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The Influence of Anthropomorphic Chatbot Design on Consumer Tolerance of Service Failures: The Mediating Roles of Attachment and Cognitive Dissonance

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ABSTRACT

Problem statement: The widespread use of chatbots in hospitality and tourism leads to inevitable service failures. Although research has investigated the influence of chatbots` anthropomorphic cues, comprehending how distinct anthropomorphic cues influence user behavior in service failure is still limited.
Methodology: To explore how the anthropomorphic design of chatbots affect user`s tolerance for service failure, this research conducts a 2 (anthropomorphic appearance: 3D vs. 2D) x 2 (language style: informal vs. formal) x 2 (interdependent self-construal: high vs. low) between-subject online experiment.
Result: Results show that the congruent anthropomorphic cues of chatbots can significantly improve consumers ' tolerance, where attachment mediates this process positively. Additionally, the interdependent self-construal level plays a positive moderating role in this process.
Implications: This study contributes theoretically by explicating anthropomorphism in attachment and cognitive dissonance theory and extending the understanding of self-construal theory. Moreover, the study provides recommendations for managers to design effective anthropopathic chatbots.

Keywords

Chatbot, anthropomorphism, service failure, cognitive dissonance, attachment, interdependent self-construal.

INTRODUCTION

In the digital age, chatbots, powered by artificial intelligence, are widely employed for their ability to engage in natural dialogues with humans and provide efficient services. The tourism industry, which is experiencing a rapid post-COVID-19 recovery, especially relies on chatbots to alleviate labor service pressure and cut costs (Li et al., 2021). However, the chatbot's technical limitations may lead to its inevitable service failure, such as failing to respond to consumer requirements and giving error messages. Moreover, the chatbot's lack of empathy may aggravate consumers' dissatisfaction during service recovery process (Gale & Mochizuki, 2019). While prior research has extensively explored service failures in the context of human service providers, chatbots may be perceived differently from humans (Pawlik, 2022; Zhang et al., 2023). Thus, consumer perceptions and responses to chatbot service failures are unique and warrant investigation. Research has shown that chatbot design significantly influences service experiences, with anthropomorphic cues being key features shaping positive consumer perceptions. However, the impact of these cues on service failure remains controversial (Choi et al., 2021). For example, informal language, as an anthropomorphic cue, was confirmed to enhance consumer attachment and mitigate service failure's negative effects (Cai & Law, 2022). In contrast, other research indicates that informal language may have opposing effects in certain situations (Chen et al., 2023). One possible reason for these conflicts is the incongruence among multiple anthropomorphic cues of chatbots. While past research has emphasized the impact of single anthropomorphic cues on consumer perceptions, little attention has been given to the congruence of multiple cues. In the highly interactive tourism industry, the congruence of chatbot design becomes especially critical in service failure, given the close attention consumers pay to service providers. Some anthropomorphic cues may enhance consumer attachment to chatbots, while others may cause over-expectations of chatbot's competence. Moreover, the incongruent combination of anthropomorphic cues may lead to inconsistent consumer perceptions. Consequently, understanding the role of anthropomorphic cues and their perceived congruence in shaping consumer tolerance for service failure is essential. Furthermore, understanding how consumers attribute service failure is crucial for managing dissatisfaction. Consumer dispositions related to self-construal significantly influence their responses to service failure, particularly in digital service encounters. High interdependent self-construal individuals may be more inclined to attribute blame to non-human providers during service failure (Fan et al., 2020). Therefore, comprehending the role of interdependent self-construal is essential. To bridge these gaps, we aim to investigate the following research questions:

RQ1: How does the congruence of multiple anthropomorphic cues in chatbot design influence the consumer tolerance of service failure?

RQ2: How does interdependent self-construal moderate the relationship between anthropomorphic cues and consumer tolerance of service failure?

In this study, we use scenario-based experiments to investigate the interaction of two anthropomorphic cues - appearance and language style to analyze their impact on consumer tolerance of service failure. We propose a dual-path model to study the influence process of such congruence on service failure tolerance. We also examine the moderating effect of interdependent self-construal in this interaction. The paper is structured as follows: The first section reviews relevant literature on chatbot service failures. Section two outlines the theoretical foundations and research hypotheses. Section three details the experimental design and procedure. Finally, we discuss the experimental results, contributions, and study limitations.

LITERATURE REVIEW

Related Work on Chatbot Service Failure

A chatbot is an artificial intelligence service agent that can communicate with consumers through natural language, and text-based chatbots are the most widely used type (Lv et al., 2021). Current research primarily focuses on chatbot design and function optimization, and factors influencing consumer acceptance (Brandtzaeg & Følstad, 2017; Cheng et al., 2022). Emerging research streams include chatbot service failures, prevalent in scripted hotel and tourism chatbots, leading to issues like command recognition errors and contextual misunderstanding (Chong et al., 2021). Moreover, the chatbot's lack of empathy and flexibility may aggravate consumers' dissatisfaction with the service recovery process (Gale & Mochizuki, 2019). Current research addresses these issues through compensation or manual intervention (Chong et al., 2021). Furthermore, chatbot anthropomorphic design has emerged as an effective service recovery strategy. Anthropomorphism involves adding human-like features to non-human entities (Epley, 2007). Current studies have shown that consumers' negative evaluation of service failure can be alleviated by imbuing chatbots with various anthropomorphic cues (Song et al., 2023). Anthropomorphic cues encompass two dimensions: formal realism and behavior realism (Miao et al., 2023). Formal realism cues involve human-like communication styles, such as informal language, which can elicit positive consumer responses by establishing emotional connections through everyday language (Keller, 2009; Cai & Law, 2022). Behavior realism cues, particularly anthropomorphic appearance, can significantly impact consumer perceptions, with 3D AI avatars having more human-like features yielding positive results (Song & Shin, 2022). Given these two dimensions of anthropomorphic cues, the congruence between anthropomorphic appearance and informal language may moderate user responses during service failures. According to the principle of cue consistency,congruent cues mayyield positive user responses, while incongruent cues lead to negative responses (Miao et al., 2022; Chen et al., 2023). Therefore, it is necessary to consider whether the congruence of these two cues will result in opposite consumer evaluations.

THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Impact of Congruence of Anthropomorphic Cues on Consumer's Tolerance

Anthropomorphism refers to attributing human-like traits to non-human entities, driven by sociality and effectance motivations based on one's knowledge of these entities (Epley, 2007). Social motivation in anthropomorphism theory highlights the need for simulating human-like interactions with non-human entities to establish emotional connections (Chen et al., 2015). Research indicates that increasing anthropomorphic cues in non-human entities enhances their human-like perception and emotional connection, satisfying social motivation and leading to positive consumer reactions like forgiving service failures (Hermann, 2021; Law et al., 2022). Besides, the congruence of these cues is another crucial factor for enhancing human-like perception. Studies show that consumers prefer congruent interface cues as they align with human schemas (Sundar, 2004). In brand anthropomorphism research, highly congruent anthropomorphic features in non-human entities boost consumers' brand attachment and foster a more positive attitude (Luo et al., 2016). In cases of service failure, chatbots with highly anthropomorphic appearances and informal language styles, displaying more anthropomorphic cues and congruence, are anticipated to mitigate consumers' negative service failure evaluations better. Thus, it is expected that:

Hypothesis 1a: In case of high level of anthropomorphic appearance of chatbot, the present of informal language style of chatbot will increase consumer`s tolerance of service failure.

Another aspect of the anthropomorphic theory is effectance motivation, which pertains to consumers' desire to enhance predictability and control over the behavior of non-human entities through anthropomorphism (Epley, 2007). When non-human entities display incongruent anthropomorphic cues, it can adversely affect consumers' state and increase perceptual uncertainty. Cognitive psychology suggests that consumers often use their initial impressions of an object as a frame of reference for evaluating subsequent performance (Gelman & Heyman, 1999). The low anthropomorphic appearance may activate the user's machine schema, resulting in lower performance expectations (Go & Sundar, 2019). Conversely, an informal language style may activate user`s human schemas and fostering relevant higher performance expectations (Go & Sundar, 2019). In the context of service failure, consumer expectations towards the chatbot and their actual experiences are pivotal in shaping perceptions. The incongruence of anthropomorphic cues can lead to consumer confusion, increasing perceived uncertainty and uncontrollability. Research has confirmed

that incongruent anthropomorphic cues within a unified entity may trigger cognitive biases among consumers, leading to more complaints and dissatisfaction (Miao et al., 2022; Chen et al., 2023). Thus, we anticipate:

Hypothesis 1b: In case of low level of anthropomorphic appearance of chatbot, the present of informal language style of chatbot will decrease consumer`s tolerance of service failure.

Mediating Effect of Attachment and Cognitive Dissonance

Attachment can be construed as an emotional connection between an individual and a specific entity (Mikulincer & Shaver, 2012). Research has demonstrated that individuals can form affiliations akin to friendships when engaging with non-human entities (Kim et al., 2022). The presence and congruence of anthropomorphic cues in non-human entities influences attachment's establishment and degree. Studies have shown that integrating more pronounced anthropomorphic social cues into chatbots can enhance emotional attachment (Hermann, 2022; Pentina et al., 2023). Interface congruence cues principle also indicates that non-human entities with congruent anthropomorphic cues deepen the perception of humanity, strengthening attachment (Sundar, 2004). Moreover, attachment between consumers and non-human entities can trigger positive responses. In the context of AI speakers, attachment plays a positive mediating role in the effect of human likeness on consumer purchase intentions (Kim et al., 2022). In service failure scenarios, users' attachment to non-human entities may lead to positive responses, such as increased forgiveness and continued use willingness (Law et al., 2022; Yim et al., 2022). Thus, it is expected that:

Hypothesis 2a: In case of a high level of anthropomorphic appearance of the chatbot, the effect of informal language style on the consumer's tolerance level is positively mediated by attachment to the chatbot.

Cognitive dissonance theory posits that incongruence between cognitive cues can lead to discomfort (Festinger, 1957). Consumers use their initial impressions as reference frames to judge subsequent object performance (Gelman & Heyman, 1999). In the case of AI avatars, the anthropomorphic level of interface cues can activate machine or human schemas, impacting user's expectations (Sundar, 2018). While literature varies in views on anthropomorphic chatbot performance expectations, enhanced anthropomorphism is suggested to increase users' expectations (Liu, 2022). Consumers' perceptions of chatbots' human likeness are influenced by two cues: appearance and language style. A less anthropomorphic chatbot appearance may activate a machine schema, resulting in lower user expectations, while a highly anthropomorphic language style can activate human schemas, raising user expectations. This incongruence can lead to inconsistent performance expectations, potentially triggering negative consumer reactions. Component consistency implies that consistent computer design elements affect perception, while inconsistency reduces predictability and increases cognitive dissonance (Qiu, 2009). Heightened cognitive dissonance often leads to negative psychological reactions and related behaviors, such as increased complaints and decreased satisfaction (Salzberger & Koller, 2010). Therefore, we anticipate that:

Hypothesis 2b: Low anthropomorphic chatbot appearance and the effect of informal language style on consumer's tolerance level is negatively mediated by cognitive dissonance.

Moderating role of Interdependent Self-Construal

Interdependent self-construal as self-construal emphasizes that the self is a part of social relationships and is concerned with social connection (Markus & Kitayama, 1991). In this Chinese society-focused study, the impact of interdependent self-construal is a key area of interest. Consumers with high interdependent self-construal value social connection and seek intimacy, which can be fulfilled through interactions with human-like non-human entities (Epley, 2007; Mourey et al., 2017). These entities, with strong emotional capacity, can meet these consumers' social needs and elicit positive responses (Chang et al., 2021). In the context of cue congruence, highly interdependent consumers value consistency and coordination, preferring anthropomorphic cues that are congruent, while cue incongruence may result in negative perceptions (Kitayama et al., 1997). Therefore, H3 is proposed:

Hypothesis 3: The interaction effect between anthropomorphic appearance and informal language style on consumers' tolerance level of chatbot service failure can be moderated by consumer`s interdependent-self construal level

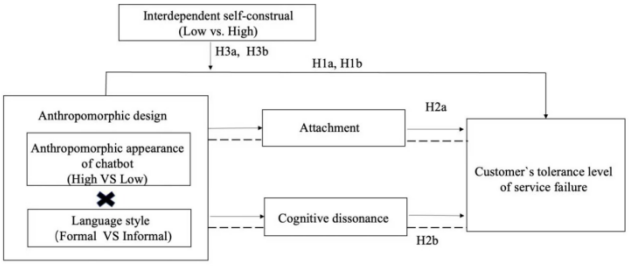

Figure 1. Research Framework

RESEARCH METHODOLOGY

This study is a 2 (anthropomorphic appearance: 3D realism vs. 2D cartoonish) x 2 (language style: informal vs. formal) x2 (interdependent self-construal: high vs. low) between

subject experiment. We adopted a convenient sampling method through Sojump to recruit all respondents. 280 participants (46.1% male; 53.9% female; Mage=27.5) are randomly assigned into four distinct groups. Demographic responses are collected from all respondents, with subsequent variables measured using a 7-point Likert scale.

EXPERIMENT STIMULUS

This study focuses on hotel booking service failures in China's hotel tourism industry. Participants were exposed to a scenario where a hotel app's service chatbot failed to respond to hotel renewal discounts questions, with experimental manipulations involving the chatbot's language style and appearance. A realistic 3D avatar was generated using Midjourney, while a 2D cartoon avatar was created with Photoshop (Figure2). For the language style manipulation, the chatbot's informal language included elements of CHV(Keller, 2009), like informal punctuation, emojis, and friendly rhetoric, while the formal language style was characterized by brevity, precision, and grammatical strictness. This resulted in four experimental conditions (Figure2): a) 2D cartoon avatar with informal language style; b) 3D realistic avatar with informal language style; c) 3D realistic avatar with formal language style; d) 2D cartoon avatar with formal language style.

Figure 2. Four experimental condition

Manipulation check

Ninety-nine respondents (45.4% male;54.6% female Mage=27.5) participated in the pre-test to validate the experimental manipulations of the chatbot's appearance and language style. Forty-six respondents were involved to ensure the successful manipulation of the chatbot's anthropomorphic appearance (high vs. low). The results revealed a significant difference in consumers' perceptions of the chatbot's anthropomorphic appearance between 3D realism and 2D cartoonish ($M_{3D} = 5.39$, $M_{2D} = 3.57$, $T = 6.148$, $p < .001$). Fifty-three respondents participated in confirming the successful manipulation of anthropomorphic language (informal vs. formal). The results showed that the score for informal language style was significantly higher than that for formal language style ($M_{informal} = 5.34$, $M_{formal} = 3.81$, $T = 5.833$, $p < .001$). These manipulation checks confirm the validity of the experimental manipulations of the chatbot's anthropomorphic appearance and language styles.

Procedure and measures

Responders read the textual description of the conversation scenario included servcie chabot failure and chabot`s response. Then, they reported their perceived attachment (Kim et al., 2022) (α=0.842) cognitive dissonance of chabot service (Hausknecht et al., 1998) (α=0.885), their interdependent self-construal level (Singelis, 1994) (α=0.785) and their tolerance level of service failure (Finkel et al.; 2002) (α=0.776). We controlled user`s perceived severity of service failures and user`s familiarity with chatbot (Chong et al., 2017). In the end, users reported their age, gender, and income.

ANALYTICAL RESULTS

The two-way ANOVA of 2 (anthropomorphic appearance: high vs. low) × 2 (language style: informal vs. formal) demonstrated that there is a significant interaction between the anthropomorphic appearance and language style of the chatbot ($F = 5.376$, $p < 0.05$). Then, the study examines the main effects of the two cues through a simple effect test. The results show that the presence of an informal language style of the chatbot will increase consumers' tolerance in the condition of high anthropomorphic appearance of chatbot ($MD = 0.547$, $p < 0.05$). Thus, H1a is supported. However, in the condition of low anthropomorphic appearance, there is no significant difference between the consumer's tolerance under the informal language style and that under the formal language. H1b is not supported.

Mediation analysis was adopted to verify the mediating role of attachment and cognitive dissonance in this interaction process. To test the mediating effect of attachment, this study adopts a bootstrap sampling method and hierarchical regression in Process Model 7. The regression model results show that interaction between the chatbot's language style and appearance can positively predict attachment when the significance level is 10% ($\beta = 0.03$, $p < 0.1$). This suggests that the first pathway of the mediation model (language style to attachment) is mediated by chatbot appearance. When the anthropomorphic level of appearance is high (Mean +1), the Bootstrap 95% confidence intervals for the indirect effect ranges from 0.012~0.122 (excluding 0), indicating that when the appearance is highly anthropomorphic, the attachment

will play a significant mediating role in the influence of informal language on consumer tolerance. However, when the anthropomorphic appearance level is low (Mean-1), language style has no significant mediating effect through attachment on tolerance. In conclusion, under high anthropomorphic appearance conditions, attachment positively mediates the influence of informal language style on the consumer's tolerance level. H2a is verified. However, through the same Mediation analysis to test the mediating effect of cognitive bias, the results show that regardless of the anthropomorphic appearance of the chatbot, cognitive dissonance does not play a significant mediating role. H2b is not supported.

A three-way ANOVA 2 (anthropomorphic appearance: high vs. low) x 2 (language style: formal vs. informal) x 2 (interdependent self-construal: high vs. low) is used to explore whether there is a significant interaction effect between the appearance of the chatbot, language style and interdependent self-construal on consumer tolerance. The results show that the interaction effect of three factors on consumer's tolerance is significant ($F = 6.839$, $p < 0.05$). Moreover, the comparison results of simple effects show when the participants have a high degree of interdependent self-construal, and the anthropomorphic appearance of the chatbot is high with an informal language style, the tolerance score will be significantly higher than that of the chatbot with a formal language style ($MD = 0.71$ $p < 0.05$). Moreover, when participants have a low degree of interdependent self-construal, there is no significant difference in the impact of the interaction of three factors on tolerance level.

Besides, according to the results of SPSS process model one, the interaction coefficient between the interaction term of appearance and language style and the interdependent self-construal dimension was significant ($t = 2.14$, $p < 0.05$), with a regression coefficient of 0.114. It is indicated that the higher the level of interdependent self-construal, the more significant positive moderating effect it plays in the process. H3 is, therefore, supported.

DISCUSSION

This study explores different degrees of anthropomorphic appearance in congruence with language styles to study their effects on tolerance. Moreover, this study also explores whether and how the congruence of anthropomorphic cues affects consumer tolerance. The study finds that when a chatbot has a high level of anthropomorphic design with congruent cues (presented by the combination of informal language style and 3D realism appearance), it can significantly enhance consumer tolerance of service failure through attachment. This further verifies the relationship between anthropomorphic theory and attachment, namely that people have a social motivation to form emotional bonds by anthropomorphizing non-human entities; when this motivation is satisfied, a positive consumer response is triggered (Epley et al., 2007; Law et al., 2022). Although this study did not find that incongruent anthropomorphic cues of chatbots would lead to cognitive dissonance in mediating consumer tolerance, it did find that the perceived severity of service failure would significantly affect cognitive dissonance. This could indicate that incongruent anthropomorphic cues may activate consumers' cognitive dissonance in more severe service failure scenarios. Moreover, the moderating role of interdependent self-construal in consumer receptivity towards anthropomorphic design is explored, with interdependent self-construal having a significant positive moderating effect under conditions of high anthropomorphic appearance and informal language. This confirms the previous research, which indicates that consumers with highly interdependent self-construal have a greater preference for non-human entities with a high degree of anthropomorphism, eliciting more positive responses (Mourey et al., 2017; Kim et al., 2019; Chang et al., 2021).

Theoretical Implications

First, although previous studies combined situational factors to study the impact of a single anthropomorphic cue of a chatbot on the user's response to service failure, they have yet to examine the impact of the congruency of anthropomorphic cues. Thus, this study makes up for this gap. This study confirms that chatbots have the greatest utility in increasing consumer tolerance of service failure when they have highly anthropomorphic and congruent cues. Our findings elucidate applications of anthropomorphic and attachment theory, where due to the consumer's preference for consistency, the congruence of anthropomorphic cues is likely to increase consumer attachment and play a positive role (Luo et al., 2019). Secondly, our study contributes to the understanding of interdependent self-construal in the context of chatbot service failures. While prior research suggested that individuals with high interdependent self-construal tend to apply social norms to anthropomorphic avatars, leading to harsher criticism (Fan et al., 2020), our study presents contrasting findings. This discrepancy may be related to consumers' knowledge about the non-human entity, influencing their use and attitude towards anthropomorphism (Epley, 2007). Third, the findings of this study suggest that the mechanism of cognitive dissonance is not significant because positive disconfirmation alleviates negative perception caused by incongruent cues. This finding further points towards the significance of expectancy disconfirmation within the chatbot service failure field.

Managerial Implications

This study reveals that when chatbots exhibit congruent anthropomorphic cues at a high level of anthropomorphism, they can significantly boost consumer attachment and yield positive outcomes during service failures. Moreover, greater levels of interdependent self-construal enhance this positive effect. This highlights the importance of considering anthropomorphic design and cue congruence in optimizing consumer responses. While the study did not find that

incongruence in anthropomorphic cues leads to cognitive dissonance and negative responses, it underscores the significance of service failure severity. Managers should consider chatbots for straightforward tasks to avoid severe service failures that may trigger cognitive dissonance with negative consequences.

Limitation and future research

There are three limitations in this research: While this study manipulated informal language style and anthropomorphic appearance, other factors like message length and chatbot facial expressions may have influenced participant responses. Future studies should refine stimulus design and explore user response motivations. Besides, this study focused on hotel booking service failures, potentially limiting the generalizability of the findings. Varying service failure severity, types, and scenarios should be explored in future research. Lastly, given that consumers often prefer human service (Zhang et al., 2023), future studies could introduce human service as a control to compare the effectiveness of anthropomorphic chatbot design in service failure recovery.

REFERENCE

1. Brandtzaeg, P. B., & Følstad, A. (2017). Why people use chatbots. In *Internet Science: 4th International Conference* (pp. 377-392). Springer International Publishing. http://dx.doi.org/ 10.1007/978-3 -319-70284-1_30
2. Cai, D., Li, H., & Law, R. (2022). Anthropomorphism and OTA chatbot adoption: a mixed methods study. *Journal of Travel & Tourism Marketing, 39*(2), 228-255. https://doi.org/10.1 080/10548408.2022.2061672
3. Chen, J., Guo, F., Ren, Z., Li, M., & Ham, J. (2023). Effects of anthropomorphic design cues of chatbots on users' perception and visual behaviors. *International Journal of Human–Computer Interaction,* 1-19. https://doi.org/10.1080/10447318.2023.2193514
4. Chang, C. T., Chu, X. Y. M., & Kao, S. T. (2021). How anthropomorphized brand spokescharacters affect consumer perceptions and judgments: Is being cute helpful or harmful to brands? *Journal of Advertising Research, 61*(2), 225-244. https://doi.org/10.2501/jar-2020-025
5. Choi, S., & Mattila, A. S. (2008). Perceived controllability and service expectations: Influences on customer reactions following service failure. *Journal of Business Research, 61*(1), 24-30. https://doi.org/10.1016/j.jbusres.2006.05.006
6. Chong, T., Yu, T., Keeling, D. I., & de Ruyter, K. (2021). AI-chatbots on the services frontline addressing the challenges and opportunities of agency. *Journal of Retailing and Consumer Services, 63,* 102735. https://doi.org/10.1016/j.jretconser.2021.102735
7. Cross, S. E., Hardin, E. E., & Gercek-Swing, B. (2011). The what, how, why, and where of self-construal. *Personality and Social Psychology Review, 15,* 142-179. https://doi.org/10.117 7/1088868310373752
8. Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: a three-factor theory of anthropomorphism. *Psychological Review, 114*(4), 864-886. https://doi.org/10.1037/0033-295 X.114.4.864
9. Fan, A., Wu, L., Miao, L., & Mattila, A. S. (2020). When does technology anthropomorphism help alleviate customer dissatisfaction after a service failure? The moderating role of consumer technology self-efficacy and interdependent self-construal. *Journal of Hospitality Marketing & Management, 29*(3), 269-290. https://doi.org/10.1080/19368623.2019.1639095
10. Festinger, L. (1957). Cognitive dissonance. Scientific American, 207(4), 93-106. https://doi.org/10.1038/scientificamerican1062-93
11. Finkel, E. J., Rusbult, C. E., Kumashiro, M., & Hannon, P. A. (2002). Dealing with betrayal in close relationships: Does commitment promote forgiveness? *Journal of Personality and Social Psychology, 82*(6), 956-974. https://doi.org/10.1037/0022-3514.82.6.956
12. Gale, A., & Mochizuki, T. (2019). Robot hotel loses love for robots. *The Wall Street Journal, 14.*
13. Gelman, S. A., & Heyman, G. D. (1999). Carrot-eaters and creature-believers: The effects of lexicalization on children's inferences about social categories. *Psychological Science, 10*(6), 489-493. https://doi.org/10.1111/1467-9280.00194
14. Go, E., & Sundar, S. S. (2019). Humanizing chatbots: The effects of visual, identity and conversational cues on humanness perceptions. *Computers in Human Behavior, 97,* 304-316. https://doi.org/10.1016/j.chb.2019.01.020
15. Hausknecht, D. R., Sweeney, J. C., Soutar, G. N., & Johnson, L. W. (1998). " After I Had Made the Decision, I...:" Toward a Scale to Measure Cognitive Dissonance. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior, 11,* 119-127.
16. Hermann, E. (2021). Anthropomorphized artificial intelligence, attachment, and consumer behavior. *Marketing Letters, 33*(1), 157–162. https://doi.org/10.1007/s11002-021-09587-3
17. Kelleher, T. (2009). Conversational voice, communicated commitment, and public relations outcomes in interactive online communication. *Journal* of Communication, 59(1), 172-188. https://doi.org/10.1111/j.1460-2466.2008.01410.x
18. Kim, J., Kang, S., & Bae, J. (2022). Human likeness and attachment effect on the perceived interactivity of AI

speakers. *Journal of Business Research, 144,* 797-804. https://doi.org/10.1 016/j.jbusres.2022.02.047

19. Kitayama, S., Markus, H. R., Matsumoto, H., & Norasakkunkit, V. (1997). Individual and collective processes in the construction of self: Self-enhancement in the United States and Self-criticism in Japan. *Journal of Personality and Social Psychology, 72*(6), 1245–1267. https://doi.org/10.1037/0022-3514.72.6.1245
20. Law, T., Chita-Tegmark, M., Rabb, N., & Scheutz, M. (2022). Examining attachment to robots: Benefits, challenges, and alternatives. *ACM Transactions on Human-Robot Interaction (THRI), 11*(4), 1-18. https://doi.org/10.1145/3526105
21. Li, L., Lee, K. Y., Emokpae, E., & Yang, S. B. (2021). What makes you continuously use chatbot services? Evidence from chinese online travel agencies. *Electronic Markets, 31*(3), 575–599. https://doi.org/10.1007/s12525-020-00454-z
22. Liu, J. (2022). Artificial intelligence humor in service recovery. *Annals of Tourism Research, 95,* 103439. https://doi.org/10.1016/j.annals.2022.103439
23. Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: Machines vs. humans: The impact of artificial intelligence chatbot disclosure on customer purchases. *Marketing Science, 38*(6), 937-947. https://doi.org/10.1287/mksc.2019.1192
24. Lv, X., Liu, Y., Luo, J., Liu, Y., & Li, C. (2021). Does a cute artificial intelligence assistant soften the blow? The impact of cuteness on customer tolerance of assistant service failure. *Annals of Tourism Research, 87,* 103114. https://doi.org/10.1016/j.annals.2020.1031 14
25. Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*(2), 224–253. https://doi.org/10.1037/00 33-2 95x.98.2.224
26. Miao, F., Kozlenkova, I. V., Wang, H., Xie, T., & Palmatier, R. W. (2022). An emerging theory of avatar marketing. *Journal of Marketing, 86*(1), 67-90. https://doi.org/10.1177/002 2242921996646
27. Mikulincer, M., & Shaver, P. R. (2012). An attachment perspective on psychopathology. *World Psychiatry,* 11(1), 11-15. https://doi.org/10.1016/j.wpsyc.2012.01.003
28. Mourey, J. A., Olson, J. G., & Yoon, C. (2017). Products as pals: Engaging with anthropomorphic products mitigates the effects of social exclusion. Journal of Consumer Research, 44(2), 414-431. https://doi.org/10.1093/jcr/ucx038
29. Pawlik, V. P. (2022). Design matters! How visual gendered anthropomorphic design cues moderate the determinants of the behavioral intention towards using chatbots. In Chatbot Research and Design (pp. 192–208). Springer International Publishing. http://dx.doi.org/10. 1007/978-3-030-94890-0_12
30. Qiu, L., & Benbasat, I. (2009). Evaluating anthropomorphic product recommendation agents: A social relationship perspective to designing information systems. *Journal of Management Information Systems, 25*(4), 145-182. https://doi.org/10.2753/MIS0742-1222250405
31. Singelis, T. M. (1994). The measurement of independent and interdependent self-construals. *Personality and Social Psychology Bulletin, 20*(5), 580-591. https://doi.org/10. 1177/0146167294205014
32. Song, S. W., & Shin, M. (2022). Uncanny valley effects on chatbot trust, purchase intention, and adoption intention in the context of e-commerce: The moderating role of avatar familiarity. *International Journal of Human–Computer Interaction,* 1-16. https://doi.org/10. 1080/10447318. 2022.2121038
33. Sundar, S. S. (2004). Loyalty to computer terminals: is it anthropomorphism or consistency? *Behaviour & Information Technology, 23*(2), 107-118. https://doi.org/10.1080/014492903100 01659222
34. Zhang, J., Zhu, Y., Wu, J., & Yu-Buck, G. F. (2023). A natural apology is sincere: Understanding chatbots' performance in symbolic recovery. *International Journal of Hospitality Management, 108,* 103387. https://doi.org/10.1016/j.ijhm.2022.103387