What gender do you associate with ChatGPT?

A Study of Demographic Correlations with Users' Perception of ChatGPT's Gender

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OpenAI's ChatGPT is often anthropomorphized by its users, who may attribute gendered pronouns to it or subconsciously associate it with a gender. In our study, we explore the relationship between demographic groups and their perceptions of ChatGPT's gender through a survey of 588 participants, consisting of 7 questions. Our findings reveal a 69% male bias among respondents who expressed a gendered perspective. Interestingly, a respondent's own gender plays a minimal role in this perception. Instead, attitudes towards AI and the frequency of usage significantly influence gender association. Contrarily, factors such as the respondents' age or language do not significantly impact gender perception. We conclude by discussing the implications of these findings for the application of AI in various industries.

1. Introduction

As the most advanced dialogue agent ever created, and who some say even passes the Turing Test [1][2], ChatGPT presents itself as an interesting platform on which to study people's gender perception of an objectively inanimate computer program, in a novel scenario as opposed to gendering a ship for example. In daily life and in the media, ChatGPT and other similar LLM agents are often anthropomorphized [3]. Anthropomorphizing refers to the act of attributing human characteristics, emotions, or intentions to non-human entities, such as animals, objects, or, in this context, artificial intelligence systems like ChatGPT. This phenomenon often leads people to interact with these entities as though they possess human-like qualities, despite their inanimate nature. Past research has been conducted on less advanced virtual assistants [4], but research on gender perception into paradigm-changing LLM based AI chat agents is still very new [5], but demographic reasons for these biases exist have not yet been explored.

Investigating users' perceptions of ChatGPT's gender, or lack there-of, can firstly teach us a lot about the types of users who tend to anthropomorphize chat agents, which could have UX implications when designing systems that leverage such chatbots, as well as being interesting on a secondary level by taking a look at this technology's possible links to gender stereotypes or biases in our modern world.

In this study, we take a look at 588 responses to a 7 question multiple choice survey to see if filtering demographic groups by gender, age, first language, usage of ChatGPT, and perception of AI

could show a bias in the perception of ChatGPT's gender, as well as discuss user's anecdotes and opinions, before finally discussing important takeaways for the AI industry.

2. Methods

2.1 Survey Questions

For this study, participants complete a seven question form, designed to be quick to answer. The main question asks them "What gender do you associate to ChatGPT?", on a seven point scale (Definitely Male, Probably Male, Leaning Male, Neutral / No gender, Leaning Female, Probably Female, Definitely Female). This scale is effective to investigate both the categories of gender perceived, and the conviction of the judgment.

Next there were three demographic questions, and were optional to answer. The participants gave their gender (Male, Female, Non-binary/Other, Prefer not to say), their age range (<15, 15-20, 21-30, 31-40, 41-60, >60), and their primary language (English, German, French, and Spanish were the top groups, as well as an Other option). Many participants (~5%) report being multilingual, and in these cases the language group they are assigned to was the first language mentioned in their answer.

Finally, there were three questions about the participants' relationship with AI, and were also optional to answer. They are asked if they've used ChatGPT's spoken mode (No only in a text box, Yes with a male voice, Yes with a female voice), how often they use ChatGPT (Daily, Weekly, Monthly, Less than once a month, Never), and "How do you feel about AI overall?" (Strongly Positive, Positive, Slightly Positive, Neutral, Slightly Negative, Negative, Strongly Negative).

2.2 Audience and Demographics

588 participants completed the survey. It was shared on social media to collect the maximum number of responses, regardless of general demographics. This is acceptable since a correlation study does not need representative samples of the categories it's controlling for (eg. participant gender or age). These social channels include Instagram (in eastern Canada), Facebook (on Canadian and Australian pages), Reddit (globally, on r/OpenAI and r/ChatGPT), and with physical posters (in eastern Canada).

The demographics of the respondent groups can be seen below (Figure 1). There is a slight bias towards male respondents, and younger respondents (15-25 representing 41% of the sampled group). Most respondents are anglophone and had never used ChatGPT with a voice. The frequency of ChatGPT use among participants is balanced, and 77% of respondents think positively of AI, with only 13% of respondents with a negative perception. This population comes mainly from Westernized societies, where gender stereotypes can differ from the rest of the world, and could therefore not be representative of a global sample, but is still applicable to services in western markets.

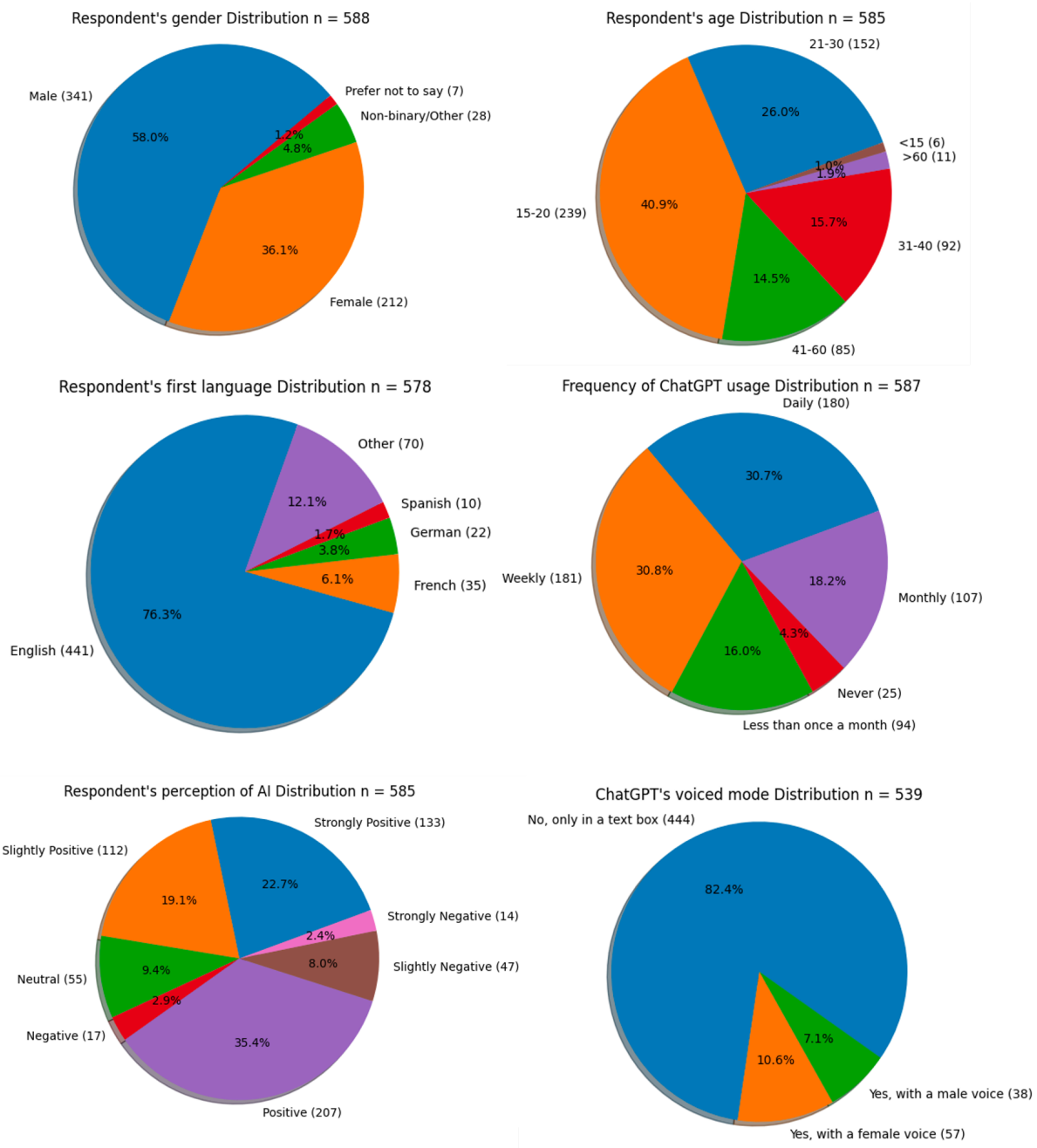

Figure 1: Pie Charts for respondents' genders, ages, languages, ChatGPT usage, perception (feelings) on AI, and usage of ChatGPT's voiced mode.

3. Results

To facilitate data analysis, the gender perception field was split into gender categories (Male, Female, Neutral), and into conviction (Leaning, Probably, Definitely, Neutral). The full anonymized dataset is available on GitHub [6], along with a Jupyter notebook full of other figures [7]. Anecdotes and comments were collected on Reddit [8][9].

3.1 Gender Perception

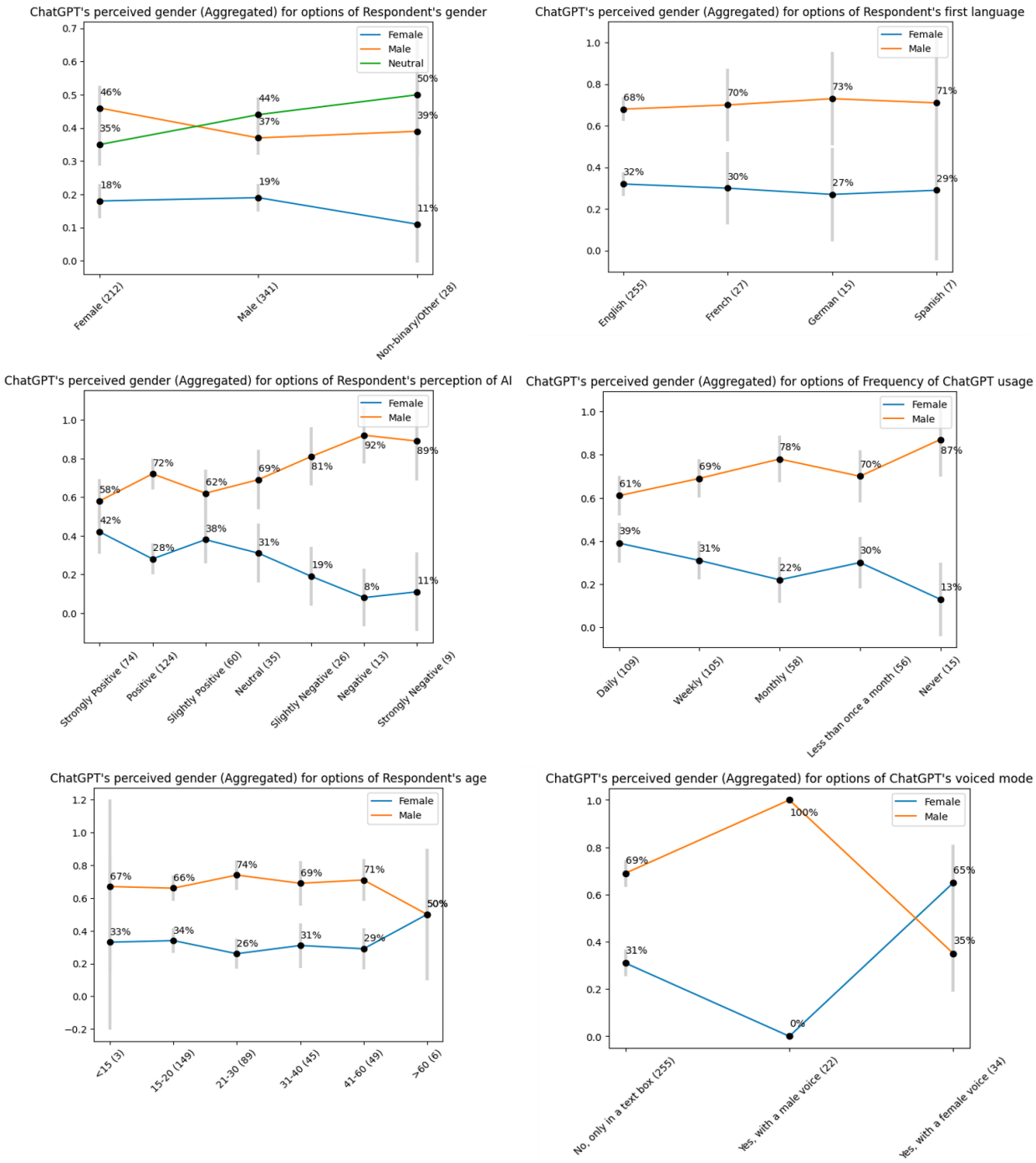

Figure 2: Line Graphs with 95% error bars for frequencies of gender perception of ChatGPT over respondent's gender. Other graphs only represent respondents with a gendered opinion (i.e. not Neutral) over respondent's age, respondent's perception of AI, respondent's frequency of ChatGPT usage, and respondent's first language, as well as over the usage of ChatGPT's voiced mode.

3.2 Conviction of Perception

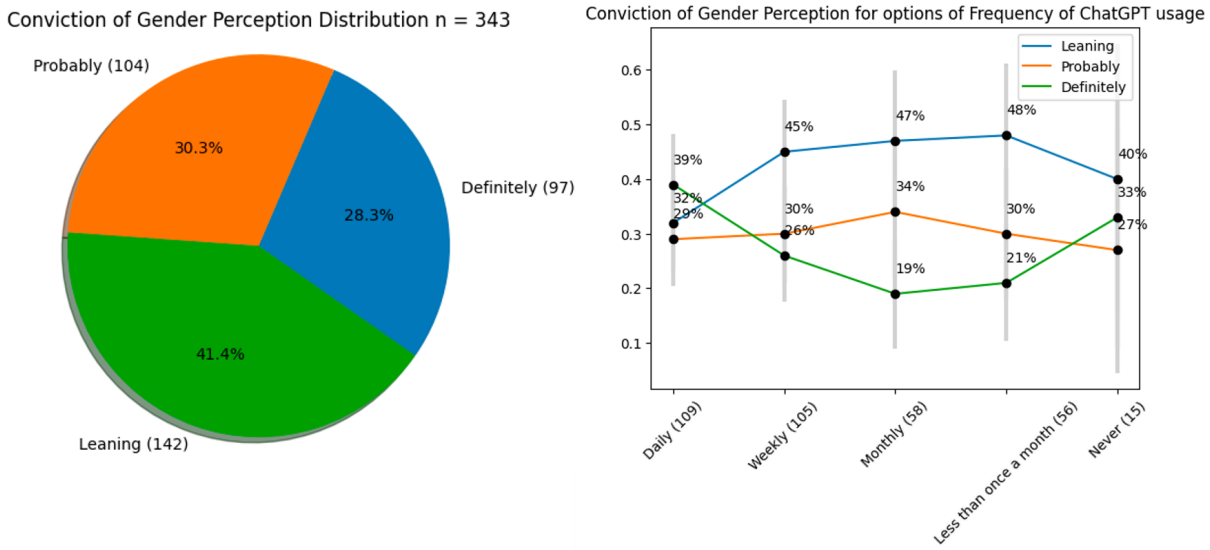

Figure 3: A pie chart for the conviction of the perception of ChatGPT's gender in respondents with a gendered opinion (i.e. not Neutral), and a line graph with 95% error bars for frequencies of conviction over the frequency of ChatGPT usage. All other demographic separation criteria did not differ significantly from the overall population's frequencies of conviction, including perceived gender over the conviction of perception.

4. Discussion

4.1 Statistical Results

In this study, we investigate people's perceptions of ChatGPT's gender. In short, 42% of respondents did not perceive a specific gender, but of the remaining 58% of respondents with an opinion, 69% of them thought ChatGPT more male and 31% thought ChatGPT more female (Figure 2). The rest of this discussion focuses on this subset of respondents with a gendered opinion. Our findings align with past research also in the 70% male bias range [2]. Female respondents had a slight, but not statistically significant, inclination to perceive ChatGPT as more male than male respondents (72% vs. 66% of gendered opinions).

Furthermore, through evaluating perception over different demographics, we uncover that perception of ChatGPT's gender is not affected by a respondent's age, nor by their primary language. This first result is interesting because even if western society's perceptions of gender and stereotypes have evolved over subsequent generations, this does not impact the way people of different ages perceive the novel AI. Primary language not influencing respondent's gender perception also agrees with critiques of linguistic relativity, discussed further below.

Perception of ChatGPT's gender is, unsurprisingly, extremely influenced by if participants have used ChatGPT with a gendered voice. 100% of respondents who had used ChatGPT with a male voice perceived it as male (up from 69% in the no voice case), and 65% of respondents who had used ChatGPT

with a female voice perceived it as female (up from 31%). It's interesting to note that only 18% of respondents had used ChatGPT with a gendered voice, and at the time of this study this was still a new feature. It will be interesting to see in the future how this percentage evolves, as well as its effect on ChatGPT's gender perception.

Finally, participants who used ChatGPT more often are less biased to the male perception than other groups. Daily users had a 61% male bias, as opposed to monthly or less frequently users with between 70% and 87%. A respondent's overall perception of AI also had a measurable effect on gender perception. Positive users overall had a 66% male bias, as opposed to negative users with an 85% male bias. We can interpret these results together to say that users who enjoy the ChatGPT product have less of a gender bias compared to less positive or frequent users, and might be reflective of an increased familiarity with the chat agent, as opposed to still being struck by its novelty, or cynical about AI..

In most of the metrics discussed above, the percentage of respondents who perceived ChatGPT as having a Neutral / No Gender stays around 40%. Non-binary / Other respondents reported an elevated 50% neutral gender perception for ChatGPT, higher than both male and female respondents, but otherwise, most metrics have neutral perception vary from 35% to 45%. Figures with the neutral lines annotated can be found in the Jupyter Notebook [7].

From analyzing the conviction of gender perceptions (Figure 3), we can see that overall, 41% of non-neutral respondents only have a "leaning" conviction, with then 30% "probably" and only 28% "definitely". This suggests that people's perceptions are weak, and could be easily influenced by external factors, such as seen with the effect of a gendered spoken voice or by a gendered name like seen in Cortana or Alexa [4]. Furthermore, we see that participant's conviction in their judgment increases with more frequent usage of ChatGPT. This seems to indicate that people are more sure of themselves with increased experience, and in combination with the fact that the bias to a male perception decrease with more frequent usage, we can theorize that as people become more familiar with the service, they become more sure of their perception, regardless of if it's a male or female judgment. This result is to be taken with a grain of salt though due to its low statistical significance, and more research is required in general to investigate the strength of gender perceptions.

4.2 Respondents' Comments

Some users commented that their perception was affected by the ways in which they used ChatGPT, as a Redditor said, "*I usually personify it to a female identity because I prefer interacting with women. Especially if I'm using it for any kind of psychological or emotional processing*". Similar stereotypes around sensibility, kindness, and helpfulness are often commented on, with people having diametrically opposed views depending on how ChatGPT acts: "*If it actually answers my question, or completes the task properly, I assume woman. If it misunderstands me or seems like it didn't even read my prompt, male*". These perceptions agree with previous research into gender perception over different capabilities of ChatGPT,

where the task "Providing emotional support" only had a 31% male bias [2]. This is an interesting commentary on gendered stereotypes in western culture.

A few respondents mentioned that their languages aren't gendered (respondent 452 "*Estonian (has no gender)*", respondent 458 "*Hungarian (there are no genders in Hungarian)*"). That being said, respondents whose first language was non-gendered did not significantly differ from the rest of the respondents in gender perception. These participant's comments might refer to the controversial theory of Linguistic relativity [10], but disagree with the survey's statistics observed above. The theory's main proposal is that what language you speak affects the way you think, so would therefore affect your perception of ChatGPT's gender based on the gendered, or lack thereof, pronouns used in your language. Adding to this, a Redditor commented that "*In Brazilian Portuguese, ChatGPT always refers to itself as male*", which would have obvious consequences on gender in users.

Some participants also noted that their perception of ChatGPT's gender varies between mediums in which it's used: respondent 477 said "*i consider it a male in written form and female in speech form (using a female voice)*", which again underlines how sensitive gender perception is to external biases like a gendered voice. Historically, smart assistants have predominantly had female voices (Siri, Alexa, Google Assistant and even GPS navigators), as well as an existing stereotype of female human assistants, which was commented on by some Redditors. We might expect ChatGPT to have a similar perception, so it's therefore interesting that despite this history, people consistently perceive ChatGPT as male more often than female.

4.3 Limitations

This report has outlined many interesting relationships between user's demographics and perception of ChatGPT's gender, and opens up many new questions. Do bilingual users have different perceptions? How many people's perceptions of ChatGPT's gender vary with how they use it? Since GPT4 has been shown to perform significantly better than its 3.5 predecessor [11], do the 3.5 and 4 ChatGPT versions have different gender perceptions?

To answer these questions well, it would be advantageous to study a larger group of respondents (up to 5000), from more diverse geographic and cultural backgrounds, and ask more specific questions, for example about how participants use ChatGPT. More work could also be done with this dataset, using unsupervised clustering algorithms or neural networks to uncover relationships in the demographic groups and their effect on gender perception.

4.4 Future Work and Implications for AI Design and Ethics

To inform industry work, future research on the strength of biases in perceived gender relative to other biased animate and inanimate things should be conducted, as well as evaluating the direct UX consequences of this bias in AI agents [3]. Research to understand the long-term effects of human-AI interactions, focusing on how these relationships influence user behavior, trust, and emotional

well-being will also be crucial in the coming years as chatbot technology develops. Work needs to be put into further analyzing in which situations users anthropomorphize chat agents [12], since attributing human-like characteristics or genders to AI systems could have valuable impacts on user trust and comfort, such as in therapy scenarios, as well as questioning whether users might engage differently based on their gender perceptions, and therefore how to best tailor products.

Given the power that these chat agents have, AI developers and prompt engineers should take care to reduce potential biases in their products to avoid spreading harmful stereotypes [12][13]. Ensuring AI products cater to a diverse user base is crucial, promoting accessibility and equity by considering varied cultural, linguistic, and cognitive backgrounds in design decisions. Developers should also clearly outline the capabilities and limitations of chat agents, helping users set realistic expectations and mitigating the risk of over anthropomorphism.

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A huge thank you to everyone who filled out the survey, and to those who shared it to broaden its reach. I started this survey because I was genuinely curious about if there were correlations in the ways people gendered ChatGPT around me, and am so glad to have gotten enough responses to write this report.

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