

Chapter 2

Chatbot Design Challenges and the Effect on User Behavior


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ABSTRACT

Chatbots are efficient artificial intelligence tools employed frequently across various industries such as healthcare, tourism, entertainment, and education, to assist in performing repetitive activities requiring a conversation, thereby facilitating humans to focus on more innovative tasks. This chapter reviews the design challenges of two types of chatbots classified based on their interaction modes: dyadic chatbots interacting with one individual at a time; and polyadic chatbots interacting with multiple individuals simultaneously. Further, the chapter identified the associated challenges in the chatbots, namely: engagement, trust, and human likeliness based on personality types - at a higher level in the chatbot design, together with the impact of each challenge on the user behavior. The authors review the literature in the relevant areas to pinpoint the research gaps requiring more focus within each area of challenge. The research community can address these identified research areas, which will eventually promote a more efficient human-machine collaboration.

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INTRODUCTION

Chatbots have become prevalent in various industries, including tourism, education, healthcare, and education, as they can simulate a uniquely human activity, conversation. Recent advances in artificial intelligence gave rise to natural language processing (NLP) which accelerated the growth of chatbots. For example, chatbots can now comprehend language and analyze emotions. As such, researchers are increasingly developing more human-like chatbots. However, despite the rise in chatbot adoption and recent advances in its design, many challenges remain open for researchers to tackle. The dyadic chatbots involve one-on-one conversations with a human user (Kim et al., 2019), and several issues and concerns have emerged in the literature. For instance, to design empathetic chatbots, various researchers developed frameworks that incorporate context and use emotion sampling and imitation (Majumder et al., 2020), while other researchers developed machine learning techniques that enhance intent prediction and language processing (hum et al., 2018).

For polyadic chatbots, conversational agents that mediate human-human conversations and involve multiple parties, various challenges have been reported in the literature (Tegos et al., 2015). For instance, such chatbots are often ignored or mistreated by the users, or even worse, they may be considered intrusive (Tegos et al., 2015). Moreover, various researchers raised the concern that several polyadic chatbots need to use social cues to be accepted by human users (Liu et al., 2018). Nevertheless, building a chatbot with full comprehension capacity is still challenging. As such, researchers continue to explore modeling empathetic conversation, memory, and knowledge, to improve the quality of chatbots. Researchers have also explored the effect of chatbot design on human behavior, in particular, user engagement, usage intention, trust, and perceived authenticity. For example, research shows that there is a positive relationship between trust and anthropomorphism of chatbots (Lee et al., 2021). Similar relationships can be found for other behavioral aspects. Moreover, the effect of chatbot personality has also been assessed (Kulkarni et al., 2015), with the results showing that users favor agreeable chatbots.

This chapter sums up the design challenges of dyadic and polyadic chatbots and how the chatbot design configuration affects user behavior. The first section of this chapter provides a succinct overview of the research design challenges in dyadic and polyadic chatbots, while the second section summarizes the latest research on chatbot design's impact on user behavior. Finally, we conclude by providing the main insights of the chapter.

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