This is a preprint of a poster accepted for presentation at the 87th Annual Meeting of the Association for Information Science & Technology in Calgary. Preliminary findings on students' use of metaphors in understanding ChatGPT.

College Students' Metaphors for ChatGPT: An Exploratory Study

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ABSTRACT
The introduction of ChatGPT has sparked significant interest and presented both great opportunities and challenges to higher education. While more students are using ChatGPT, little is known about their mental models for and sensemaking of the system, including the metaphors they use to understand the system. In this exploratory study, we interviewed 25 students at three universities in the US during the summer of 2023 to identify the metaphors they use for ChatGPT. Through qualitative analysis of the interview transcripts, we found that participants commonly used metaphors to make sense of ChatGPT. They compared ChatGPT to humans and popular technologies or tools, with being the most frequently Google mentioned. These findings highlight the potential for metaphor-based design and the development of AI literacy programs.

KEYWORDS
ChatGPT, metaphors, college students.

INTRODUCTION
ChatGPT is a chatbot powered by a large language model (LLM) based on the Generative Pre-trained Transformer (GPT) architecture. Empirical studies across various locations and sample sizes have found that students use ChatGPT for diverse academic tasks such as language learning, text generation, and programming (Wang et al., 2024). Students appreciate ChatGPT's benefits, such as its friendly interface and personal tutoring function (Ngo, 2023), but also have concerns or barriers to using it, such as its impact on independent thinking (Ngo, 2023) and the difficulty of evaluating the output (Schuetzler et al., 2024). To address students' barriers and concerns in using ChatGPT, it is necessary to know students' understanding of ChatGPT. Metaphors afford learning by comparing the targeted system to other familiar entities. Users often apply metaphors when they learn about a new system (Carroll & Olson, 1988; Carroll & Thomas, 1982). While metaphors can enlighten understanding of system components or functions, they can be misleading due to their lack of accuracy (Carroll & Olson, 1988). To investigate how students understand ChatGPT to shed light on their behavior of using GenAI tools, we explored the research questions: **What metaphors did college students apply to make sense of ChatGPT**?

RESEARCH METHODS
We used interviews to elicit students' metaphors of ChatGPT. To intended to impose minimum constraints on participants' articulation of how they perceive ChatGPT, we began the interviews with general questions, such as "How much do you know about ChatGPT?". When participants had difficulty articulating how ChatGPT works, we probed with more specific questions, such as "How does ChatGPT generate answers to your questions?" The data collection took place between April and June 2023. We recruited participants from three U.S. universities. 25 students participated in the study. Most of them were White (n=16), aged 18 to 30 (n=19), and were undergraduates (n=13). In terms of gender, 12 were males, 12 were females, and 1 was non-binary. Regarding academic discipline, 17 majored in information science, followed by psychology (n=2), marketing and business (n=2), economics (n=1), human ecology (n=1), history (n=1), and architecture (n=1). All participants had used ChatGPT. Each participant received a $20 Amazon gift card after the interview. This study is part of a larger study that investigates college students' ChatGPT use, it was approved by the Institutional Review Boards in all three universities involved.

The interview transcripts were analyzed following the qualitative content analysis method (Miles et al., 2014) and facilitated by Nvivo 1.7 (Lumivero Software). Following prior research (Desai & Twidale, 2023), we coded participants' metaphors by identifying direct comparison between ChatGPT and other entities. For example, P15 mentioned that ChatGPT is "*kind of like an encyclopedia*." When sentences or phrases were unclear or confusing

(primarily due to errors in auto transcription), the audio recordings of the interviews were referenced to validate and correct the data. Weekly group meetings were held to discuss and address coding discrepancies.

FINDINGS

Table 1 shows the metaphors that participants used to help them understand ChatGPT. The metaphors touched upon three aspects of ChatGPT: What it is, how it interacts with users, and how it learns. Overall, participants analogized ChatGPT to humans or other tools in daily life. Google is the most used metaphor (n=7).

Aspect	Metaphors (the bracketed number represents the participant count)	No. of participants
What ChatGPT is	**Human**: Librarian (1) **Other tools**: Google (7), encyclopedia (1), filter (1), SQL query (1)	11
The way ChatGPT interacts with users	**Human:** Normal human (2), friend (2), machine man (1), personal assistant (1) **Other tools:** Instant messaging system (2)	7
How ChatGPT learns	**Human:** Human's learning through conversation (1) **Other tools:** AI in self-driving cars (1)	2

Table 1. Metaphors used by the participants to construct their understanding of ChatGPT

- **What ChatGPT is**. Four participants valued ChatGPT's ability to find accurate information and used different metaphors to make sense of what ChatGPT is. One considered ChatGPT a **librarian** that "*actually knows what the information is*" (P01); one thought it as an **encyclopedia** that "*gives you the actual information*" (P15); one mirrored it to a **filter** that scans and leaves the results that you want (P09); and the other participant thought it a **SQL query** that "*gives you a result set*" (P06). Seven participants used **Google** as the metaphor, thinking that ChatGPT has similar data sources like Google (n=3) or works "*similar to Google, like searching the web and just pulling out those key items*" (P23). P21 regarded ChatGPT as "*my own Google*", which "*gives me back the answers in an organized format.*"
- **The way ChatGPT interacts with users**. When describing their interactions with ChatGPT, a common analogy that participants used was human: a "***machine man*****"** (P07) that is programmed "*like a **normal human** being*" (P10) and "*always ready to work for you*" (P25). One participant particularly mentioned that ChatGPT "*loaded a lot of conversational techniques*", which make it "*almost like a **personal assistant***" (P12). Two participants felt they were "*texting a **friend***" (P01). Apart from humans, participants also analogized ChatGPT to a **messaging system** "with the history" (P06) and providing instant response (P07).
- **How ChatGPT learns**. Two participants noticed the self-learning feature of ChatGPT and tried to make sense of it using two different metaphors. One participant thought it as "***AI in self-driving cars***" that "*can make itself better*" (P20); the other compared it to **human's learning through conversations**: "*It's in the conversations a lot of the time. So we collect the information from outside the fact that we feel some information in at the same time…but now it seems the computers can do that*." (P19)

DISCUSSION

During April to June 2023 when the interviews were conduct, a short time after ChatGPT was released to the public, our participants applied a wide range of metaphors, from humans to familiar technologies in everyday life, to support their understanding of ChatGPT. Among these metaphors, Google is the most commonly used one. This result is consistent with recent research showing that people used ChatGPT as a search engine (Ngo, 2023; Skjuve et al., 2023). The Google metaphor can help users interact with ChatGPT but was not as efficient in affording a correct understanding of ChatGPT's working mechanisms. For example, P23 misunderstood that ChatGPT searched the web like Google to get real-time information. This result demonstrates that metaphors' limitations in guiding users' understanding of a new system (Carroll & Olson, 1988). The potential of other metaphors for misleading should also be noted. For example, the metaphor encyclopedia implies that ChatGPT can deliver information that is reviewed and of high quality, which does not reflect the system's actual capabilities; the metaphors "friends" and "personal assistant" show that some students tended to anthropomorphize ChatGPT and might share their personal information with it and thus inflict damage on their privacy (White, 2023). Future research could further validate the influence of metaphors on user behavior. These results not only remind designers to think about how to make use of metaphors to help users understand LLM-powered systems properly (Daudén Roquet & Sas, 2021; Desai & Twidale, 2023) but suggest that a comprehensive literacy program, either stand-alone or being integrated into existing courses, needs to be established to educate students about GenAI tools, how they work, and their limitations to foster productive and ethical use of these tools.

GENERATIVE AI USE

We confirm that we did not use generative AI tools/services to author this submission.

AUTHOR ATTRIBUTION

JA: conceptualization, methodology, data curation, formal analysis, writing – original draft; HB: resources, data curation, formal analysis, writing – review and editing; WC, YZ, and BS; resources, methodology, data collection, project administration, supervision, writing – review and editing

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