Chatbots, ChatGPT, and Scholarly Manuscripts
WAME Recommendations on ChatGPT and Chatbots in Relation to Scholarly Publications

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Journals have begun to publish papers in which chatbots such as ChatGPT are shown as co-authors. The following WAME recommendations are intended to inform editors and help them develop policies regarding chatbots for their journals, to help authors understand how use of chatbots might be attributed in their work, and address the need for all journal editors to have access manuscript screening tools. In this rapidly evolving field, we expect these recommendations to evolve as well.

INTRODUCTION

A chatbot is a tool "[d]riven by [artificial intelligence], automated rules, natural-language processing (NLP), and machine learning (ML)…[to] process data to deliver responses to requests of all kinds" [1]. Artificial intelligence (AI) "broadly refers to the idea of computers that can learn and make decisions in a human-like way" [2]. Chatbots have been used in recent years by many companies, including those in healthcare, for providing customer service, routing requests, or gathering information .

ChatGPT is a recently-released chatbot that "is an example of generative AI, because it can create something completely new that has never existed before," [3] in the sense that it can use existing information organized in new ways. ChatGPT has many potential uses, including "summarising long articles, for example, or producing a first draft of a presentation that can then be tweaked" [4]. It may help researchers, students, and educators generate

ideas **[5]**, and even write essays of a reasonable quality on a particular topic **[6]**. Universities are having to revamp how they teach as a result **[7]**.

ChatGPT has many limitations, as recognized by its own creators: "ChatGPT sometimes writes plausible-sounding but incorrect or nonsensical answers…Ideally, the model would ask clarifying questions when the user provided an ambiguous query. Instead, our current models usually guess what the user intended… While we've made efforts to make the model refuse inappropriate requests, it will sometimes respond to harmful instructions or exhibit biased behavior" **[8]**. And, "[u]nlike Google, ChatGPT doesn't crawl the web for information on current events, and its knowledge is restricted to things it learned before 2021, making some of its answers feel stale" **[9]**. OpenAI is currently working on an improved version that is "better at generating text than previous versions" and several other companies are creating their own "generative AI tools" **[7]**.

Chatbots are "trained" using libraries of existing texts. Consequently, in response to specific input from the human operator (a "question" or "seed text"), chatbots respond with an "answer" or other output. Ultimately, this output comprises a selection of the training materials adapted according to the algorithms. Since chatbots are not conscious **[10]**, they can only repeat and rearrange existing material. No new thought goes into their statements: they can only be original by accident. Since chatbots draw on the library of existing texts on which they were trained, there is a risk that they might repeat them verbatim in some circumstances, without revealing their source. According to a recent preprint that used ChatGPT to generate text, "The percentage of correct references in the preliminary text, obtained directly from ChatGPT, was just 6%" **[11]**. Thus, if chatbot output is to be published in an academic journal, to avoid plagiarism, the human author and editor must ensure that the text includes full correct references, to exactly the same degree as is required of human authors.

More alarmingly, ChatGPT may actually be capable of lying intentionally - "the intentionality is important, as the liar knows the statement they are making is false but does it anyway to fulfill some purpose…" as demonstrated by Davis **[12]**. Of course, ChatGPT is not sentient and does not "know" it is lying, but its programming enables it to fabricate "facts".

Chatbots are not legal entities, and do not have a legal personality. One cannot sue, arraign in court, or punish a chatbot in any way. The terms of use and accepted responsibilities for the results of using the software are set out in the license documentation issued by the company making the software available. Such documentation is similar to that produced for other writing tools, such as Word, PowerPoint, etc. Just as Microsoft accepts no responsibility for whatever one writes with Word, ChatGPT's creator OpenAI accepts no responsibility for any text produced using their product: their terms of use include indemnity, disclaimers, and limitations of liability **[13]**. Only ChatGPT's users would be potentially liable for any errors it makes. Thus, listing ChatGPT as an author, which is already happening **[14,15]** and even being encouraged **[16]**, may be misdirected and not legally defensible.

While ChatGPT may prove to be a useful tool for researchers, it represents a threat for scholarly journals because ChatGPT-generated articles may introduce false or plagiarized content into the published literature. Peer review may not detect ChatGPT-generated content: researchers can have a difficult time distinguishing ChatGPT-generated abstracts from those written by authors **[17]**. Those most knowledgeable about the tool are wary: a large AI conference banned the use of ChatGPT and other AI language tools for conference papers **[17]**.

Looked at in another way, chatbots help produce fraudulent papers; such an act goes against the very philosophy of science. It may be argued that the use of chatbots resembles papermills albeit with a small difference -- though the latter clearly have an intention to deceive, this may not always be true for the use of chatbots. However, the mere fact that AI is capable of helping generate erroneous ideas makes it unscientific and unreliable, and hence should have editors worried.

On a related note, the year 2022 also saw the release of DALL-E 2 **[18]**, another ML-based system that can create realistic images and art from a description submitted to it as natural language text, by OpenAI, the same company that has made ChatGPT. More recently, Google has also released a similar product named Imagen **[19]**. These tools too have raised concerns somewhat similar to those with ChatGPT. Interestingly, each image generated

using DALL-E 2 includes a signature in the lower right corner, to indicate the image's provenance **[20]**; however, it can be easily removed using one of several simple methods that are a web search away.

With the advent of ChatGPT and DALL-E 2, and with more tools on the anvil, editors need to establish journal policies on use of such technology and require the tools to be able to detect content it generates. Scholarly publishing guidelines for authors should be developed with input from diverse groups including researchers whose first language is not English. This may take some time. In the meantime, we offer the following recommendations for editors and authors.

WAME Recommendations:

1. Chatbots cannot be authors. Chatbots cannot meet the requirements for authorship as they cannot understand the role of authors or take responsibility for the paper. Chatbots cannot meet ICMJE authorship criteria, particularly "Final approval of the version to be published" and "Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved" **[21]**. A chatbot cannot understand a conflict of interest statement, or have the legal standing to sign a statement. Chatbots have no affiliation independent of their creators. They cannot hold copyright. Authors submitting a manuscript must ensure that all those named as authors meet the authorship criteria, which clearly means that chatbots should not be included as authors.

2. Authors should be transparent when chatbots are used and provide information about how they were used. Since the field is evolving quickly at present, authors using a chatbot to help them write a paper should declare this fact and provide full technical specifications of the chatbot used (name, version, model, source) and method of application in the paper they are submitting (query structure, syntax). This is consistent with the ICMJE recommendation of acknowledging writing assistance **[22]**.

3. Authors are responsible for the work performed by a chatbot in their paper (including the accuracy of what is presented, and the absence of plagiarism) and for appropriate attribution of all sources (including

for material produced by the chatbot). Human authors of articles written with the help of a chatbot are responsible for the contributions made by chatbots, including their accuracy. They must be able to assert that there is no plagiarism in their paper, including in text produced by the chatbot. Human authors must ensure there is appropriate attribution of all quoted material, including full citations. They should declare the specific query function used with the chatbot. Authors will need to seek and cite the sources that support the chatbot's statements. Since a chatbot may be designed to omit sources that oppose viewpoints expressed in its output, it is the authors' duty to find, review and include such counterviews in their articles.

4. Editors need appropriate tools to help them detect content generated or altered by AI and these tools must be available regardless of their ability to pay. Many medical journal editors use manuscript evaluation approaches from the 20th century but now find themselves face-to-face with AI innovations and industries from the 21st century, including manipulated plagiarized text and images and paper mill-generated documents. They have already been at a disadvantage when trying to sort the legitimate from the fabricated, and chatbots such as ChatGPT take this challenge to a new level. Editors need access to tools that will help them evaluate content efficiently and accurately. Publishers working through STM are already developing such tools **[23]**. Such tools should be made available to editors regardless of ability to pay for them, for the good of science and the public. Facilitating their use through incorporation into open-source publishing software such as Public Knowledge Project's Open Journal Systems **[24]**, and education about the use and interpretation of screening outputs, would make automated screening of manuscript submissions a much-needed reality for many editors.

We encourage comments and feedback from WAME Members and other readers. Please contact us at <mwinker@wame.org>.

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