Behind The Feminine Facade: Gender Bias in Virtual Assistants and its Effect on Users

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Abstract

The paper examines the boundaries of gendered voice in virtual assistant responses. It intends to examine the gender biases these virtual assistants display by looking at popular systems such as Siri, Alexa, Cortana and Google Assistant which are known for using female voices in their choice of assistants. The study explores how gender bias in VA design affects user experience using both quantitative and qualitative methods of study. It examines how Virtual assistants can be programmed and designed for inclusive interaction to challenge societal gender norms. By drawing from diverse fields such as pragmatics, sociolinguistics, and gender studies to analyze how these assistants encode and reproduce gender bias. The present study also highlights the importance of linguistic equity in digital interaction.

Keywords: *Virtual assistants; gender bias; stereotype; linguistic equity; digital interaction.*

Introduction

Virtual assistants (henceforth VAs) have increasingly become an integral part of our daily life. The response of the VAs holds a significant influence on users' perceptions and societal norms. Within this expansive realm of Human-computer interaction (HCI), gender bias in the VA's responses has become a critical issue, that ranges from answering queries to controlling smart devices. Gender bias reveals itself in various ways like voice, language use, tone and perpetuation of stereotypes. It is important to understand this bias for the sake of just interaction as well as the ethical growth of artificial intelligence. This entails looking at how various VAs responded to different contexts and users' interactions. The study attempts to find out such occurrences so that it could recognize the prevalence and nature of the bias.

VAs and Artificial intelligence (henceforth AI) power software tasks are often gendered as female. The portrayal of VAs as female reflects the traditional association between women and caregiving roles. For example, Apple's Siri, Amazon's Alexa, Google Assistants, and Microsoft's Cortana use female names and voices. VAs is omnipresent in modern life. It is embedded in every smartphone, smart speaker, and many digital devices and platforms. It is important to understand the impact of this gender bias on the user experience, as the biased feedback shapes users' perception and trust and thus impacts overall satisfaction. Therefore, it becomes significant to understand the causes of this bias. The gendering of VAs appears to be a deliberate policy choice by the developers, reflecting cultural norms and expectations of gender roles and behaviours.

The present research aims to examine the phenomenon of gender bias in VA responses by examining existing communicative theories from pragmatics, sociolinguistics, and gender studies to understand the mechanism through which gender bias manifests in VAs. Analysis of these dimensions helps to apprehend how VAs challenge gender bias. Examining the intersections between language and gender used by VAs, the study offers insights into understanding the nuances of VA language in fostering inclusive communication practices in a digital world. The linguistic nuances of the VAs can provide inclusive communication practices that are respectful and welcoming to all genders.

Literature Review

The default gendering of VAs as female has been widely noted. West et al. (2019), examine the implications of VAs for reinforcing stereotypes and social biases. The gendering of VAs affects how gender roles and stereotypes are represented and reinforced. Miller (2017) examines how female VAs are portrayed as

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obedient and helpful, maintaining social stereotypes. The present study examines how the designing of VAs, with their voice and identity, reinforces traditional gender norms. Several studies shed light on how gender-neutral designs can challenge traditional gender norms. One such study by Shaer and Hornecker (2010) examines how the design of VAs affects users' perceptions and interactions. The study discusses how choosing a gender-neutral identity and voice can disrupt the stereotype of assistants as exclusively female, challenging traditional gender norms and roles. Another work by Gillespie and Cornish (2010) examines the effects of gender representation in virtual environments on user behaviours and attitudes. The study highlights the potential for VAs related to gender to trigger perceptions of gender norms.

Various researchers in the relevant area have examined how the gendering of VAs reinforces traditional gender roles and stereotypes. Research by Miller (2017) highlights the portrayal of female VAs as compliant, considerate, and polite advocating social biases. The gendering of the VAs has a significant impact on the user's intentions and behaviours. For example, users can express preferences and beliefs based on the perceived gender of VAs. Lee et al. (2020) affirm the phenomenon in their study on 'gender stereotypes and perception', that preexisting gender bias affects users' interaction with gendered VAs. For instance, users may indicate a preference for the female voice, which may be influenced by the stereotype portraying women as nurturing, obedient, and supportive.

Noble (2018) accentuates how the design choices of VAs can cause gender discrimination and inequality. The VAs are programmed using datasets that may reflect the societal bias which in turn influences the interaction with the VAs. Therefore, an ethical framework is crucial to address the gender bias in VAs ensuring unbiased outcomes. Kim et al. (2019) examine the perception and engagement of the users with the VAs based on their gender presentation, impacting user experience and satisfaction. Various factors such as language use, tone, voice, and perceived personality tests, shape users' perception of VAs. Studies in the relevant suggest mitigating gender bias in VAs providing options for the users to select the gender of the VA.

Methodology

The present study employs a multifaced approach to study the gendered voice of VAs and its linguistic implications in digital communication. The study takes into account well-known VAs such as Siri, Alexa, Google Assistant, and Cortana. Interaction with the VAs is a significant part of the data collection process to capture instances of gendered language, stereotypical representations, and other manifestations of gender bias. The study explores the linguistic design of VAs to identify the themes and patterns related to gender representation with the use of qualitative analysis. The analysis helps with potential interventions and strategies to lessen gender bias in VA interactions.

The findings of the study contribute valuable insight to support inclusive communication practices in the digital era to promote linguistic equity.

Communicative Theories and Gender Bias in Language Use

Pragmatic Approaches: Gricean Maxims and Politeness Theory

Grice (1975) outlines the foundation of cooperative principles in his maxims; the four principles- quantity (providing enough information), quality (being truthful), relation (being relevant), and manner (being clear and concise). Grice examines how context influences meaning in communication, though several studies indicate that gender can be expressed through deviation from these precepts. Numerous studies have consistently demonstrated that men and women have distinct communication styles. The variation in their styles results from how they adhere to these principles and principles. For instance, men are more likely to convey power and assertiveness in their language than women. This leads to a potential violation of Brown and Levinson's politeness principle (1987). In the politeness theory framework, gender has a significant role in shaping linguistic practices. Males and females employ different politeness strategies for communication, where men tend to be direct and assertive; women use more indirect and mitigated language (Lakoff 1975).

It is significant to understand the association between Gricean Maxim, gender-specific communication style, and politeness theory, to examine how language usage reflects gender bias in communication.

Sociolinguistic perspective: Genderlect and language variation

Studies in the area of sociolinguistics have contributed significantly to uncovering genderlects. Genderlect plays a significant role in shaping communication patterns and reinforcing gender stereotypes. The gender differences in the communication styles contribute to various misunderstandings and misinterpretations (Tannen 1990). Eckert's research (2000) highlights the correlation between gender, social characteristics, and linguistic qualities. The study illustrates that language use is not monolithic but varies across social contexts and identities.

Lakoff (1975) explains how language perpetuates and reflects gender inequality. The use of certain linguistic features such as 'hedges' and 'tag questions' reflects how female speech is marked by politeness and uncertainty. The sociolinguistic perspective of language contributes significantly to the understanding of the complex ways in which gender influences languages and vice versa.

Exploring the gendered language

Gender bias is significantly evident in communication with the VAs'. The default female voice and the names of several well-known virtual assistants reflect the prejudices and the social standards associated with gender. It is important to understand and identify the trends to promote diversity in the digital world.

Numerous studies have shown that humans have a predilection for female voices, a tendency that stems from early developmental experiences (Wu et al., 2009; Ul-Haq et al., 2023). Recent research in the relevant areas has revealed an inclination toward female synthetic voices in AI applications too (Lauriello et al., 2019). However, as this study highlights, these choices unintentionally reinforce gender stereotypes in VA designs. It is important to understand that everyone, regardless of gender, may communicate well, even though variables like vocal cord tension and cultural communication norms may influence the perceived clarity in female voices (Pliner et al., 1995). The significance of gender inclusiveness in AI is overlooked as Emphasizing these preferences alone neglects the importance of gender inclusivity in AI development.

Repetitive responses such as "I am sorry", "I apologize" or "I am not sure" support the stereotype of women not being assertive in communication. The apologetic tone of the VAs perpetuates the stereotype that women are submissive and accommodating. Regardless of gender, if the VAs' default responses were assertive, they would challenge the stereotype and promote a more balanced perspective on communication. The Vas occasionally uses overly familiar and flirtatious language responses. For instance, making any playful remark or calling the user sweetheart might support the notion of women being less assertive, and they primarily exist to entertain and please others. Several VAs have previously been subject to users' rude remarks and verbal abuse without strong disapproval. Moreover, female-voiced VAs employ more accommodative language while declining a request, reinforcing the conventional gender norms of subversiveness and nurturing. For example, VAs respond to insults with deflection, humour, or playful flirtations instead of setting limits. This normalizes the inappropriate behaviours and reduces the female to an object rather than recognizing it as an individual worthy of respect.

By depicting VAs in limited light, such as submissive, apologetic, or overly accommodating, the technology sector not only supports but strengthens the gender role. This makes the situation difficult for women to be seen as capable and assertive in personal and professional settings. The tendency to minimize women's contribution and view them through a submissive lens harms their opportunities and advancements in different sectors. Such portrayals are not only damaging but also lose the potential to exhibit female AI VAs as dynamic and intelligent holding a position of authority. It affects users' opinions and interactions with women in a real-world setting and helps create a welcoming and inclusive environment for women in the IT industry.

The gendering of Virtual Assistants: A closer look

Gender prejudice has affected many popular VAs, whether it is intentional or unintentional. Nevertheless, the female voice and character are closely aligned with the intrinsic nature of the VAs even though some assistants offer speech options. One must be informed about such biases that have been displayed in several forms, whether it is their linguistic design or the way they are talked to.

Default female voice: The default female voice of the VA is often feminine. It is a complex issue that potentially may have an impact that goes beyond individual choices.

The human brain is wired to make quick decisions and categorize information based on various signals such as voice pitch, tone, and intonation (Benjamin et.al. 2018). Research in this area has shown that users may mistakenly believe that VAs are female because higher-pitched voices are frequently linked to femineity and can evoke subconscious characteristics such as helpfulness, nurturing behaviour, and submissiveness (Smith 2019). Unintentionally, the default use of female voices in VAs reinforces societal and cultural prejudices against gender norms. When users often engage with assistants mostly voiced by females and are presented as "helpers", they may support the psychological connection between femineity and submissive positions. This backs to sustaining negative preconceptions about women in society.

Feminine names and phrases: The idea of a gendered perspective on women is influenced by the commonly used feminine pronouns such as "her" and "she" to refer to VAs. The default linguistic choices such as "I am sorry! I didn't quite catch that", "She can help you with that", or "Ask her to set a reminder", reinforce the feminine identity of the VAs.

Alexa, Siri, and Cortana are the names that are typically associated with women and people tend to see them as feminine. Moreover, certain commands like "Ask Alexa, if she knows the weather forecast?", "She is waiting to help you", and "She is ready to assist" are some common expressions that lead to the stereotype of these VAs as female assistants. Though there is an option for the users to select different options, the default setting is that of a female voice. Expressions like "tell her", and "ask her" are often used while interacting with them representing gender bias.

"She's ready to assist" or "Ask her for the weather", such common expressions contributed to a gendered perception of these VAs as female assistants. Users may choose different voices, but the default is often associated with a feminine tone. Even the wake word for Amazon Alexa is perceived as female. The common phrases used when interacting with them like "ask her", and "tell her", contribute to gender portrayal.

Limited representation: Limited representation of female voices in VAs' voices can lead to feelings of exclusion and support gender biases. It potentially harms the specific user populations, specifically children in a developmental stage who regularly interact with technology are sensitive to what they see and hear, and may adopt the prejudices propagated by technology. If they consistently hear a female voice in a submissive role, they might unconsciously begin to associate women with submissive roles. Children as young as two years old start forming gender stereotypes and exposure to such biased technology can strengthen these stereotypes (Hammack and Manago, 2024). When youngsters hear only female voices working on instruction and providing assistance they might develop a skewed perception of gender roles.

When the voice of the VAs is predominantly female, other users may not identify themselves with the voice. Employing female voice as default embeds gender stereotyping, suggesting that females are more suited for subordinate and service-oriented roles. However, users who identify themselves as non-binary or other gender feel alienated due to their lack of representation. offering a wide variety of speech options that include different genders, accents, and tones can help users feel represented and respected.

Implications and consequences

The persistent representation of VAs as female has a significant impact on society, especially when it comes to gender stereotypes. There is a possibility that such portrayals, primarily identifying women as domestic and submissive may normalize the idea that women are more suited for assisting roles and not leading roles. The underrepresentation of women in higher-ranking jobs across numerous industries might worsen if gender prejudices are normalized. It perpetuates a cycle where males hold a position of authority and d women are regulated to subordinate positions. In addition to limiting women's chances across various industries, these old gender norms also subtly influence users' expectations and views of gender roles in both virtual and real-world contexts.

The representation of VAs as female significantly impacts users' behaviour, attitude, and interaction. It may have potential implications for how people view and relate to women in the real world. Numerous studies in this field indicate that the way women are portrayed in technological interfaces affects how people feel

and act toward women. The users may lose their sensitivity to gender prejudice and stop challenging the idea that women should play submissive roles. Furthermore, the objectification of women as assistants or helpers in the virtual world may come to be seen primarily in terms of utility or support rather than recognizing their agency and authority. It leads to a dismissive attitude toward women's competence and capabilities reinforcing gender disparity in professional and leadership settings.

Path towards change

It is important to promote gender inclusiveness and representation in technology. Breaking away from the default female persona associated with the VAs can be accomplished partly by including a non-gendered voice and also by providing diversity in terms of the voice of the VAs. Moreover, an inclusive environment may be achieved by substituting gender-neutral pronouns like "they" and "them" with gendered pronouns such as "her" and "she". Giving consumers an option to customize and personalize their VAs following their preferences may help eradicate negative preconceptions and promote equity in society.

Unconscious bias in VAs can be tackled through ethical designs and thoughtful decision-making. The developers need to be aware of such biases and should make conscious efforts to avoid them. Prioritizing inclusive designs from the beginning can prevent the creation of VAs that reinforce stereotypes. reinforcement of detrimental stereotypes. This approach will foster VAs that represent gender and diversity and prioritize ethical considerations truly. Ultimately such efforts will pave the way for an equitable and inclusive environment with such efforts.

Conclusion

The persistent gendering of VAs underlies serious concerns regarding the stereotype and its potential influence on the preconceptions and interactions of the users with VAs. Recognizing and resolving this issue with VAs calls for more than simply technological tweaks and providing a wider range of voice and personal possibilities. Incorporating communication theories and principles at the time of design and development is important. The communicative theories emphasize that communication is bidirectional and that context, clarity, and empathy are critical components of good communication. The communicative theories may help in better understanding the need and preference to meet diverse communicative styles. It can create an experience inclusive and respectful of users' identity and cultural background.

To bring attention to this unconscious prejudice, it is noteworthy that technology companies are increasingly making efforts to provide their customers with more customization processes. It includes the ability to choose the gender of the VAs s per their preference and convenience. The consistent use of feminine pronouns and allusions reinforces the linguistic association between VAs and gender. The technology industry offers a variety of voice options that include male and gender-neutral choices; however, users' preferences seem to gravitate towards female voice and persona. Interestingly, some users find the excessive politeness unsettling, suggesting a desire for a broader range of communication styles beyond the stereotypical feminine persona.

VA designs thrive on cultural sensitivity. Variations in the design, language, and tone across cultures demand attention. What signifies confidence and leadership in one culture might be perceived as an indicator of authority and assertiveness in another. An indirect, polite approach might be preferred to maintain harmony. Respecting these subtleties ensures the tone of the VA and the persona resonates with users' expectations. the user.

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