarize and elaborate on the sentence 'The study examined the effects of sleep deprivation on cognitive performance'?"

Output: "The study explored the impact of sleep deprivation on various cognitive functions, including memory, attention, and decision-making abilities." [Note that the output only illustrates elaboration, not summarization.]

5. Writing prompt generation:

Prompt: "I'm looking for a writing prompt for my essay. Can you help me generate a topic or idea to write about?"

Output: "How about exploring the ethical implications of artificial intelligence in healthcare? Analyze the benefits and challenges it presents in improving patient care and privacy."

6. Suggests related research topics:

Prompt: "I'm in need of a research topic for my thesis. Can you provide me with some suggestions or ideas to explore?"

Output: "Consider investigating the impact of social media on mental health among adolescents or exploring the effectiveness of mindfulness-based interventions in reducing stress and anxiety."

[Comment: While ChatGPT can provide random topics for a thesis, normally students would have to indicate their field of study to obtain a potentially relevant topic. See next example and Pretorius (2023) for a comprehensive example.]

7. More focused research question generation:

Prompt: "I need help formulating a research question for my study on climate change. Can you provide assistance in crafting an appropriate research question?"

Output: "How does deforestation contribute to climate change, and what measures can be implemented to mitigate its effects?"

8. Paper outlining and structure:

Prompt: "I'm struggling with organizing my ideas and structuring my paper. Can you provide guidance on how to improve the organization and structure?"

Output: "To enhance the organization of your paper, consider using a clear introduction, followed by coherent sections that present your main arguments, supported by relevant evidence. Conclude with a succinct summary and thoughtful implications."

[Comment: See also Example 3 on page T20.]

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