
Increasing transparency to design inclusive Conversational Agents (CAs)

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Abstract

Artificial Intelligence (AI)-based Conversational Agents (CAs) have a great potential to include marginalized and vulnerable populations. However, some issues still make these interfaces exclusive for some users. In this position paper, we aim to highlight how increasing CAs' transparency can contribute to these systems' inclusiveness and indicate open issues that must be addressed to make AI-based CAs more transparent and inclusive. We argue that adding more guidance to users on how CAs work, what they can do, and how they may be operated might alleviate older adults' misperceptions about functioning and privacy that hamper CAs' adoption, facilitate its usage for people with impairments, and help identify possible prejudicial biases. As challenges, researchers and practitioners should investigate how to determine appropriate levels of transparency through personalization, produce human-centered knowledge on transparency, and study new methods, tools, and processes to support CA development that considers inclusiveness.

Author Keywords

Conversational Agents; Inclusive Design; Artificial Intelligence; Transparency.

CSS Concepts

• **Human-centered computing~Interaction Design**; *Interaction Design process and methods*; User centered design.

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Introduction

Artificial Intelligence (AI)-based Conversational Agents (CA) are growing in popularity and have a great potential to foster diversity and the inclusion of marginalized and vulnerable populations. For example, AI-powered Voice Assistants (VAs) such as Siri and Alexa allow eyes and hands-free, straightforward interaction, which supports inclusiveness. These characteristics have been shown to make interactions easier for people with intellectual disabilities [1], improve the independence of people with visual and motor impairments in their everyday life [11], and make interactions simpler for older adults [5].

Nevertheless, there are still some open issues that impend CAs' inclusiveness. People with visual impairment often face discoverability issues with VAs, struggling to discover and learn new apps and advanced commands since information is sometimes displayed on the VAs' (non-auditory) app [11]. A similar issue has been indicated in studies that assessed older adults' perceptions of CAs and identified that these users find it effortful to discover or explore features [14, 15], resulting in misconceptions about how the VA operates [5]. Likewise, deaf and hard-hearing users of smart assistants believe these devices' multimodal feedback (e.g., sounds coupled with lights) to be insufficiently informative [2]. Finally, privacy concerns have been an open issue impeding the adoption of CAs by older adults [5, 15].

To tackle these issues, in this position paper, we argue that increasing AI-based CAs' overall transparency is essential to practicing inclusive design. We also aim to indicate open issues around this topic that researchers and practitioners should address.

Transparency and Inclusive Design of CAs

Deriving from seminal literature on HCI and usability, transparency can be understood as a way to design a product by adding features – such as affordances, cues, or feedback - that allow users to understand its functioning, processes, and components [4, 9]. A growing body of literature has advocated the need for transparency to make AI systems Human-Centered [e.g., 13] and enable inclusive design [e.g., 8]. This section discusses how increasing transparency might improve CAs and mitigate usage barriers for marginalized and vulnerable user groups.

Firstly, a trial-and-error approach to learning AI systems can be exclusive for some users who might need guidance, such as people with visual impairment [11] and older adults [14]. Similarly, Sin et al. [14] argued that CAs should provide more guidance for older users about their initial setup and its general functioning. Such an effort might help address older adults' misconceptions about CAs' operation that hamper adoption [5] since voice interfaces with increased discoverability and guidance have been demonstrated to improve performance and error recovery for the general public [6].

Working towards transparency might also contribute to mitigating older adults' privacy concerns. As previously shown [3], users are generally unaware of privacy-related information such as data collection, storage, and sharing, which consequently impacts their trust in the CA. Hence, clarifying CAs' functioning processes might lead to a better understanding of privacy-related processes and alleviate older adults' concerns.

Finally, transparency in how AI-based CAs work and make decisions is also imperative for design teams to avoid exclusive and prejudicial biases. Microsoft [8] explains that bias in AI is bound to happen and that developers should be able to recognize where and how bias affects the system. To this end, an increasing number of publications discuss applying explainability approaches or eXplainable AI (XAI) methods that improve transparency by enabling systems to explain their processes and decision-making [7].

Open Issues

Despite the potential benefits of increasing transparency for AI-based CAs' inclusiveness, some open issues still need to be addressed. Below, we present some gaps that can contribute to the workshop's discussion:

Excessive transparency and personalization: While transparency is beneficial, excessively presenting information for users might backfire. Voice outputs are naturally slower than visual information, and thus interactions can become boring and slow if too much information is provided [6]. Determining how transparent a CA should be is a challenge for inclusive design since users need guidance on different levels [8] and formats [2]. A solution may be to allow users to personalize how much, when, and how they receive information about the CA. For instance, experienced users might prefer to skip instructions, but these should be offered to people who are still learning to interact. Letting users choose a preferred information modality – or a combination of them – (e.g., visual, auditory) may also be considered to support users' varying capabilities and characteristics. Working towards making CAs adjustable to varied needs is essential for inclusive

design since it aligns with the idea that products should be designed to accommodate all people from the start [10].

Producing knowledge on transparency and explainability for AI systems: As mentioned, XAI and explainability techniques and methods have been progressively discussed in the literature. Nevertheless, efforts in this direction have been directed to the technical aspects of development rather than Human-Centered requirements. Thus, it is crucial to produce knowledge about user requirements and inclusiveness. Researchers may investigate how users with varying characteristics understand the information presented by CAs, their preferred modalities (e.g., totally visual or auditory), their goals in performing tasks and how they should dictate the way information is presented, adequate levels of vocabulary complexity, and so on.

New development methods and processes: As mentioned, an inclusive design must be planned from the initial stages of product development [10]. Similarly, the self-explanatory capacities that foster transparency in AI systems must also be decided from the start [7]. Such novel development requirements call for HCI specialists and User eXperience (UX) designers to work with system developers to ensure transparency and inclusiveness. These professionals should be able to communicate and make joint decisions about CAs, which demands a homogeneous understanding of how the systems work and why user requirements should be employed. However, UX designers and system developers often work separately in AI systems, with UX designers focusing solely on UX derived from a User Interface rather than from the AI system as a whole [12]. Therefore, practitioners and

researchers should explore new methods, processes, and tools to integrate all team members and skills involved in developing CAs to support communication and understanding and, consequently, transparency for inclusiveness.

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