

Anthropomorphism of AI Chatbots and Loyalty: the impacts of Perceived Empathy and Task Complexity

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Abstract

Anthropomorphic (human-like) language has become a central feature of AI chatbots, shaping how users perceive and experience them. This research aimed to understand how it shapes customer loyalty and how perceived empathy and task complexity influence this relationship. A 2x2 between-subjects online experiment was conducted, manipulating chatbot anthropomorphism (emotionally expressive versus non emotionally expressive language) and task complexity (high versus low). A total of 324 people participated in the experiment, and the results showed that anthropomorphism significantly increased perceived empathy, which in turn enhanced loyalty. However, anthropomorphism also has a negative direct effect on loyalty. Creating a competitive mediation pattern in which empathy partially reduces this negative impact. Task complexity did not moderate the relationship between anthropomorphism and perceived empathy. These findings suggest that anthropomorphism alone is insufficient to foster loyalty and that empathetic expression is essential. Therefore, it highlights the importance of designing chatbots that communicate emotional understanding.

Keywords: chatbots, task complexity, empathy

Track: Digital Marketing & Social Media

1. Introduction

Anthropomorphism, the attribution of human-like characteristics to non-human entities, can have a significant impact on the way users perceive and interact with technology (Epley et al., 2007). Although anthropomorphic (human-like) characteristics in AI-powered chatbots are becoming more common, there remains a lack of clarity about how these anthropomorphic (human-like) characteristics influence customer loyalty, specifically in terms of chatbot reuse intention, within a customer service context.

Research has explored the role of anthropomorphic features in AI-powered chatbots on user and customer satisfaction. For instance, (Zheng et al., 2023) demonstrate that anthropomorphic features in AI-powered chatbots lead to higher perceived warmth and competence, which in turn boost user satisfaction. Similarly, Klein & Martinez (2023) the significant potential of anthropomorphic cues in AI-powered chatbots, showing they are positively linked to customer satisfaction. However, there is limited research on how anthropomorphism in AI-powered chatbots affects customer loyalty, specifically regarding a customer's intention to reuse the company's chatbot for future communication.

Not only is the direct relationship between anthropomorphism of AI chatbots and customer loyalty valuable, but also the roles of task complexity and perceived empathy are worth exploring. Since anthropomorphism features may influence perceived empathy, which in turn can foster stronger relationships with the chatbot. In this study, customer loyalty is defined as a customer's willingness to reuse the firm's chatbot for future interactions with the company. Research has shown that repeated chatbot use boosts customer confidence in the organization, which in turn fosters customer loyalty (Jenneboer et al., 2022).

Moreover, as chatbots are deployed on an increasingly large scale, they also face more complex tasks, making it harder to deliver good performance and ensure user satisfaction (Juquelier et al., 2025). However, the perspective of task complexity has also not yet been explored in this context. This research aims to fill this gap by focusing on the anthropomorphism of AI-powered chatbots and the direct impact on customer loyalty, as well as the influence of task complexity on the relationship between chatbot anthropomorphism and perceived empathy.

This study contributes from both managerial and academic perspectives. From a managerial point of view, this research offers valuable guidance on leveraging the anthropomorphism chatbot design to enhance customer loyalty. By examining the relationship between anthropomorphism, perceived empathy, and the moderating role of task complexity,

this study provides insights into how specific anthropomorphism features in chatbots influence customer loyalty and promote positive customer service experiences. This enables companies to refine their chatbot design and strategies to optimize both customer loyalty and long-term business success. To further elaborate, by understanding the anthropomorphising of AI chatbots and task complexity, chatbots can be better customised to match the level of task complexity, helping companies enhance the customer experience. This leads to more efficient resource allocation and higher customer satisfaction.

Academically, while research on AI chatbot anthropomorphism is expanding, its influence on customer loyalty and the moderating effect of task complexity remains underexplored. This study will extend the current research by exploring how anthropomorphism of AI chatbots influences perceived empathy, and customer loyalty. Additionally, examines the moderating role of task complexity in the relationship between anthropomorphism of AI chatbots and perceived empathy. This research aims to address the gap concerning the moderating role of task complexity and its impact on customer loyalty. Moreover, it contributes to the literature on anthropomorphism and chatbots by extending its application to the specific context of customer service.

By examining these dynamics, this research provides novel insights into how AI chatbot anthropomorphism influences customer loyalty, either strengthening or weakening customer loyalty. Thus, this study not only addresses a gap in AI chatbot anthropomorphism research related to customer loyalty but also enhances the theoretical understanding of the impact of task complexity, offering a valuable new perspective.

2. Literature Review

Chatbots that ensure high quality increase customer satisfaction and loyalty through quick response times, accurate information, and ease of use (Jenneboer et al., 2022). Additionally, chatbots that are able to build trust and provide a positive experience are more likely to drive repeat purchases or continued use (Chen et al., 2023). Konya-Baumbach et al. (2023) shows that the anthropomorphism of AI chatbots leads to increased user trust. This effect is mediated by social presence, which means that the perception of a chatbot as socially present drives the positive effects of anthropomorphism on customer outcomes. Given that anthropomorphism of AI chatbots leads to increased trust and positive customer outcomes, such as purchase intention and satisfaction, this could strengthen customer loyalty.

Moreover, many studies show that anthropomorphizing of AI chatbots leads to higher user satisfaction (Klein & Martinez, 2023; Konya-Baumbach et al., 2023; Xu et al., 2023; Zheng et al., 2023). Research by Hsu & Lin (2023) shows that user satisfaction leads to greater loyalty. In other words, satisfied users are more likely to continue using chatbot services and remain loyal to the brand (Cheng & Jiang, 2020). In a service context, this means that when a chatbot effectively addresses customer needs in the short term, it results in stronger customer loyalty in the long run (Lian & Lian, 2023). Based on these previous findings, **Hypothesis 1** states that **anthropomorphism of AI chatbots directly increases customer loyalty**.

In this study, the focus is on perceived empathy, and this refers to how empathy is perceived by another person. The impression a person may have of how empathetic the chatbot is. Although AI chatbots are not persons and lack genuine emotions, they can simulate empathetic responses by using human-like language and adapting to user input. According to Ma et al. (2025), the human characteristics of chatbot avatars have a positive influence on perceived empathy. In other words, the more human the chatbot looks and behaves, the more users perceive the chatbot as empathetic. In addition, research by Al Farisi et al. (2022) shows that anthropomorphic design increases the direct empathy experienced from chatbots in both verbal and non-verbal ways.

Gkinko & Elbanna (2022) has stated that employees experience emotions when interacting with AI chatbots at work, and that these emotions influence their use. In addition to frustration and satisfaction, users may also experience emotions related to connection, such as empathy, fairness, and forgiveness (Gkinko & Elbanna, 2022). These emotions are influenced by the chatbot's social interactions and its ability to learn and adapt. In addition, empathy is a crucial component within AI systems, as it enhances their effectiveness, increases user engagement, and fosters trust and acceptance (Hitos-García et al., 2025). Users are more likely to feel emotionally connected and willing to use the chatbot when it comes across as personal and human for example, through a natural tone, empathetic responses, and recognizable emotions (Kim & Hur, 2024). Based on previous research, the following **hypothesis 2** is proposed: **anthropomorphism of AI chatbots positively influences perceived empathy**.

According to Wood (1986) task complexity is determined by three primary dimensions: the amount of information that needs to be processed, how this information is related, and how the information should be converted into an appropriate result. High task complexity often demands greater effort, expertise, and adaptive strategies to manage and

achieve desired outcomes effectively. Furthermore, Cheng et al. (2022) demonstrate that the complexity of tasks varies depending on the stage of the customer journey. The pre-purchase stage often involves relatively simple information requests, while the post-purchase stage involves more complex requests, such as returns or resolving issues (Cheng et al., 2022).

Based on cognitive load theory by Sweller (1994), it can be expected that complex tasks increase cognitive load. Users then seek more support and human signals to reduce their uncertainty. Anthropomorphism of AI chatbots can help with this by showing a sense of humanity and understanding. According to Nass et al. (1994) people apply to chatbots the same social rules they usually use when interacting with other people. Small social cues, such as language, are enough to elicit that behaviour. The research also implies that more complex interactions will reinforce this tendency (Nass et al., 1994). In addition, Berger and Calabrese (1975) state that the more uncertainty someone experiences, the more information they seek. Uncertainty makes decision-making emotionally heavier (Lerner et al., 2015). Therefore, people that face more complex tasks experience more uncertainty and this can increase their need for support and their reliance on social and emotional cues.

Based on previous research, it can be expected when chatbots are involved in more complex tasks, users are likely to perceive pay attention to emotional cues, which can further enhance the perception of empathy. In contrast, for simpler tasks, users may focus more on efficiency and functionality, making anthropomorphic features less salient. Therefore, the following **hypothesis 3** is formulated: **task complexity moderates the relationship between anthropomorphism of AI chatbots and perceived empathy**, such that the relationship is strengthened when the task is perceived as more complex.

3. Method

This study employs a 2 x 2 between-subjects design: the anthropomorphism of AI chatbots (emotionally expressive language vs. non-emotionally expressive language) and task complexity (high task complexity vs. low task complexity). The scenarios were pre-tested, and all manipulations worked as intended. The manipulation check for perceived anthropomorphism was adapted from Moussawi et al. (2019) and for task complexity was adapted from Morgeson & Humphrey (2006). This study was approved by the Economics and Business Ethics Committee (EBEC), University of Amsterdam (approval number: EB-18565).

The final sample size for the analysis was 324 respondents (56.2% Female, with a mean age of 35 years old; SD = 14,5), with 78 cases or more per scenario. The questionnaire

was designed using Qualtrics and distributed through convenience sampling combined with snowball sampling, and platforms of respondents (e.g., Survey Swap, Survey Circle and Prolific). Participants were excluded if they were unable to complete the questionnaire, did not accept the informed consent, or for failing the attention check. Participants randomly viewed one of the four chatbot conversations (in the context of customer service). Immediately after they saw the conversation, they were asked to answer an attention check question. In this study, a memory recall question was used as an attention check for the main study questionnaire regarding the topic of the conversation (a lost package, stock of the product, and I don't remember). Participants were then instructed to answer the scales addressing perceived empathy (Schmidmaier et al., 2024), and customer loyalty (adapted from Homburg et al., 2009). After these questions, the control variables were also included measuring participants' attitude towards AI adapted from Stein et al. (2024) and their familiarity with chatbots adapted from Gefen (2000) age, gender, and educational level. All variables showed high reliability with value of Cronbach's alpha above the threshold of 0.70. Assumptions of normality and linearity were checked. Overall, the results show that the three variables are reasonably normally distributed.

4. Results

To test our hypothesis, a moderated moderation analysis was performed using Hayes' PROCESS macro 5.0 (Model 7). The results (Table 1) indicate that task complexity did not significantly influence the effect of anthropomorphism on perceived empathy. Specifically, the interaction between anthropomorphism and task complexity was not significant ($p = 0.48$). However, the direct effect of anthropomorphism on perceived empathy was significant, and the effect of perceived empathy on customer loyalty was also significant. The findings therefore suggest that anthropomorphism and perceived empathy have a direct effect on loyalty, but task complexity may not enhance this relationship.

Table 1: overview moderated mediation analysis

Variable	Coeff.	SE	t	p
Perceived Empathy				
Constant	17.93	2.6670	6.72	0.0000
Anthroporphism	21.02	3.7837	5.55	0.0000
Task Complexity	10.18	3.7151	2.74	0.0065
Interaction (Anthro x Task)	3.75	5.2703	0.71	0.4773
Customer Loyalty				
Constant	4.37	0.1185	36.89	0.0000
Anthroporphism	-0.39	0.1540	-2.54	0.0116

Perceived Empathy	0.02	0.0029	7.19	0.0000
Indirect Effect (Anthro -> Empathy -> Loyalty)	0.43	0.1033	4.18	0.0000
Index of Moderated Mediation	0.08	0.1098	0.70	0.4773

Note. N = 324. Number of bootstrap sample for percentile bootstrap confidence intervals: 5000. Level of confidence: 95

It is interesting to note that the results show evidence of competitive mediation. The indirect effect of anthropomorphism on loyalty through perceived empathy is statistically significant but has the opposite sign of the direct effect. The direct effect of anthropomorphism is negative, while the indirect effect is positive. This means that anthropomorphized chatbots have a positive effect on loyalty, if they are perceived to be empathetic. Perceived empathy can partially offset the negative effects of anthropomorphized chatbots. Consequently, we provide support to H2 but not H1. This result contradicts the literature that states that anthropomorphism alone would have a positive effect on loyalty (Klein & Martinez, 2023; Konya-Baumbach et al., 2023; Xu et al., 2023; Zheng et al., 2023). We also could not provide evidence that task complexity mitigates or strengthens this effect.

5. Conclusion

Anthropomorphic (human-like) AI-powered chatbots are more present than ever in people's lives, as organisations across industries increasingly adopt AI-powered chatbots to enhance customer interaction and efficiency (Misischia et al., 2022). Technology is incorporating human-like characteristics to engage users. ChatGPT, Gemini, among other conversational AI, explore emotional expressive language to create a feeling of proximity with users. Companies alike use this strategy in their chatbot. Our study focuses on these anthropomorphic (human-like) characteristics influence customer loyalty, specifically in terms of chatbot reuse intention in a customer service context. To best of our knowledge, there is limited research on anthropomorphism in AI-powered chatbots and customer loyalty (H1). Besides this direct effect, our study explored both the mediation of perceived empathy (H2) and the moderation role of task complexity (H3).

Our results show that anthropomorphized chatbots have a negative and not positive effect on loyalty (or intention to reuse). What seems to be contracting to both literature and the reality of widespread use of AI, might be explained by the mediation of perceived empathy. Anthropomorphized chatbots have indeed a positive effect on loyalty, however, only if they are perceived to be empathetic. This aligns with prior research showing that

anthropomorphic chatbots enhance perceived empathy (Al Farisi et al., 2022; Janson, 2023). This means that perceived empathy partially cancels the negative effect of anthropomorphized chatbots. We encourage future research on the role of task complexity in mitigating or strengthening this effect. Even if our study could not detect a significant effect, there is robust support in the literature that inspires further empirical tests (Cheng et al., 2022). The lack of significant results in our study might be related to our limitations (e.g., convenience sampling method, sample size and composition) that future studies can overcome.

This study contributes to both practice and literature by providing evidence that, contrary to past research, solely using human-like characteristics might not improve loyalty if there is no perception of empathy. Prior studies consistently showed that anthropomorphism enhances trust, satisfaction, or warmth (Cheng et al., 2022; Klein & Martinez, 2023; Ma et al., 2025; Zheng et al., 2023), but these effects may not translate into loyalty without empathy. Companies need to design their AI chatbots in a manner that validates the user's emotions. The study provides empirical evidence of a phenomenon that is discussed in traditional media and social media about conversational AI. These technologies are programmed to validate and prize users with the goal of keeping users engaged. Our study shows evidence of that effect, which also warrants ethical considerations that can be explored in future studies.

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