

RESEARCH ON THE SERVICE REMEDIATION MECHANISM OF E-COMMERCE CHATBOTS EMPATHIC RESPONSE ON CONSUMERS FORGIVENESS INTENTION

HUI GUAN* AND XUYAN SUN

School of Economics and Management
Dalian University

No. 10, Xuefu Street, Jinzhou New District, Dalian 116622, P. R. China
sunxuyanm@163.com

*Corresponding author: gloria366000@163.com

Received November 2022; revised March 2023

ABSTRACT. *Chatbots have been widely used in different areas, but frequent service failures bring negative emotions to consumers and even lead to negative word-of-mouth or abandonment of the service. How to alleviate consumers' negative emotions to obtain forgiveness has become an important issue of concern for enterprises and academics. Based on the service recovery perspective, this study explores the influence mechanism of chatbots empathic response on consumers forgiveness intention. We conducted empirical study through three scenario experiments of pre-sale, in-sale and after-sale and the Bootstrap method. The results show that, high empathic response from chatbots increases consumers forgiveness intention during service remediation, with social presence and trust acting as full chain mediators. In addition, technology readiness moderates not only the effect of empathic response on social presence, but also the mediating effect of social presence and the chain mediating effect of social presence and trust. However, the moderating roles of technology readiness in the effects of empathic response on consumers forgiveness intention and trust are not significant. E-commerce merchants should focus on developing the empathy capabilities of chatbots to enhance social presence and trust, which in turn increases consumers forgiveness intention.*

Keywords: Chatbots, Empathic response, Service remediation, Forgiveness intention, Social presence

1. **Introduction.** Chatbots are a new form of multi-technology-enabled customer service and are now widely used in government and institutions, finance, e-commerce retail and online education [1]. Due to the advantages of cost reduction and efficiency, e-commerce platforms have built chatbots systems, such as JD's JIMI and Alibaba's Ali Xiaomi. In this context, chatbots have become a key element in ensuring the customer service experience. According to the results of a survey released by the China Youth Daily Social Survey Centre in early 2022, 95.7% of the 2,018 respondents had used chatbots, but only 41.3% found them useful. In the process of using chatbots, 62.1% of respondents thought that chatbots' answers were stiff and mechanical, and 65.9% of respondents expected chatbots to provide more personalized and humanized services [2]. Therefore, in order to prevent chatbots from failing in their service and causing customers to abandon their purchases or escalating their dissatisfaction to the point of spreading negative word-of-mouth about the brand, there is an urgent need to explore a service remediation mechanism suitable for chatbots.

Service remediation is a series of measures and actions taken by businesses to eliminate customer dissatisfaction, regain customer trust and maintain customer loyalty after service failure [3]. The current research on AI service remediation focuses on both the extrinsic characteristics and intrinsic capabilities of AI. The extrinsic characteristics of AI refer to the human-like characteristics of the intelligences, including cute appearance, cute voice, and anthropomorphic voice, etc. Lv et al. found that the cute appearance and voice of AI assistants could enhance consumers' tolerance for service failure [4]. Consumers with high sense of power had a strong willingness to switch when faced with an anthropomorphic voice from a self-service device after service failure [5]. The intrinsic capabilities of artificial intelligence include apologies, explanations, and promises. Studies have found that service robots that apologize [6], explain, promise [7] or give consumers alternative options [7] after service failure can make consumers perceive sincerity and warmth, thus increasing satisfaction with remediation and effectively enhancing consumers' willingness to use again.

All of these studies ignore remedial strategies to mitigate negative consumer sentiment after a service failure. After a service failure, consumers may still hold some resentment, especially in the case of chatbots, even though they have taken remedial measures. Negative emotions prevent consumers from expressing their demands rationally or negotiating calmly to solve problems, which is not conducive to service remediation [8], so there is a need to find remediation strategies that can eliminate negative emotions. Chatbots with empathic capabilities can provide appropriate feedback by sensing and understanding consumers' demands, allowing them to feel uniquely humanized and effective in eliminating their negative emotions [9]. Furthermore, empathy is an important ability to eliminate negative emotions in interpersonal interactions, which can be demonstrated through behaviors such as verbal enquiry, physical contact and gesture display. In addition, it is important to note that removing negative consumer sentiment and obtaining consumer forgiveness is the most direct and long term developmental remedy [3]. Research has shown that consumer forgiveness has a positive effect on consumers' willingness to repurchase and spread positive word of mouth [10,11], making it crucial to obtain consumer forgiveness when remediating.

In summary, although existing studies have focused on the remedial measures taken by chatbots following service failures, current empirical evidence on mitigating consumer emotion is still limited. Empathy is an important way of emotional recovery in interpersonal interaction. Text-based empathy recovery is a convenient method in the context of artificial intelligence service recovery. However, after the switch from human-human interaction to human-robot interaction, it is important to verify whether empathic responses delivered by chatbots can still be a remedy. Based on the reality of the widespread use of text-based chatbots, can e-commerce chatbots be effective in eliminating negative consumer emotions and gaining forgiveness when they take the remedy of empathic response? What is the influence mechanism?

In this study, we explore the remediation mechanism of the impact of chatbots empathic responses on consumers' willingness to forgive, with social presence and trust as mediating variables and technology readiness as moderating variables. Set up three e-commerce shopping contexts before, during and after the sale, and use experimental methods to test the research hypotheses. This study can further enrich the theory related to intelligent customer service remediation and provide a reference for e-commerce service remediation strategies.

This paper is structured as follows. Section 1 describes the background, motivation, and related studies. In Section 2, we describe the literature review of relevant studies. In Section 3, we present the theoretical background, develop research hypotheses and

establish the research model. Section 4, Section 5 and Section 6 describe experimental study 1, experimental study 2 and experiment study 3, respectively. Finally, in Section 7, we present the conclusions, theoretical implications, managerial implications, and future prospects.

2. Literature Review.

2.1. Connotations and dimensions of empathy. Empathy originated in psychology. It has since been introduced into the study of sociology, biological neuroscience, service marketing and other disciplines, and has been given different connotations. According to psychologist Titchener, empathy is an emotional experience in which an individual makes an active effort to enter the inner world of another person [12]. According to sociologist Hoffman, empathy is an emotional response to another person's situation rather than one's own [13]. Decety and Svetlova's neuroscience research suggested that empathy is the ability to put oneself in another person's shoes or position to feel and understand another person's emotional state [14]. Parasuraman, a marketing scientist, argued that empathy referred to a company's ability to care about its consumers and provide them with personalized services [15]. Although the connotations of empathy vary, researchers generally agree that empathy encompasses multiple dimensions. Some researchers argued that empathy encompasses both cognitive and affective empathy [14,16,17]. Some researchers have also argued that empathy encompasses three dimensions: cognitive empathy, affective empathy and behavioral empathy [18,19]. Affective empathy is an innate ability in which people instinctively respond to the emotional states of others [19]. Cognitive empathy refers to people's ability to understand the thoughts and emotional states of others based on their own experiential perceptions [14]. Behavioral empathy refers to specific manifestations of cognitive and affective empathy and includes behavioral mirroring and empathic communication. Behavioral mirroring refers to individuals imitating others' facial expressions, mannerisms, postures and gestures in interactions, and also includes verbal imitation, such as imitation of syntax, language style, speech rate and tone of voice. Empathic communication refers to communication behaviors that individuals display based on emotional and cognitive empathy, such as adding statements that express their own understanding and processing, asking the other person how they feel or what they think, and accompanying the interaction with physical expressions.

Artificial intelligence empathy is a technical manifestation programmed and designed based on emotional computing and other means. The connotation of empathy varies slightly in different forms of AI body empathy research. Leite et al. stated that social robot empathy is derived from transposition, not only understanding each other's feelings but also including emotional responses to others [20]. Ling et al. argued that empathy is a characteristic of intelligences that referred primarily to their ability to interact emotionally with others [21]. Pelau et al. argued that empathy referred to the emotional response to others' experiences and feelings as well as cognitive understanding [17]. The Russian nesting model is the most influential of the programming design AI empathy models, based on a perception-action mechanism that divides chatbot empathy into a three-tier structure, with transpersonal thinking at its core, followed by empathic care and emotional empathy [19]. Transpersonal thinking is the ability of chatbots to identify consumers' functional needs and solve problems through real-time conversations. Empathic care refers to chatbots' natural language processing based on text data to identify consumers' emotions and deliver empathic care language. And emotional empathy is spontaneous human emotion synchronization, which is more difficult for chatbots to achieve, but artificial intelligence can deliver certain emotions through imitation. Based on the above discussion, chatbots

empathic response is a specific form of chatbots empathy. This paper argues that chatbots empathic response refers to the ability of chatbots to sense and understand consumers' emotional and functional needs and then respond appropriately. In the subsequent study, chatbots empathy will be viewed as an overall capability, rather than being explored in terms of dimensions.

2.2. Research related to chatbots empathy. Empathic AI is one of the most advanced forms of AI and requires three stages: mechanical AI, analytical AI, and intuitive AI [22]. Thanks to technological developments such as affective computing, empathy can be applied to intelligent customer service practices and create value. Adam et al. used empathy as one of the anthropomorphic cues for text-based chatbots. They demonstrated through online experiments that empathy in chatbots can enhance consumers' social presence and thus their willingness to comply with bot service feedback requests [23]. Lv et al. showed that empathic responses from service bots can increase the psychological distance between consumers and bots, enhance consumer trust, and thus increase consumers' willingness to continue using the service [24]. In addition, chatbots empathy not only enhances the aforementioned positive psychological perceptions and behavioral intentions of consumers, but also alleviates consumer frustration and increases consumer stickiness [25]. The impacts of chatbots empathy on consumers' psychological perceptions and behavioral intentions are also moderated by a number of factors. There are two main categories of factors that produce effects: consumer's own factors, such as the idiosyncratic regulatory focus in consumers' personality traits [4] and implicit personality [24], and consumers' emotional state [26], and external environmental factors, such as task complexity and degree of intelligence disclosure [27], and interaction mode [24].

3. Theoretical Background and Hypotheses Development.

3.1. Social response theory. Social response theory was proposed by Nass et al. based on the *Computers are Social Actors* theoretical paradigm to investigate human responses during human-computer interaction [28]. The theory states that when computers provide or represent social cues people unconsciously respond to them by following social rules. The theory suggests that people tend to view computers as social actors and unconsciously bring the behaviors, responses and interaction conventions of human interaction into the process of human-computer interaction, despite knowing that computers do not possess emotions, egos or human motivations. The essence of artificial intelligence exhibiting social cues is that it allows people to perceive the human-like qualities of the intelligences, whose anthropomorphic nature is more likely to provoke a social response and have a positive impact. Social response theory has been widely adopted in the existing AI study to investigate consumer responses. For example, Diederich et al. showed that anthropomorphic cues of intelligent conversational agents designed on the basis of social response theory can lead to higher levels of pleasure, human-like perception and social presence in consumers [29]. Adam et al. experimentally verified that verbal anthropomorphic design cues for text-based chatbots significantly increased the likelihood of users complying with the chatbot's service feedback requests based on social response theory [23]. Empathic response, as one of the anthropomorphic features, can elicit social responses from consumers, and therefore social response theory can be used as a theoretical basis for this study.

Two social cues, linguistic cues and interactive cues, are the motivations that trigger people to respond socially to the computer [24]. Linguistic cues are the text displayed on the computer screen. When a computer can display human language, people will communicate with it in text and naturally respond socially to the computer. Most chatbots

interact with consumers through text, and consumers then show social tendencies to respond socially to chatbots when confronted with human language. Interactive cues refer primarily to two-way communication, which is a key feature of interpersonal interaction. When consumers perceive communication with chatbots as two-way communication, the more interactive they perceive it to be.

3.2. The impact of chatbots empathic response on consumers' forgiveness intention. Consumer forgiveness intention refers to the behavioral tendency of consumers to increase their willingness to rebuild relationships by releasing their negative emotions and choosing to be considerate and forgiving of mistakes after a service failure. According to social response theory when chatbots provide a series of irrelevant and repetitive responses, consumers become dissatisfied and may even exacerbate negative emotions, causing them to be reluctant to interact with the chatbot. In contrast, when chatbots are given anthropomorphic characteristics and provide precise services, consumers perceive their human-like characteristics as triggering social reactions and positive emotions, leading to forgiveness of failure.

Empathy is one of the most important emotional intelligence skills in interpersonal communication. An empathic response from a chatbot fully expresses an understanding of the customer's needs and offers a range of remedial options. As a result, consumers perceive more verbal cues and a strong sense of interaction. When a chatbot gives an empathic response after a service failure, it allows the consumer to treat the problem in accordance with interpersonal practices. The consumer will temporarily suppress his or her negative emotions and communicate with the chatbot in the same friendly manner, eventually cooperating to resolve the problem [27]. As the problem is resolved, the consumer is likely to forgive the mistake and strengthen their relationship with the merchant. As a result, the following hypothesis is proposed.

H1: Highly empathic response from chatbots is more likely to increase consumers' forgiveness intention than low empathic response when it comes to service remediation.

3.3. The mediating role of social presence and trust. Social presence refers to the psychological perception of the presence of others in mediated communication, perceived closeness and intimacy with others [30], resulting in multi-channel social interactions [23]. The social presence studied in this paper refers to the sense of authenticity and intimacy that arises from consumers' perception of and identification with the content of chatbots responses. Social presence theory suggests that the more cues passed in mediated communication, the higher the level of perceived social presence, thus giving the communicator a sense of authenticity similar to face-to-face communication [23]. After service failure, the chatbot's empathic response conveys cues to think from the customer's perspective, and the content can include verbal cues of text and non-verbal cues of emojis [31]. Consumers perceive the real presence of the chatbot and thus are likely to develop a high level of social presence. According to social response theory, social presence motivates consumers to respond positively to chatbots and increases the tolerance level for mistakes made by the other party. The high social presence induced by the chatbot's empathic responses provides customers with a sense of real-life contextual experience and helps both parties to accurately understand the intention of the communication [27], while the perceived intimacy of the chatbot's responses may alleviate the expression of negative emotions and lead to the likelihood of forgiveness. Therefore, this paper proposes the following hypotheses.

H2a: Highly empathic response from chatbots generates higher social presence compared to low empathic response when it comes to service remediation.

H2b: Social presence mediates the effect of chatbots empathic response on consumers' forgiveness intention.

In the field of marketing, trust is understood as a confidence in the object of a transaction and the psychological process that accompanies trust in the counterparty. The trust studied in this paper refers to the degree of confidence that consumers hold in the capabilities that chatbots possess. In human-computer interaction, when consumers perceive that the responses from intelligent service bots are too mechanical and formal, they are less inclined to continue communicating and generate negative perceptions [30]. Thus, the use of empathic responses to address consumer dissatisfaction in a timely manner can alleviate negative perceptions and gradually strengthen positive perceptions of the chatbot thereby increasing trust. In contrast, the essence of consumer forgiveness is the pro-social behavior of consumers after they have regained trust. Individuals regain trust in the brand as a result of remedial measures such as empathetic responses from the at-fault party, reducing the perceived risk to the brand and demonstrating positive intentions and behaviors to maintain the relationship. The increase in consumer trust reduces negative emotions such as avoidance of the service failure party and even attempts to generate forgiveness out of trust repair considerations [24]. Therefore, the following hypotheses are proposed in this paper.

H3a: Highly empathic response from chatbots generates higher trust compared to low empathic response when it comes to service remediation.

H3b: Trust mediates the effect of chatbots empathic response on consumers' forgiveness intention.

Social presence can enhance consumer trust. Firstly, when platforms give consumers a sense of immersion and rich interactive information, consumers' trust in the platform merchant increases [32]. Secondly, the social presence in the platform reduces the social distance between consumers and merchants, and trust is more likely to be generated [33]. Finally, consumers face uncertainty and perceived risk when shopping online. When they perceive the presence of others and are in the same interpersonal communication scenario as others, feelings of interpersonal communication are enhanced and consumer trust increases [30]. Empathic responses are not limited by the specific form of the service entity, and can adopt interaction methods such as voice, text, and emoticons [31]. All of these elements create a sense of social presence, making each other feel the emotional expression of the other. Emotional communication based on both parties will allow consumers to trust each other and help to alleviate and regulate negative consumer emotions after online service failure, thus gaining consumer forgiveness. Therefore, the following hypothesis is proposed in this paper.

H4: Social presence and trust play a chain mediating role in the effect of chatbots empathic response on consumers' forgiveness intention.

3.4. The moderating role of technology readiness. When a service is remedied, consumers' behavioral decisions are influenced by their own individual characteristics in addition to the remedies of the service failure party. Technology readiness is a characteristic-like individual difference variable that reflects the overall attitude towards the acceptance of new technology and can have an impact on consumers' behavioral intentions [34]. The technology readiness studied in this paper refers to the overall attitude of consumers towards the adoption of chatbots by e-commerce merchants. Technology readiness consists of both facilitators and inhibitors. Facilitators include optimism and innovation, where people believe that technology can increase efficiency, improve people's lives and lead others to embrace new technologies, reflecting positive attitudes towards technology. Inhibitors include discomfort and insecurity, where people feel overwhelmed by the

complexity of technology and doubt its operability, reflecting negative attitudes towards technology [34]. The moderating effect of technology readiness on individual behavioral influences in the Internet environment has been demonstrated. For example, Chang and Chen found that technology readiness was a moderating variable of consumer shopping intentions by the ease of use of smart technology, and that consumers with high technology readiness were more likely to shop in smart shops where smart technology was easy to use [35].

Highly technology-ready individuals perceive technology as more useful. They maintain a positive attitude when it is problematic, and are therefore more attentive to the benefits of chatbots when it comes to service remediation. They are also more likely to experience high levels of social presence and trust when confronted with highly empathetic responses from chatbots, thereby increasing consumer willingness to forgive. Low technology-ready individuals, on the other hand, are inherently skeptical and distrustful of technology, and therefore more concerned with the consequences of service failure when it comes to service remediation. As a result, negative attitudes towards chatbots are enhanced. The positive effects of empathetic responses are diminished, higher levels of social presence and trust in chatbot empathetic responses are not easily generated, and consumer willingness to forgive is lower. Therefore, the following hypotheses are proposed in this paper.

H5a: Technology readiness moderates the effect of chatbots empathetic response on consumers' forgiveness intention.

H5b: Technology readiness moderates the effect of chatbots empathetic response on social presence.

H5c: Technology readiness moderates the effect of chatbots empathetic response on trust.

In summary, the conceptual model is shown in Figure 1. The model differs from existing research models in two ways. First, existing research has focused on consumer acceptance and willingness to use chatbots, and few studies have focused on the impact of chatbot empathetic responses on consumer willingness to forgive in a service failure context. Second, no research has examined the impact of social presence on consumers' willingness to forgive. As an important variable in the field of artificial intelligence research, it is worth examining the various effects of social presence on consumers.

This paper tests all the research hypotheses through 3 experiments and the research framework is shown in Table 1.

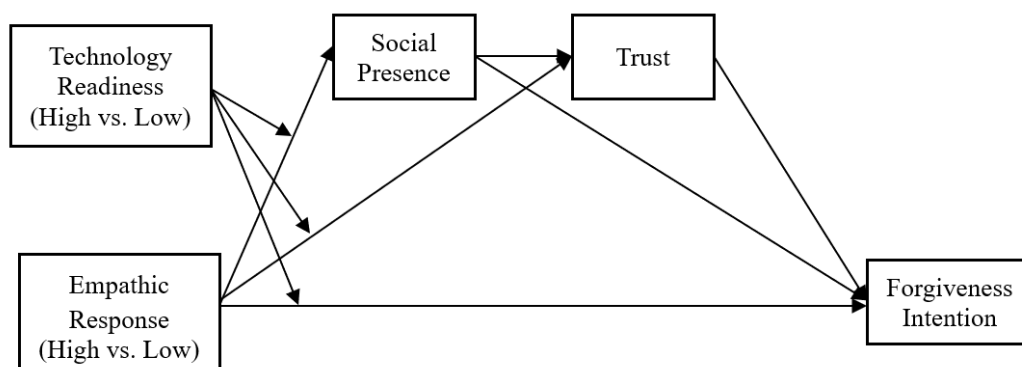


FIGURE 1. Conceptual model

TABLE 1. Research framework

Effect/Hypothesis	Study	Customer service process
Main effect/H1	Study 1	Pre-sales
Mediated effect/H2a, H2b, H3a, H3b, H4	Study 2	In-sales
Moderated effect/H5a, H5b, H5c	Study 3	After-sales

4. Experimental Study 1.

4.1. **Pretest.** The aim of the pretest was to examine the effectiveness of empathic response manipulation in a pre-sales service failure scenario. Referring to Chen et al.'s [36] experiment, the specific experimental context of purchasing clothes on an e-commerce platform was selected. The response statements were designed with reference to the current experimental materials [24,31,36]. The experimental material was modified to fit the actual situation. There were no differences between the two experimental materials, except for the response language after service failure, as described in Appendix 1.

We recruited 63 participants for a fee from Credamo online platform to take part in pretest [31.7% men; mean age (M_{age}) = 29 years; standard deviation of age (SD_{age}) = 7.400]. Credamo, an international professional data platform (equivalent to MTurk) that is well-known in the academic community and acknowledged by prestigious international journals in fields like management, psychology, and environmental science, offers a national, extensive data collection service for academics. The questionnaire was set in Chinese and all participants are Chinese. Subsequent participants were recruited on this platform. First, participants were randomly grouped to read the experimental material, with 27 in the low empathic response group and 36 in the high. Then, the participants were asked to respond to empathic response, demographic information and attention verification items. The same procedure was used for all subsequent experimental pre-tests. The five items (see Appendix 4) for empathic response ($\alpha = 0.892$) were adapted from Parasuraman et al. [15] and Lv et al. [24]. All items were measured on a 7-point Likert scale. Independent samples T-test results showed that, participants in the high empathic response group had significantly higher empathic perceptions than those in the low group [$M_{\text{low-empathic}} = 3.348$, $M_{\text{high-empathic}} = 4.139$, $t(61) = -2.310$, $p = 0.024$]. Thus, the manipulation of empathic response was successful.

4.2. **Procedure and measures.** We recruited 105 participants to take part in a single-factor (empathic response: high vs. low) between-groups design (34.3% men; $M_{\text{age}} = 30$ years, $SD_{\text{age}} = 8.114$). Participants who take part in the pre-test will not be involved in the formal trial. To avoid the potential influence of participants' mood, participants were invited to answer emotion items. The participants were then randomly grouped to read the experimental material and fill in the questionnaire, with 51 in the low empathic response group and 54 in the high group. The contents of the high and low empathic response were the same as the pre-test. The questionnaire included items on empathic response, consumer forgiveness intention, purchase experience, severity of service failure, demographic information and attention validation.

The four items for mood ($\alpha = 0.840$) were adapted from Nenkov and Scott [37]. Empathic response measurement items are the same as the pre-test ($\alpha = 0.876$). The four items for forgiveness intention ($\alpha = 0.911$) were adapted from Finkel et al. [38] and Fedorikhin et al. [39]. Purchase experience and severity of service failure were measured using items by Coupey et al. [40] and Hess [41], respectively. Appendix 4 depicts all items.

4.3. Results. Independent samples T-test results showed that, participants in the high empathic response group had significantly higher empathic perceptions than those in the low group [$M_{\text{low-empathic}} = 3.459$, $M_{\text{high-empathic}} = 4.281$, $t(103) = -3.283$, $p = 0.001$]. Thus, the manipulation of empathic response was successful. There was no significant difference between groups in participants' mood [$M_{\text{low-empathic}} = 5.637$, $M_{\text{high-empathic}} = 5.676$, $t(103) = -0.200$, $p = 0.842$], in purchase experience [$M_{\text{low-empathic}} = 5.765$, $M_{\text{high-empathic}} = 5.611$, $t(103) = 0.616$, $p = 0.539$], and in severity of service failure [$M_{\text{low-empathic}} = 3.961$, $M_{\text{high-empathic}} = 3.463$, $t(103) = 1.724$, $p = 0.088$]. The potential influence of these three control variables can be excluded and the manipulation of the variables is successful.

The results of the independent samples T-test showed that consumers' forgiveness intention was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.500$, $M_{\text{high-empathic}} = 5.037$, $t(97) = -2.138$, $p = 0.035$]. And then, this paper tested the effect of empathic response on consumers' forgiveness intention when controlling for the participants' gender, age, education, occupation, and income through an analysis of covariance (ANCOVA), and the results remained consistent with the independent samples T-test. That is, consumers' forgiveness intention was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.454$, $M_{\text{high-empathic}} = 5.080$, $F(1, 98) = 6.470$, $p = 0.013$]. Therefore, H1 was supported.

4.4. Discussion. Experiment 1 initially verified the effect of empathic response on consumers' forgiveness intention in a pre-sales service failure scenario. However, Experiment 1 only examined pre-sales service failure scenarios, and further validation is needed in subsequent stages of customer service (e.g., in-sales service failure scenarios). Based on this, Experiment 2 will further investigate the mediating effects of social presence and trust in the context of in-sales service failure.

5. Experimental Study 2.

5.1. Pretest. We recruited 80 participants for a fee to take part in pretest (43.8% men; $M_{\text{age}} = 30$ years, $SD_{\text{age}} = 6.729$). 40 participants were for the low empathic response group and 40 for the high empathic response group. Independent samples T-test results showed that, consumers' empathic perceptions ($\alpha = 0.870$) was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.020$, $M_{\text{high-empathic}} = 4.835$, $t(78) = -3.070$, $p = 0.003$]. Thus, the manipulation of empathic response was successful.

5.2. Procedure and measures. We recruited 193 participants to take part in a single-factor (empathic response: high vs. low) between-groups design (42% men; $M_{\text{age}} = 30$ years, $SD_{\text{age}} = 6.843$). To avoid the potential influence of participants' mood, participants were invited to answer emotion items. The participants were then randomly grouped to read the experimental material (Appendix 2) and fill in the questionnaire, with 96 in the low empathic response group and 97 in the high group. The questionnaire included items on empathic response, consumer forgiveness intention, social presence, trust, purchase experience, severity of service failure, demographic information and attention validation.

The items measuring mood ($\alpha = 0.943$), empathic response ($\alpha = 0.872$), forgiveness intention ($\alpha = 0.874$), purchase experience, and severity of service failure were the same as in Experiment 1. The three items for social presence ($\alpha = 0.915$) were adapted from [30]. Empathic response measurement items are the same as the pre-test ($\alpha = 0.876$). The three items for trust ($\alpha = 0.895$) were adapted from [33].

5.3. Results. Independent samples T-test results showed that, consumers' empathic perceptions were significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.210$, $M_{\text{high-empathic}} = 5.087$, $t(181) = -5.345$, $p < 0.001$]. Thus, the manipulation of empathic response was successful. There was no significant difference between groups in participants' mood [$M_{\text{low-empathic}} = 5.292$, $M_{\text{high-empathic}} = 5.366$, $t(191) = -0.355$, $p = 0.723$], in purchase experience [$M_{\text{low-empathic}} = 5.844$, $M_{\text{high-empathic}} = 5.784$, $t(191) = 0.365$, $p = 0.716$], and in severity of service failure [$M_{\text{low-empathic}} = 3.635$, $M_{\text{high-empathic}} = 3.309$, $t(191) = 1.895$, $p = 0.060$]. The potential influence of these three control variables can be excluded and the manipulation of the variables is successful.

The results of the independent samples T-test showed that consumers' forgiveness intention was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 5.148$, $M_{\text{high-empathic}} = 5.613$, $t(191) = -3.319$, $p = 0.001$]. Therefore, H1 was again supported.

The results of the independent samples T-test showed significant differences between groups for both social presence and trust. Consumers' social presence was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.028$, $M_{\text{high-empathic}} = 5.117$, $t(179) = -5.306$, $p < 0.001$]. Therefore, H2a was supported. Consumers' trust was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.517$, $M_{\text{high-empathic}} = 5.447$, $t(170) = -5.441$, $p < 0.001$]. Therefore, H3a was supported.

We used a bootstrap analysis to assess mediation effect, relying on 5,000 bootstrap samples with a 95% confidence interval (CI) and Model 6 in PROCESS. This model took empathic response as the independent variable, social presence and trust as the sequential mediating variables, and forgiveness intention as the dependent variable. Table 2 depicts the results. We found a positive effect [$\beta = 0.270$, $CI_{95} = (0.126, 0.465)$, not including 0] of empathic response on forgiveness intention through social presence and a positive effect [$\beta = 0.085$, $CI_{95} = (0.010, 0.173)$, not including 0] of empathic response on forgiveness intention through trust. Meanwhile, the sequential mediation via social presence and trust was also significant [$\beta = 0.173$, $CI_{95} = (0.071, 0.309)$, not including 0]. Notably, the direct effect of empathic response on forgiveness intention was no longer significant [$CI_{95} = (-0.293, 0.169)$, including 0], demonstrating that social presence and trust play a complete mediating role. The findings thus support H2b, H3b and H4.

TABLE 2. Mediating effects of social presence and trust

Effect type	Effect	SE	T-statistics	p-value	95% CI	
					LLCI	ULCI
Direct effect	-0.062	0.117	-0.532	0.595	-0.293	0.169
Indirect effect						
ER→SP→FI	0.270	0.085	—	—	0.126	0.465
ER→TR→FI	0.085	0.042	—	—	0.010	0.173
ER→SP→TR→FI	0.173	0.062	—	—	0.071	0.309

Notes: ER = Empathic Response, SP = Social Presence, TR = Trust, FI = Forgiveness Intention

5.4. Discussion. Experiment 2 again validated the main effect of empathic response on forgiveness intention in an in-sales service failure scenario, and verified the mediating effects of social presence and trust. However, the first two experiments did not ensure consistent response word counts and neither examined the effect of individual characteristics. Therefore, Experiment 3 will explore the moderating effect of technology readiness based on ensuring a consistent number of words in chatbots responses.

6. Experimental Study 3.

6.1. Pretest. We recruited 77 participants for a fee to take part in pretest (42.9% men; $M_{\text{age}} = 30$ years, $SD_{\text{age}} = 5.432$). 38 participants were for the low empathic response group and 39 for the high empathic response group. Independent samples T-test results showed that, consumers' empathic perceptions ($\alpha = 0.887$) was significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.521$, $M_{\text{high-empathic}} = 5.103$, $t(67) = -2.271$, $p = 0.026$]. Thus, the manipulation of empathic response was successful.

6.2. Procedure and measures. We recruited 275 participants to take part in a 2 (empathic response: high vs. low) \times 2 (technology readiness: high vs. low) between-subjects design (34.2% men; $M_{\text{age}} = 30$ years, $SD_{\text{age}} = 5.549$). To avoid the potential influence of participants' mood, participants were invited to answer emotion items. The participants were then asked to answer the technology readiness items and were randomly grouped to read the experimental material (Appendix 3) and fill in the questionnaire, with 133 in the low empathic response group and 142 in the high group. The questionnaire included items on empathic response, consumer forgiveness intention, social presence, trust, purchase experience, severity of service failure, demographic information and attention validation.

The items measuring mood ($\alpha = 0.911$), empathic response ($\alpha = 0.872$), forgiveness intention ($\alpha = 0.876$), social presence ($\alpha = 0.894$), trust ($\alpha = 0.894$), purchase experience, and severity of service errors were the same as in Experiment 2. Technology readiness was measured with reference to modified technology readiness scale from Parasuraman and Colby [42], resulting in 10 items. An exploratory factor analysis (KMO = 0.891, $p < 0.001$) was conducted on these 10 items, indicating that a factor analysis was appropriate. The factor analysis extracted 2 factors with a total variance explained of 59.076%. However, one item had a factor loading of 0.396, which was less than the minimum criterion of 0.5, and was therefore removed. After deletion, the total variance explained increased to 63.715%, leaving 4 items for the motivator and 5 items for the inhibitor, and the subsequent analysis was conducted using a scale containing these 9 items. The Cronbach' α for the two dimensions was 0.771 and 0.853, respectively, and the overall Cronbach' α for the scale was 0.869, indicating good internal consistency of the scale.

6.3. Results. Independent samples T-test results showed that, consumers' empathic perceptions were significantly higher in the high empathic response group than in the low group [$M_{\text{low-empathic}} = 4.483$, $M_{\text{high-empathic}} = 4.932$, $t(273) = -3.176$, $p = 0.002$]. Thus, the manipulation of empathic response was successful. There was no significant difference between groups in participants' mood [$M_{\text{low-empathic}} = 5.575$, $M_{\text{high-empathic}} = 5.583$, $t(273) = -0.054$, $p = 0.957$], in purchase experience [$M_{\text{low-empathic}} = 5.737$, $M_{\text{high-empathic}} = 5.965$, $t(257) = -1.900$, $p = 0.059$], and in severity of service failure [$M_{\text{low-empathic}} = 3.526$, $M_{\text{high-empathic}} = 3.430$, $t(273) = 0.629$, $p = 0.530$]. The potential influence of these three control variables can be excluded and the manipulation of the variables is successful.

The questionnaire in Experiment 3 contained items measuring all variables and was tested for the same main and mediating effects that had been verified in the two previous experiments. The following section focuses on the test for moderating effects of technology readiness.

We measured the technology readiness of all participants. The inhibitor items values were reverse scored and the mean of all technology readiness items values of the pooled sample was used as the segmentation criterion [42]. Those greater than the mean were considered to be in the high technology readiness group and those less than the mean were considered to be in the low group.

We used a bootstrap analysis to assess moderation effect, relying on 5,000 bootstrap samples with a 95% confidence interval (CI) and Model 1 in PROCESS. This model took empathic response as the independent variable, technology readiness as the moderating variable. Consumers' forgiveness intention, social presence and trust were taken as the dependent variables, respectively. The results showed that technology readiness moderated the effect of empathic response on social presence ($p = 0.033$). As shown in Figure 2, the effect of empathic response on social presence was significant in the high technology readiness group [$\beta = 0.861$, $CI_{95} = (0.460, 1.261)$, not including 0], and high empathic response significantly enhanced consumers' social presence compared to low empathic response [$M_{\text{low-empathic}} = 4.569$, $M_{\text{high-empathic}} = 5.430$, $t(156) = -4.603$, $p < 0.001$]. In the low technology preparation group, the effect of empathic response on social presence was not significant [$CI_{95} = (-0.270, 0.658)$, including 0]. However, technology readiness did not moderate the effect of empathic responding on forgiveness intention ($p = 0.152$) and trust ($p = 0.054$). Thus, H5a and H5c were not tested.

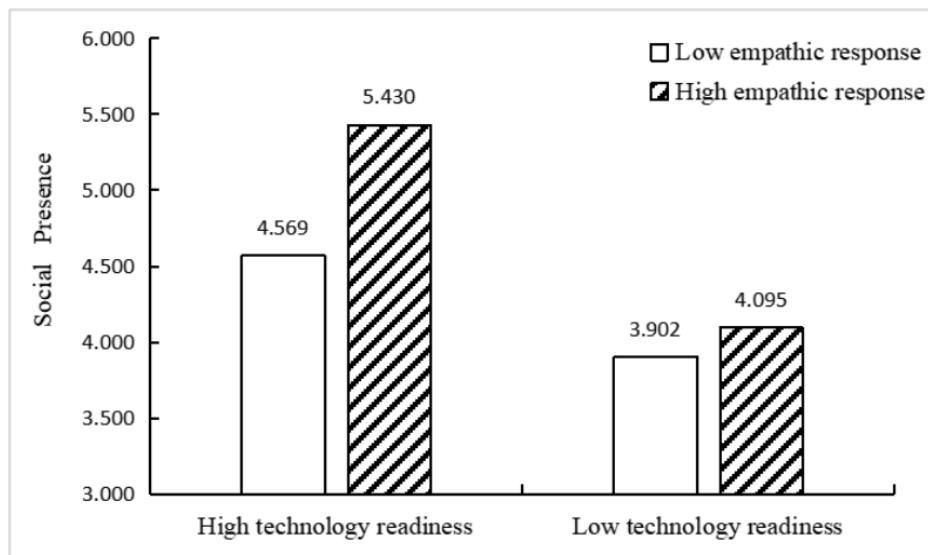


FIGURE 2. Crossover effect between empathic response and technology readiness

We used a bootstrap analysis to assess moderated mediating effect of social presence, relying on 5,000 bootstrap samples with a 95% confidence interval (CI) and Model 83 in PROCESS. This model took empathic response as the independent variable, social presence as the mediating variable, forgiveness intention as the dependent variable, and technology readiness as the moderating variable. The results showed that there was a moderated mediating effect of social presence [$\beta = 0.093$, $CI_{95} = (0.004, 0.232)$, not including 0]. The moderated mediating effect of social presence was significant in the high technology readiness group [$\beta = 0.119$, $CI_{95} = (0.037, 0.240)$, not including 0] but not significant in the low technology readiness group [$CI_{95} = (-0.047, 0.115)$, including 0]. In addition, the moderated sequential mediating effect of social presence and trust was also significant [$\beta = 0.159$, $CI_{95} = (0.010, 0.323)$, not including 0]. The moderated sequential mediating effect of social presence and trust was significant in the high technology readiness group [$\beta = 0.205$, $CI_{95} = (0.105, 0.319)$, not including 0] but not significant in the low technology readiness group [$CI_{95} = (-0.075, 0.171)$, including 0]. In summary, H5b was tested.

6.4. Discussion. Experiment 3 verified the moderating effect of technology readiness in an after-sales service failure scenario. It was found that the mechanism of chatbots empathic response was more significant among consumers with high technology readiness. The results of Experiment 3 effectively supported H5b, but H5a and H5c were not effectively supported. Specifically, technology readiness moderates the effect of empathic response on social presence. However, the moderating effect of technology readiness on the effect of empathic response on forgiveness intention and trust are not significant, possibly because low technology readiness inhibits forgiveness and trust generation.

7. General Discussion.

7.1. Conclusions. We investigate the effect of chatbots empathic response on consumers' forgiveness intention in e-commerce environment through scenario experimental study. The following conclusions were obtained. Firstly, the results of the pre-sales service context in Experiment 1 showed that high empathic response increased consumers' forgiveness intention more than low empathic response. Secondly, the results of the in-sales service context in Experiment 2 also validated the main effect of Experiment 1 and further demonstrated that social presence and trust fully mediated the effect of empathic response on forgiveness intention. Thirdly, the results of the after-sales service context study in Experiment 3 validated the main and mediating effects of the two previous experiments and further confirmed that technology readiness moderated the effect of empathic response on social presence, but not significantly in the effect of empathic response on forgiveness intention and trust. Specifically, among consumers with high technology readiness, high empathic response led to higher social presence and thus higher trust and willingness to forgive compared to low empathic response. Among consumers with low technological readiness, there was no difference in the effect of high and low empathic responses on social presence.

7.2. Theoretical implications. First, this paper explores the remediation mechanism of chatbots' empathetic replies, which expands the existing research system of AI service remediation. Previous studies have focused on consumers' willingness to accept and use chatbots and the positive effect of empathy in the case of successful human-computer interaction. However, consumers' willingness to forgive in the case of service failure has not been paid attention to. Chatbot service failures will inevitably lead to consumers' negative emotions, which will lead to adverse consequences. Eliminating consumers' negative emotions and obtaining their forgiveness will have a positive impact on subsequent use intention and purchase intention, which should become an important research issue. In this paper, we introduced empathic response into the service remediation of chatbots, making up for the lack of human touch in chatbots. Chatbot can obtain consumers' forgiveness by eliminating negative emotions through empathic response, broadening the idea of AI service remediation and enriching the application context of AI.

Second, this study combines social presence, an important factor influencing consumer behavior in virtual scenarios, with trust, an important factor influencing consumer behavioral intentions in relationship quality, to build a model of the mechanism of empathic response. Existing studies have confirmed the influence of trust on consumers' willingness to forgive, but have not paid attention to the influence of social presence on consumers' willingness to forgive, nor have they focused on the chain effect of social presence and trust. Social presence is an important perceptual factor in human-computer interaction, which has an impact on consumers' psychological perception and behavioral intention. Therefore, it is necessary to study its role in the mechanism of empathic response in chatbots. In this study, we not only validate the common path of trust on consumers'

willingness to forgive, but also verify the impact of social presence on consumers' willingness to forgive, and further extend the application of social presence in the context of artificial intelligence, providing a reference for future intelligent services.

Finally, this study uses technology readiness as a moderating variable, broadening the application range of technology readiness. Existing studies have focused on technology readiness as an antecedent to technology use, but less on the moderating effect of technology readiness. Where research has been conducted on the moderating effect of technology readiness, scholars have tended to only examine the moderating effect of a certain factor of technology readiness, for example, only the moderating effect of optimism factor in technology readiness. However, in this paper, factors related to technology readiness were taken into account to ensure the integrity of the technology readiness variable. In this study, we found that technology readiness moderates the effect of chatbot empathic response on social presence, and also moderates the chain mediating effect of social presence and trust, extending the scope and context of technology readiness applications.

7.3. Managerial implications. First, e-commerce merchants introduce chatbots for service with attention to service failure and recovery. Chatbots service failures are inevitable. Merchants need to be concerned about whether they can independently and promptly remedy service failures and, most importantly, eliminate the negative emotions that they bring to consumers. Empathy is tried and tested as the simplest, most convenient and easy to implement and operate emotional intelligence capability. Merchants need to focus on the empathic remediation capabilities of chatbot systems.

Secondly, companies can use empathic chatbots to communicate effectively with consumers. This study confirms that empathic responses can enhance consumers' social presence and lead to trust and willingness to forgive. The language of the empathic responses of the chatbot was also designed with language expression in mind. Therefore, merchants can use chatbots with the same expressions and phrases as in everyday interpersonal interactions to enhance consumers' social presence and trust in customer service to solve problems, helping to improve human-computer interaction.

Third, companies need to provide multiple service channels based on consumer traits. The results of this study show that high technology-ready consumers are more likely to be willing to forgive chatbot empathic responses, while low-technology-ready consumers show no difference in remediation performance for chatbot empathetic responses. Therefore, merchants can differentiate between technology-ready consumers through their daily conversations with chatbots, use big data memory analysis to identify low-technology-ready consumers, and open a manual fast track directly for them to improve service efficiency.

7.4. Limitations and research prospects. Due to the limitations of the research conditions and methods, there are still many shortcomings in this study that need to be further developed. Firstly, this study used a situational experimental method, in which the subjects were put into a fixed situation through a picture display and then answered the measurement items to obtain the results, which may affect the external validity of this study. In the future, the research hypothesis could be manipulated through field experiments or simulated chatbots service. Secondly, this study only examined the expressions of text in chatbots service, while chatbot, as an emerging application technology, has other expressions such as appearance and voice intonation, which could be further explored to see whether different expressions of chatbots would bring different service effects. Thirdly, the dependent variables can be extended. This study focuses on the forgiveness intention that can fundamentally eliminate consumers' negative emotions, but does not consider

the subsequent behavior of consumers after forgiveness. Whether consumers' willingness to repurchase or word-of-mouth after forgiving a failed service can be further investigated.

Acknowledgment. This work is partially supported by Dalian Social Science Federation Fund (Grant number: 2022dlskzd344). The authors also gratefully acknowledge the helpful comments and suggestions of the reviewers, which have improved the presentation.

REFERENCES

- [1] X. Liao, X. Li, Z. Cheng and Y. Yang, Perceived control in human-agent interaction: Scale development and validation, *International Journal of Innovative Computing, Information and Control*, vol.19, no.2, pp.597-605, 2023.
- [2] S. Sun and X. F. Gu, *90% of Respondents Have Used Smart Customer Service and Only 40% Find It Useful*, http://zqb.cyol.com/html/2022-01/06/nw.D110000zgqnb_20220106_3-05.htm, Accessed on Jan. 6, 2022.
- [3] J. Wei, Z. Wang, Z. Hou and Y. Meng, The influence of empathy and consumer forgiveness on the service recovery effect of online shopping, *Front. Psychol.*, vol.13, DOI: 10.3389/fpsyg.2022.842207, 2022.
- [4] X. Lv, Y. Liu, J. Luo, Y. Liu and C. Li, Does a cute artificial intelligence assistant soften the blow? The impact of cuteness on customer tolerance of assistant service failure, *Annals of Tourism Research*, vol.87, DOI: 10.1016/j.annals.2020.103114, 2021.
- [5] A. Fan, L. Wu and A. S. Mattila, Does anthropomorphism influence customers' switching intentions in the self-service technology failure context?, *Journal of Services Marketing*, vol.30, no.7, pp.713-723, 2016.
- [6] Y. Hu, H. Min and N. Su, How sincere is an apology? Recovery satisfaction in a robot service failure context, *Journal of Hospitality & Tourism Research*, vol.45, no.6, pp.1022-1043, 2021.
- [7] M. K. Lee, S. Kiesler, J. Forlizzi, S. Srinivasa and P. Rybski, Gracefully mitigating breakdowns in robotic services, *The 2010 5th ACM/IEEE International Conference on Human-Robot Interaction*, 2010.
- [8] T. Zhang, C. Feng, H. Chen and J. Xian, Calming the customers by AI: Investigating the role of chatbot acting-cute strategies in soothing negative customer emotions, *Electronic Markets*, vol.32, no.4, pp.2277-2292, 2022.
- [9] S. Park, S. Park and M. Whang, Empathic responses of behavioral-synchronization in human-agent interaction, *Computers, Materials & Continua*, vol.71, no.2, pp.3761-3784, 2022.
- [10] J. Wei, M. Liu, W. Li, Z. Hou and L. Li, The impact of consumer confusion on the service recovery effect of Online Travel Agency (OTA), *Curr. Psychol.*, pp.1-10, 2022.
- [11] R. Salagrama, S. Prashar and S. V. Tata, Examining the influence of forgiveness and its antecedents on consumer behavior: The moderating role of service failure severity, *International Journal of Emerging Markets*, 2021.
- [12] L. Wispe, The distinction between sympathy and empathy: To call forth a concept, a word is needed, *Journal of Personality and Social Psychology*, vol.50, no.2, pp.314-321, 1986.
- [13] M. L. Hoffman, How automatic and representational is empathy, and why, *Behavioral and Brain Sciences*, vol.25, no.1, pp.38-39, 2003.
- [14] J. Decety and M. Svetlova, Putting together phylogenetic and ontogenetic perspectives on empathy, *Developmental Cognitive Neuroscience*, vol.2, no.1, pp.1-24, 2012.
- [15] A. Parasuraman, V. A. Zeithaml and L. L. Berry, SERVQUAL: A multiply-item scale for measuring consumer perceptions of service quality, *Journal of Retailing*, vol.64, no.1, pp.12-40, 1988.
- [16] M. H. Davis, Measuring individual differences in empathy: Evidence for a multidimensional approach, *Journal of Personality and Social Psychology*, vol.44, no.1, pp.113-126, 1983.
- [17] C. Pelau, D.-C. Dabija and I. Ene, What makes an AI device human-like? The role of interaction quality, empathy and perceived psychological anthropomorphic characteristics in the acceptance of artificial intelligence in the service industry, *Computers in Human Behavior*, vol.122, 2021.
- [18] M. A. Clark, M. M. Robertson and S. Young, I feel your pain: A critical review of organizational research on empathy, *Journal of Organizational Behavior*, vol.40, no.2, pp.166-192, 2019.
- [19] Y. Liu-Thompkins, S. Okazaki and H. Li, Artificial empathy in marketing interactions: Bridging the human-AI gap in affective and social customer experience, *Journal of the Academy of Marketing Science*, vol.50, no.6, pp.1198-1218, 2022.

- [20] I. Leite, A. Pereira, S. Mascarenhas, C. Martinho, R. Prada and A. Paiva, The influence of empathy in human-robot relations, *International Journal of Human-Computer Studies*, vol.71, no.3, pp.250-260, 2013.
- [21] E. C. Ling, I. Tussyadiah, A. Tuomi, J. Stienmetz and A. Ioannou, Factors influencing users' adoption and use of conversational agents: A systematic review, *Psychology & Marketing*, vol.38, no.7, pp.1031-1051, 2021.
- [22] M. H. Huang and R. T. Rust, Artificial intelligence in service, *Journal of Service Research*, vol.21, no.2, pp.155-172, 2018.
- [23] M. Adam, M. Wessel and A. Benlian, AI-based chatbots in customer service and their effects on user compliance, *Electronic Markets*, vol.31, no.2, pp.427-445, 2020.
- [24] X. Y. Lv, Y. F. Yang, D. Z. Qin, X. P. Cao and H. Xu, Artificial intelligence service recovery: The role of empathic response in hospitality customers' continuous usage intention, *Computers in Human Behavior*, vol.126, DOI: 10.1016/j.chb.2021.106993, 2022.
- [25] M. Shumanov and L. Johnson, Making conversations with chatbots more personalized, *Computers in Human Behavior*, vol.117, DOI: 10.1016/j.chb.2020.106627, 2021.
- [26] C. Crolic, F. Thomaz, R. Hadi and A. T. Stephen, Blame the bot: Anthropomorphism and anger in customer-chatbot interactions, *Journal of Marketing*, vol.86, no.1, pp.132-148, 2022.
- [27] X. S. Cheng, Y. Bao, A. Zarifis, W. K. Gong and J. Mou, Exploring consumers' response to text-based chatbots in e-commerce: The moderating role of task complexity and chatbot disclosure, *Internet Research*, vol.32, no.2, pp.496-517, 2022.
- [28] C. Nass, J. Steuer and E. R. Tauber, Computers are social actors, *CHI 94 Conference - Human Factors in Computing Systems: Celebrating Interdependence*, pp.72-78, 1994.
- [29] S. Diederich, A. B. Brendel and L. M. Kolbe, Designing anthropomorphic enterprise conversational agents, *Business & Information Systems Engineering*, vol.62, no.3, pp.193-209, 2020.
- [30] D. C. Toader, G. Boca, R. Toader, M. Măcelaru, C. Toader, D. Ighian and A. T. Rădulescu, The effect of social presence and chatbot errors on trust, *Sustainability*, vol.12, no.1, 256, 2019.
- [31] Y. Y. Huang, D. Gursoy, M. Zhang, R. Nunkoo and S. Shi, Interactivity in online chat: Conversational cues and visual cues in the service recovery process, *International Journal of Information Management*, vol.60, 2021.
- [32] Z. Cheng, X. Chen and X. Cui, How do relationship marketing activities contribute to customer citizenship behavior in the context of cross-border e-commerce, *International Journal of Innovative Computing, Information and Control*, vol.18, no.6, pp.1957-1967, 2022.
- [33] C. Flavián, M. Guinalú and R. Gurrea, The role played by perceived usability, satisfaction and consumer trust on website loyalty, *Information & Management*, vol.43, no.1, pp.1-14, 2006.
- [34] A. Parasuraman, Technology Readiness Index (TRI): A multiple-item scale to measure readiness to embrace new technologies, *Journal of Service Research*, vol.2, no.4, pp.307-320, 2000.
- [35] Y. W. Chang and J. H. Chen, What motivates customers to shop in smart shops? The impacts of smart technology and technology readiness, *Journal of Retailing and Consumer Services*, vol.58, 102325, 2021.
- [36] J. V. Chen, H. T. Le and S. T. T. Tran, Understanding automated conversational agent as a decision AID: Matching agent's conversation with customer's shopping task, *Internet Research*, vol.31, no.4, pp.1376-1404, 2021.
- [37] G. Y. Nenkov and M. L. Scott, So cute I could eat it up: Priming effects of cute products on indulgent consumption, *Journal of Consumer Research*, vol.41, no.2, pp.326-341, 2014.
- [38] E. J. Finkel, C. E. Rusbult, M. Kumashiro and P. A. Hannon, Dealing with betrayal in close relationships: Does commitment promote forgiveness?, *J. Pers. Soc. Psychol*, vol.82, no.6, pp.956-974, 2002.
- [39] A. Fedorikhin, C. Park and M. Thomson, Beyond fit and attitude: The effect of emotional attachment on consumer responses to brand extensions, *Journal of Consumer Psychology*, vol.18, no.4, pp.281-291, 2008.
- [40] E. Coupey, J. R. Irwin and J. W. Payne, Product category familiarity and preference construction, *Journal of Consumer Research*, vol.24, no.4, pp.459-468, 1998.
- [41] R. L. Hess, The impact of firm reputation and failure severity on customers' responses to service failures, *Journal of Services Marketing*, vol.22, no.5, pp.385-398, 2008.
- [42] A. Parasuraman and C. L. Colby, An updated and streamlined technology readiness index, *Journal of Service Research*, vol.18, no.1, pp.59-74, 2014.

Appendix 1: Overview of Experimental 1 manipulations

	High empathic response	Low empathic response
Scenario	Suppose you are going to buy a black running jacket as a gift for a friend. You choose one in the online store, and then contact the chatbot to inquire about the size. After you click to contact customer service, the chatbot sent you “Hi, welcome to our Sport Messenger! I am a chat assistant Alice and I will serve you during your shopping process. What can I help you?”. You ask “Hi, 170 cm tall, weigh 60 kg, what size should I choose for this one?”. Then, the chatbot replies:	
First response	Sorry, Alice fails to answer your question. Don’t worry, I suggest you select the item you wish to enquire about.	Alice fails to answer your question, please select the item you wish to enquire about.
	You immediately select the product link, and then the chatbot replies:	
Second response	Dear customer, although you may feel a little irritated, can you redescribe the problem again?	Dear customer, please redescribe the problem.
	After you repeat the above query, the chatbot replies:	
Third response	You can choose from the following size chart for this product. I will work harder to be your smart service assistant and help you at any time. I wish you a happy shopping.	You can choose from the following size chart for this product. I wish you a happy shopping.

Appendix 2: Overview of Experimental 2 manipulations

	High empathic response	Low empathic response
Scenario	Suppose you bought a black running jacket as a gift for a friend at an online store. However, the seller has not shipped the goods for a long time, so you contacted the chatbot of the online store to urge the delivery. After you click to contact customer service, the chatbot sent you “Hi, welcome to our Sport Messenger! I am a chat assistant Alice. I will serve you during your shopping process. What can I help you?”. You ask “Hi, why hasn’t the running jacket I bought the day before been shipped yet?”. Afterwards, the chatbot replied, “Dear customer, our order is delivered by the logistics company of the brand owner, generally sutong express and so on and the timeliness is guaranteed”. You keep asking “I’m asking why the order hasn’t shipped yet?”. At this time, the chatbot replies:	
First response	Sorry for not answering your question accurately. I understand that you may be a little impatient now, but please give me another chance to serve you. Please choose an order!	Sorry for not answering your question accurately. Please choose an order!
	You immediately send the order number, and then the chatbot replies:	
Second response	Dear customer, the product will be sent to you tomorrow. I hope this mistake did not affect your mood.	Dear customer, this order will be dispatched tomorrow.
	You then send “Process as soon as possible”. The chatbot replies:	
Third response	Ok. I will help you at any time, and remember to contact me anytime if you need.	Ok. Thank you for your understanding and support.

Appendix 3: Overview of Experimental 3 manipulations

	High empathic response	Low empathic response
Scenario	Suppose you bought a black running jacket in size L as a gift for your friend. Five days later, the friend received a jacket in size M. After trying it on, it was indeed inappropriate, but the style was what your friend liked. So, you contacted the online store chatbot changes size. After you click to contact customer service, the chatbot immediately sent you “Hello, welcome to our Sport Messenger! I am a chat assistant Alice. I will serve you during your shopping process. What can I help you?”. You ask “Hello, the size of the jacket you sent is wrong”. Then, the chatbot replies “Dear customer, the store products are generally normal sizes, and I suggest you refer to the size chart to buy”. You continue to ask, “I mean the size of the jacket is wrong, and I want to exchange”. At this time, the chatbot replies:	
First response	I know you must feel I have not responded to you seriously. Please choose an order!	Dear customer, I am sorry that this service was not completed successfully. Please choose an order!
	You immediately send the order number, and then the chatbot replies:	
Second response	Alice is happy to help you, please click https://12345.cn to exchange.	Dear customer, you can click https://12345.cn to apply for an exchange.
	You then send “Applied, please deal with it as soon as possible”. The chatbot replies:	
Third response	Ok. I will help you at any time, and remember to contact me anytime if you need.	Ok. If you have any questions, you can consult again. Thank you for your understanding and support.

Appendix 4: Overview of measures

Construct	Item	Source
Empathic response	The chatbot understood my specific needs when responding to me. This chatbot gave me individualized attention when responding to me. This chatbot was available to respond to me at any time. This chatbot was putting me at the center of its response. This chatbot thought from my point of view when responding to me. (1 = strongly disagree, 7 = strongly agree)	[15,24]
Forgiveness intention	I understand the failure. I accept the failure. I will forgive the failure. I will give the merchant a new chance to rebuild our relationship. (1 = strongly disagree, 7 = strongly agree)	[38,39]
Social presence	I felt a sense of human contact when interacting with the chatbot. I felt a sense of sociability when interacting with the chatbot. I felt a sense of warmth when interacting with the chatbot. (1 = strongly disagree, 7 = strongly agree)	[30]
Trust	I think the chatbot has the necessary abilities to carry out its work. I think the chatbot has sufficient experience to carry out its work. I think the chatbot has the necessary resources to carry out its work. (1 = strongly disagree, 7 = strongly agree)	[33]

Continued

Technology readiness	<p>Chatbots give me more freedom to shopping. Chatbots give me more control over shopping process. Chatbots make me more productive in shopping. In general, I am among the first in my circle of friends to contact chatbots. I can usually figure out new chatbots services without help from others. When I get technical support from chatbots, I sometimes feel as if I am being taken advantage of by someone who knows more than I do. Chatbots' technical support lines are not helpful because they don't explain things in terms I understand. Sometimes, I think that chatbots are not designed for use by ordinary people. Chatbots lower the quality of relationships by reducing personal interaction. I do not feel confident doing business with a place that can only be reached chatbots. (1 = strongly disagree, 7 = strongly agree)</p>	[42]
Mood	<p>Sad/Happy, Bad mood/Good mood, Irritable/Pleased Depressed/Cheerful (1 = bias to the left negative emotions, 7 = bias to the right positive emotions)</p>	[37]
Purchase experience	<p>I had a similar purchase experience (1 = strongly disagree, 7 = strongly agree)</p>	[40]
Severity of service failure	<p>I think the severity of this service failure is (1 = not at all, 7 = very much)</p>	[41]

Author Biography



Hui Guan received Ph.D. degree in Management from Dalian University of Technology, China, in 2010. Prof. Guan is currently a full-time professor at the School of Economics and Management, Dalian University, China. Her research interests include brand marketing and consumer behaviors, with special attention to the big data, retail, e-commerce and AI.



Xuyan Sun is a Master student at the School of Economics and Management, Dalian University, China. She received the B.Sc. degree in Management from Qingdao University of Science and Technology, China, in 2019. Her research interests include brand marketing and consumer behaviors, with special attention to the e-commerce and AI.