



Consumers' Trust Mechanism and Trust Boundary on Humanizing Customer Service Chatbots in E-commerce

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Abstract. Humanizing customer service chatbots have sparked significant interest for companies across industries. These years have witnessed some controversy on trust issues of such booming application. Previous researches have proposed some antecedents of customer service chatbots adoption (e.g., anthropomorphic features, algorithm aversion, emotional state). However, consumers' trust mechanism and trust boundary on humanizing customer service chatbots are not clear. Hence, we pay attention to personalization and contextualization grounded on above antecedents of customer service, incorporating personal habit, task creativity and social presence to investigate trust mechanism and trust boundary. We propose a research model, in which personal habit and task creativity are captured as independent variables, trust in humanizing customer service chatbots as dependent variable, and social presence as moderating variable. Hypotheses are developed and between-subjects scenario experiments are conducted to test hypotheses. Results of analysis of covariance (ANCOVA) and moderating effect test show that there exists positive effect between personal habit and trust in humanizing customer service chatbots, giving insights on complementary and substitutive influences on the interaction of independent variables and social presence for trust boundary. This paper provides practical and theoretical implications for e-commerce practitioners to improve the collaboration performance of intelligent customer service and human customer service.

Keywords: Trust mechanism · Trust boundary · Humanizing customer service chatbots · Personalization · Contextualization · e-commerce

1 Introduction

As the development of robot process automation (RPA) applications, customer service chatbots have emerged in communication, finance, retail and other fields, and they are revolutionizing the trust mechanism and trust boundary of the entire customer service industry. Since most of the customer service work is massive and repetitive, customer service chatbots, which adopt the applications of artificial intelligence (AI) in work processes, can help to reduce the number of manual receptions and eliminate repetitive work of human employees, while increasing response efficiency and decreasing labor

costs. However, in the electronic commerce (e-commerce) scenarios, the service is still mainly done by human, especially in the after-sales service stage, and the demand of “turning to human customer service” frequently appears in reality. Why are customer service chatbots not widely accepted by consumers in e-commerce? Since a large body of literature have demonstrated that anthropomorphism is found to widely adopted and positively relate to consumer adoption of chatbots [1] leading to more effective conversations [2], beneficial for transaction outcomes as well as contributing to significant increases in offer elasticity [3]. Hence, it is inevitable to examine trust mechanism and boundary of humanizing customer service chatbots from different angles.

In order to explore trust mechanism of consumers on humanizing customer service chatbots in e-commerce, firstly, trust is subjective and related to contexts. Customer traits and predispositions (e.g., computer anxiety), sociodemographic (e.g., gender), and robot design features (e.g., physical, nonphysical) have been identified as triggers of anthropomorphism [4]. In view of these, consumers’ perception of trust may be relevant to their personalized contexts. Hence, it is critical to differentiate the subjective from objective factors that affect consumers’ trust in humanizing customer service chatbots for predicting their subsequent trust. Additionally, positive interaction between social presence and trust in technology adoption area has been explored over years, short of other possible relationships between them [5]. Grounded on the current studies, we distinguished personal habit and task creativity as antecedents, aiming to examine how social presence moderate different consumers’ trust in humanizing customer service chatbots other than direct effects of both independents. Within our work, trust mechanism was exploration of personalization and contextualization (i.e., personal habit and task creativity) for consumers’ trust, while trust boundary was defined as imagined lines that mark the limits or edges of consumers’ enhanced trust and diminished trust (i.e., interaction of antecedents and social presence). The two questions that we seek to address are:

RQ1: How do consumers’ personal habit and task creativity affect their trust in humanizing customer service chatbots?

RQ2: How can social presence enhance consumers’ trust under different consumers’ personal habits and tasks creativity?

To answer the two research questions raised above, we designed a between-subjects scenario experiment to simulate the interaction situations between consumers and humanizing customer service chatbots after a preliminary study for task attributes test. We hired 141 subjects, who were from an IS experimental curriculum. According to personal habits, the subjects were divided into two categories: (1) subjects with interaction habit and (2) subjects without interaction habit, while high creativity and low creativity were set for task creativity respectively. The two-way ANCOVA was used to test the relationship between consumers’ personal habit, task creativity and trust in humanizing customer service chatbots. Furthermore, the moderating effect of social presence was also validated. This paper explores consumers’ trust mechanism and trust boundary on humanizing customer service chatbots, giving implications that help practitioners to make use of the findings to achieve the optimal human-machine coordination effect in e-commerce.

2 Literature Review and Hypotheses

2.1 Humanizing Customer Service Chatbots

Chatbots are autonomous software agents that support text-based exchanges with human users, drawing on tools and techniques from the domain of Natural Language Processing [6]. Customer service is a domain where chatbots have achieved strong and growing interest [7]. A central component in the area on the effective design of autonomous agents has been the role of anthropomorphism [8]. With this, some chatbots are designed to incorporate some attributes such as language style and name to enhance their human likeness [9]. Numerous scholars have provided evidence that humanizing customer service chatbots improve customer evaluation, as an illustration, social cues of anthropomorphism as humor, communication delays or social presence are beneficial for transaction outcomes in retailing setting [3]. Both anthropomorphism as well as the need to stay consistent significantly increase the likelihood that users comply with a chatbot's request for service feedback [10]. Nevertheless, humanizing customer service chatbots appears to only work contextually, e.g., when customers enter a chatbot-led service interaction in an angry emotional state, chatbot anthropomorphism has a negative effect on customer satisfaction, yet this is not the case for customers in nonangry emotional states [11]. Besides, consumers with high social phobia prefer anthropomorphic chatbots to less anthropomorphic chatbots [12].

Additionally, due to consumers not being able to identify their conversational partner when interacting via chats online, companies face the challenge of whether to disclose the identity of chatbots. Prior research pertaining to the chatbot disclosure dilemma indicates that chatbot disclosure does not only have negative consequences, but can lead to positive outcomes as well depending on service context [13], thus setting expectations through cues of AI capability congruent to or less than the actual AI capability can increase engagement of customer service chatbots [14].

2.2 Antecedents of Customer Service Chatbots

Customer Traits. To clarify contextual circumstances in which anthropomorphism impacts customer intention to use chatbots, some studies have investigated relationships between humanizing customer service chatbots and their antecedents [4].

Since personalization is an aspect which is strongly emphasized in IS recently, and consumer personality can be predicted during contextual interactions, customer traits are becoming promising [15]. Specifically, need for interaction with the service employee will have a negative effect on the expected quality of the technology-based self-service option [16], so the anthropomorphism-adoption relationship is stronger on conditioning that a consumer's need for human interaction is higher [1]. Prior research has introduced two related yet distinct constructs about customer traits, namely experience and habit into technology adoption. Experience reflects an opportunity to use a target technology and is typically operationalized as the passage of time from the initial use of a technology by an individual [17]. Habit is defined as learned sequences of acts that become automatic responses to specific situations, which may be functional in obtaining certain goals or end states [18]. Not only the effect of facilitating conditions on behavioral intention to

be moderated by age, gender, and experience, but also the adoption of habit have been clarified [19]. Moreover, experience is a necessary but not sufficient factor for habit formation, and the passage of chronological time can result in different levels of habit contextually. Thus, we adopt personal habit as an antecedent of trust in humanizing customer service chatbots for extending research of personalization to the emerging AI application.

H₁: Consumers' personal habits of interacting with customer service chatbots (vs. without such habit) enhance their trust in humanizing customer service chatbots.

Algorithm Aversion and Attributes of Task. Algorithm aversion is a phenomenon that consumers have a tendency to prefer humans over algorithms [20]. Specifically, when the error is committed by an algorithm, gut reactions are harsher (i.e., less acceptance and more negative feelings) and justice cognitions weaker (i.e., less blame, less forgiveness, and less accountability) [21]. Robots are invariably viewed as lacking human nature abilities (which are emotional) but not human uniqueness abilities (which are cognitive), thus algorithms are trusted and relied on less for tasks that seem subjective in nature [22]. While participants are considerably more likely to choose to use an imperfect algorithm when they can modify its forecasts [23]. Prior findings suggest that consumers' trust vary significantly depending on the type of tasks for which the algorithm is used. In terms of customer service chatbots, there has been little exploration or validation taking attributes of tasks as antecedents of technology adoption.

Attributes of task plays a significant role in consumers' trust, which have been proposed as task objectivity, awareness of algorithms performance and affective ability [22]. Besides, for high-creativity tasks, consumers exhibit lower willingness to adopt AI (vs. human) recommendation, in contrast, consumers exhibit higher willingness to adopt AI (vs. human) recommendation for low-creativity tasks [24]. In our work, we took task creativity into consideration for examining its effect on consumers' trust in humanizing customer service chatbots.

H₂: High task creativity (vs. low task creativity) reduces consumers' trust in humanizing customer service chatbots.

H₃: Consumers with personal habit of interacting with customer service chatbots (vs. without such habit) enhance trust in humanizing customer service chatbots more for high task creativity (vs. low task creativity); while consumers without the habit (vs. with such habit) reduce trust in humanizing customer service chatbots more for high task creativity (vs. low task creativity).

2.3 Social Presence and Consumers' Trust

Social presence theory describes the extent to which a medium allows a user to experience others as being psychologically present [25]. The degree of social presence in an interaction is posited to be determined by the communication medium: the fewer the channels or codes available within a medium, the less attention is paid by the user to the presence of other social participants. For example, transmitting more nonverbal visual or auditory codes such as facial expression, posture, dress, or vocalics would be

more closely to Face-to-Face communication, thereby enhancing the degree of social presence [26]. A growing body of research in IS have investigated the influencing factors of social presence, the learning performance affected by social presence, the group decision-making caused by social presence and consumers' intentions attributed to social presence [27]. Among the areas raised above, multiple scholars have emphasized the important role of trust in forming consumers' intentions, so it's inevitable to analyze the relationship between social presence and trust.

Most current studies paid attention to the interaction between social presence and trust. Specifically, social presence-information richness (SPIR) affects consumers' trust and that trust subsequently has a stronger effect on purchase intentions than TAM beliefs [5]. Besides, by validating a four-dimensional scale of trust, the influence of social presence on these dimensions of trust and its ultimate contribution to online purchase intentions were clarified [28], and a set of three social presence variables (social presence of the web, perception of others, social presence of interaction with sellers) were proposed to have positive impacts on trusting beliefs [29]. Moreover, social presence was found to not only influence initial trust in the website, but also participants' enjoyment and perceived usefulness of the site [30], while social presence does enhance P2P customer trust via both utilitarian and hedonic engagement [31]. In addition, results gathered among Facebook users indicates that trust of a social networking site increases users' information seeking in informational channels, which elevates the sense of social presence [32]. There have been some studies exploring other possible relationships between social presence and trust recently, as how information support moderates the relationship between different social presence dimensions and trust in social commerce [33]. Some scholars also posited that social presence served to enhance/attenuate the influence of institutional trust building antecedents on that trust [34]. Therefore, we aim to validate whether the moderating effect of social presence on trust in humanizing customer service chatbots exists under different levels of personal habit and task creativity.

H_{4a}: For consumers without personal habit of interacting with customer service chatbots, social presence positively moderates the relationship with trust in humanizing customer service chatbots, while this effect does not manifest for consumers with personal habit of interacting with customer service chatbots.

H_{4b}: For tasks with high creativity, social presence positively moderates the relationship with trust in humanizing customer service chatbots, while this effect does not manifest for tasks with low creativity.

Figure 1 illustrates our research model.

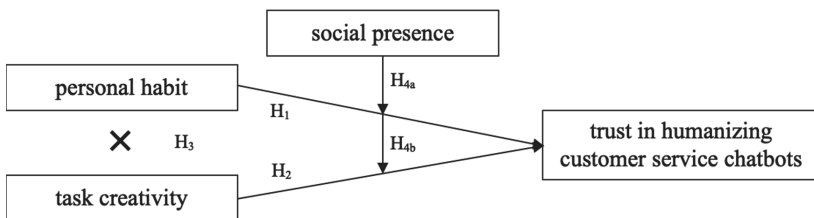


Fig. 1. Research model

3 Methodology

The goal of this experiment was to examine how personal habit and task creativity impact consumers' trust in humanizing customer service chatbots. To explore this, we conducted a 2 (with interaction habit vs. without interaction habit) \times 2 (high task creativity vs. low task creativity) between-subjects scenario experiment. To implement realistic manipulation, real-life online chats on e-commerce platform were evaluated prior to designing experiment. We chose to use scenario experiments, to be able to control confounding influences and ensure high internal validity.

3.1 Preliminary Study

The goal of preliminary study was to distinguish the tasks creativity of two online chatting scenarios. We recruited 94 participants across the universities in Xi'an, Shaanxi (42 males) from November 5 to November 12, and the average age of them was 21. According to realistic scenarios, the pre-sales consulting and after-sales service scenarios were set for them respectively.

1. You found a down jacket on Taobao platform and want to know some details. So, you click on the "customer service chatbot" button and send the link of the product to the chatbot, hoping to ask for the size, material, delivery and coupon information.
2. You had bought this down jacket on Taobao platform. After receiving it, you found that the clothes smelled pungent and the price decreased after a few days. Hence you want to ask the customer service chatbot to explain your problem and propose that you want to refund the difference of price or return the clothes.

Based on the prior research, we selected three attributes of tasks appropriate for our work. Participants rated each of the tasks on how objective versus subjective it seemed, how much creativity they feel this task need, and how difficult versus easy it seemed, assessing constructs on 7-point-likert scales ranging from strongly disagree (1) to strongly agree (7). The tasks as well as the dimensions being rated were presented in random order. The demographics were collected at the end of the scale.

Given that two tasks were evaluated by all the participants, paired samples t-test was conducted to validate the attributes raised above. Results revealed that task creativity ($M_1 = 4.15$, $M_2 = 5.89$, $t = -9.857$, $p < 0.01$) and task difficulty ($M_1 = 2.54$, $M_2 = 2.94$, $t = -2.561$, $p < 0.05$) for the second scenario were significantly higher than the first scenario, while no significant effect was found for task objectivity ($M_1 = 5.61$, $M_2 = 5.52$, $t = 0.647$, $p > 0.1$) across scenarios. Consequently, we utilized task creativity as an antecedent of trust in humanizing customer service chatbots, which was high in after-sales scenario as well as low in pre-sales scenario.

3.2 Stimulus Materials

Preparation of stimuli for the experiment involved two steps: (1) introduction of real humanizing customer service chatbot that was trained based on the current applications, and (2) classification of participants' personal habit according to prior scales. In the

first step, we targeted stores selling clothes on Taobao platform, the top online shopping website around China. It is universally acknowledged that there are hedonic [35] and utilitarian [36] elements comprising attitudes toward product categories, and research has revealed that the influence of social presence on trust and reuse intention with respect to utilitarian products is less than that with respect to hedonic products [37]. For instance, unlike headphones, increasing a firm's social presence for clothes through socially rich descriptions and pictures had a positive impact on attitudinal antecedents to purchase [38]. Therefore, we designed our experiment on a basis of the shopping for clothes. Besides, V5 customer service chatbot that had been widely adopted by e-commerce stores was introduced to our scenario. Apart from training it based on realistic reply of clothes stores chatbots, we configured it with numerous anthropomorphic characteristics (like name it Marry and talking style) and inserted it into WeChat Public Platform for further investigation.

In the second step, personal habit was measured ahead of the main study. Respondents should report their perceptions about habit of interacting with customer service chatbots. "Using customer service chatbots has become automatic to me", "Using customer service chatbots is natural to me" and "When faced with a particular task, using customer service chatbots is an obvious choice for me" [18]. We took the mean of statements on 7-point-likert scales, anchored by 1 = strongly disagree and 7 = strongly agree. The participants whose scores were over 4 were considered as ones with habit of using customer service chatbots, while those who scored under 4 (including 4) were defined as ones without habit of using customer service chatbots.

3.3 Procedure

For the main study, participants were 141 undergraduate students (65 male) from an IS experimental curriculum at Xidian university from December 25, 2021 to January 10, 2022. They received monetary compensation for their participation, and no one failed to complete the study. Demographic measures indicated that 90% were juniors or above, and the average age was 21; about 95% bought products online every month; almost all of them (more than 98%) had experiences interacting with customer service chatbots during online shopping.

As a cover story, participants were introduced to a clothes store on Taobao platform, providing a situation of buying a down jacket. The cover story explained that the participants should follow the notes attached to reply to customer service chatbot. The pre-sales and after-sales situation were given for everyone in different habit groups randomly. Then participants were instructed to ask for the questions they were concerned about (see Fig. 2). Pre-sales consulting was comprised of the size, coupons, material, delivery and so on, and after-sales service was constituted of return of goods, exchange of goods, refund of price difference, etc. Once their problems continued to be unsolved, they could choose to switch to human service.

After interacting with the humanizing customer service chatbot, participants reported their perceptions of (1) trust in humanizing customer service chatbots, (2) social presence, (3) trusting disposition, (4) familiarity with e-commerce platform. As control variables, in addition to controlling for data collection mode, we further gathered measures on demographics.

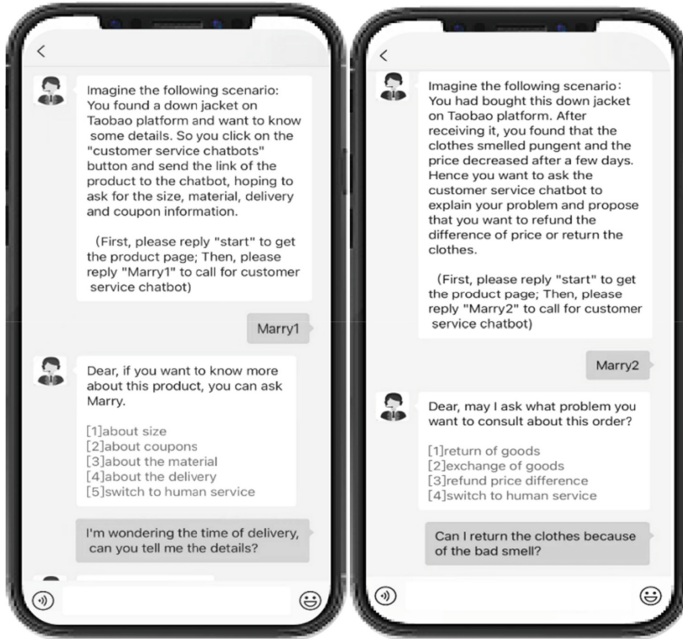


Fig. 2. Exemplary scenario

3.4 Measures

Trust in humanizing customer service chatbots was measured on a 7-point-likert scale, using items of integrity from Straub and Gefen [28], social presence was also measured on a 7-point-likert scale, using 5 items from Straub and Gefen [5]. Trusting disposition was measured on a 7-point-likert scale with 6 items from Straub and Gefen [28]. Familiarity with e-commerce platform was measured on a 7-point-likert scale with 4 items from Gefen [39].

We next examined the reliability and validity of major constructs in our study. Cronbach's alpha of all the constructs was 0.847, and Cronbach's alphas of social presence, trust in humanizing customer service chatbots, trusting disposition and familiarity with e-commerce platform were between 0.857 and 0.933, indicating high internal consistency reliability. According to KMO and Bartlett's test, the KMO measure of sampling adequacy was over 0.7, as well as the Bartlett's test of sphericity was significant, so it was well suited to make a factor analysis next. Then we conducted confirmatory factor analysis (CFA) to assess convergent and discriminant validity of all the constructs (see Table 1). Within standard estimate of factor loadings, the second construct of trusting disposition and the fourth construct of familiarity were below the cut-off value of 0.6, thus we eliminated them for retesting. The updated values were all beyond 0.6. Additionally, average variances extracted (AVE) of social presence, trust in humanizing customer service chatbots, trusting disposition and familiarity with e-commerce platform were 0.74, 0.741, 0.613 and 0.847, respectively, exceeding the cut-off value of 0.5. Besides, composite reliability (CR) for all the constructs were over 0.8, demonstrating

high convergent validity. Finally, the square roots of AVE for all the constructs were greater than the correlations between them, indicating high discriminant validity (see Table 2).

Table 1. Composite Reliability and Convergent Validity

Construct	Measure	Factor loading	CR	AVE
Social presence	There is a sense of human contact interacting with customer service chatbots	0.86	0.934	0.740
	There is a sense of personalness interacting with customer service chatbots	0.861		
	There is a sense of sociability interacting with customer service chatbots	0.898		
	There is a sense of human warmth interacting with customer service chatbots	0.883		
	There is a sense of human sensitivity interacting with customer service chatbots	0.786		
Trust in humanizing customer service chatbots	Promises made by customer service chatbots are likely to be reliable	0.896	0.896	0.741
	I do not doubt the honesty of customer service chatbots	0.801		
	I expect that customer service chatbots will keep promises they make	0.888		
Trusting disposition	I generally trust other people	0.624	0.886	0.613
	I generally have faith in humanity	0.651		
	I feel that people are generally well meaning	0.874		
	I feel that people are generally trustworthy	0.932		
	I feel that people are generally reliable	0.831		
Familiarity with e-commerce platform	I am familiar with searching for products on the Internet	0.907	0.943	0.847
	I am familiar with buying products on the Internet	0.954		
	I am familiar with Taobao platform	0.899		

Table 2. Discriminant validity

	Social presence	Trust	Trusting disposition	Familiarity
Social presence	0.74			
Trust	0.374***	0.741		
Trusting disposition	0.29***	0.028***	0.613	
Familiarity	-0.151***	0.052***	0.282***	0.847
Square roots of AVE	0.86	0.861	0.783	0.92

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level

4 Data Analysis and Results

4.1 Manipulation Test

To validate the main effect of our manipulation, we used analysis of covariance (ANCOVA). Personal habit and task creativity were taken as independent variables, and trusting disposition, familiarity with e-commerce platform, gender, experience of interacting with realistic chatbots as well as expenses of online shopping every month were used as covariates, and trust in humanizing customer service chatbots was defined as dependent variable. The results were shown in Table 3.

Table 3. Analysis of covariance

Source	MS	F	Sig
Trusting disposition	1.606	0.966	0.327
Familiarity	0.756	0.455	0.501
Gender	1.12	0.674	0.413
Experience	8.909	5.36	0.022**
Frequency of online shopping	1.498	0.902	0.344
Expenses of online shopping	3.113	1.873	0.173
Task creativity	0.863	0.519	0.472
Personal habit	16.8	10.108	0.002***
Task creativity * personal habit	12.524	7.535	0.007***
Adjusted R Square	0.129		

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level

The results revealed a significant positive main effect of personal habit on trust in humanizing customer service chatbots ($M_{\text{without habit}} = 4.3276$, $M_{\text{with habit}} = 5.0964$, $F = 10.108$, $p < 0.01$). The above result provided support for H_1 , which stated that consumers’ personal habit of interacting with customer service chatbots enhances their trust in them. However, the main effect of task creativity on trust in humanizing customer service chatbots was not significant ($M_{\text{low creativity}} = 4.8378$, $M_{\text{high creativity}} = 4.7164$, $F = 0.519$, $p > 0.1$). Furthermore, the interaction effect of task creativity and personal

habit on trust in humanizing customer service chatbots was significant ($F = 7.535$, $p < 0.01$). After simple effect analysis, consumers without habit of communicating with customer service chatbots were more likely to trust them under low creativity task ($M_{\text{low creativity}} = 4.7284$, $M_{\text{high creativity}} = 3.9785$, $F = 5.17$, $p < 0.05$), while the trust levels of consumers with habit of communicating with customer service chatbots were not reliably different from both types of tasks ($M_{\text{low creativity}} = 4.9007$, $M_{\text{high creativity}} = 5.3519$, $F = 1.49$, $p > 0.1$). From another perspective, consumers with habit of interacting with customer service chatbots were considered to trust them more under high creativity task ($M_{\text{without habit}} = 3.9785$, $M_{\text{with habit}} = 5.3519$, $F = 18.17$, $p < 0.01$), whereas no significant effect was found under low creativity task ($M_{\text{without habit}} = 4.7284$, $M_{\text{with habit}} = 4.9007$, $F = 0.47$, $p > 0.1$). (see Fig. 3), supporting H_3 .

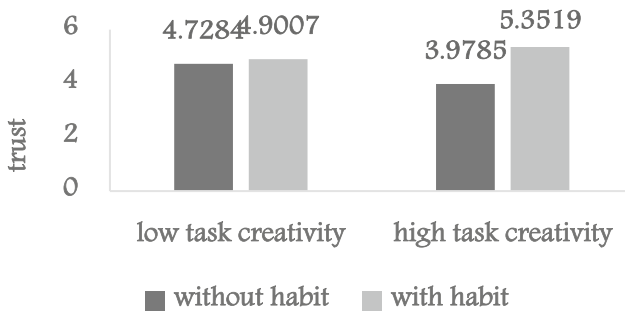


Fig. 3. Interaction effect of task creativity and personal habit

4.2 Moderating Effect Test

To better understand whether the different effects of personal habit and task creativity on trust in humanizing customer service chatbots were moderated by social presence, we conducted moderating effect test next. In line with the main analysis, personal habit and task creativity were confirmed as independent variables, trusting disposition, familiarity with e-commerce platform, gender, experience of interacting with realistic chatbots as well as expenses of online shopping monthly were regarded as control variables, and trust in humanizing customer service chatbots was defined as dependent variable. Finally, social presence was deemed as a moderating variable in this section. We mean-centered the values except personal habit and task creativity (discrete variable) prior to creating the interaction terms to reduce collinearity.

Table 4 presents the results of moderating effect test of social presence on personal habit and trust in humanizing customer service chatbots. When personal habit and social presence were introduced to the model, we found significantly positive effect of the both on trust in humanizing customer service chatbots ($\beta = 0.145$, $p < 0.1$; $\beta = 0.351$, $p < 0.01$). Then we entered the interaction term (personal habit*social presence) in the model, the result showed that social presence moderated the relationship between personal habit and trust in humanizing customer service chatbots ($\beta = -0.375$, $p < 0.01$). We also plotted the interaction effect of personal habit and social presence (see Fig. 4), a positive moderating effect of social presence on personal habit and trust in humanizing customer service chatbots was demonstrated. Specifically, a simple slope

test was conducted. Results found that the moderating effect is significant only when social presence is low.

Table 4. Moderating effect test on personal habit and trust

	Model 1		Model 2		Model 3	
	Beta	t	Beta	T	Beta	t
Control variables						
Trusting disposition	-0.023	-0.26	-0.173	-1.984**	-0.206	-2.428**
Familiarity	0.066	0.737	0.15	1.775*	0.173	2.117**
Gender	0.084	0.937	0.034	0.413	0.009	0.111
Experience	-0.2	-2.243**	-0.153	-1.85*	-0.13	-1.613
Frequency	0.108	1.166	0.112	1.3	0.122	1.474
Expense	-0.126	-1.393	-0.037	-0.427	-0.01	-0.123
Independent variables						
Personal habit			0.145	1.678*	0.121	1.446
Social presence			0.351	3.727***	0.666	5.04***
Interaction term						
Personal habit*social presence					-0.375	-3.284***
F	1.737		4.639		5.627	
R square	0.072		0.219		0.279	

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level

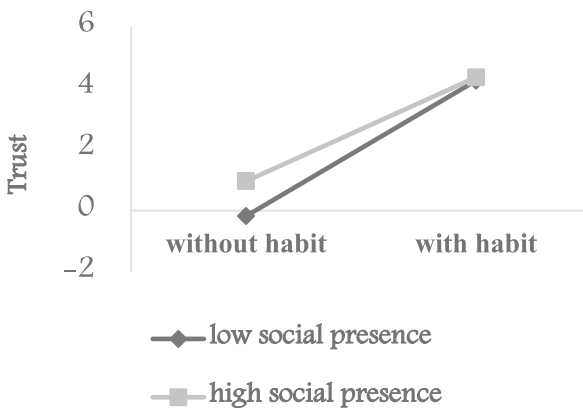


Fig. 4. Interaction plot of personal habit and social presence

Another test for moderating effect of social presence on task creativity and trust in humanizing customer service chatbots was performed (see Table 5). Consistent with the test above, social presence was validated significantly positive for trust in humanizing customer service chatbots ($\beta = 0.419$, $p < 0.01$). After the addition of the interaction term (task creativity*social presence) in the model, we found a significant moderating effect of social presence on task creativity and trust in humanizing customer service chatbots again ($\beta = 0.272$, $p < 0.05$). From the interaction plot (see Fig. 5), social presence remains positively moderating the relationship between task creativity and trust in humanizing customer service chatbots. In accordance with the simple slope test, the moderating effect of social presence is merely significant when social presence is high.

Table 5. Moderating effect test on task creativity and trust

	Model 1		Model 2		Model 3	
	Beta	t	Beta	t	Beta	t
Control variables						
Trusting disposition	-0.023	-0.260	-0.167	-1.875*	-0.145	-1.648
Familiarity	0.066	0.737	0.150	1.748*	0.124	1.453
Gender	0.084	0.937	0.037	0.436	0.044	0.535
Experience	-0.200	-2.243**	-0.161	-1.929*	-0.193	-2.312**
Frequency	0.108	1.166	0.120	1.382	0.120	1.403
Expense	-0.126	-1.393	-0.017	-0.196	0.001	0.007
Independent variables						
Task creativity			0.032	0.393	0.028	0.348
Social presence			0.419	4.611***	0.206	1.607
Interaction terms						
Task creativity*social presence					0.272	2.320**
F	1.737		4.221		4.475	
R square	0.072		0.204		0.235	

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level

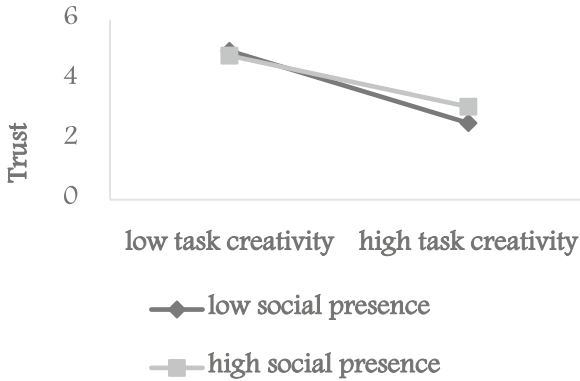


Fig. 5. Interaction Plot of Task Creativity and Social Presence

4.3 Results

By integrating personal habit, task creativity and social presence into conceptual model, this study aims to explore the mechanism and boundary of consumers’ trust in humanizing customer service chatbots. The results of ANCOVA suggest that personal habit plays an important role for consumers’ trust in humanizing customer service chatbots, whereas no significant effect was found from the perspective of task creativity. Consumers with personal habit of interacting with customer service chatbots seem to trust in humanizing customer service chatbots more for high task creativity, while consumers without habit reduces trust in them more for high task creativity. To further investigate the trust boundary, the moderating effect shows that social presence enhances relationship between consumers without personal habit and their trust, only significant for low social presence; while social presence positively moderates relationship between high task creativity and trust, only significant for high social presence.

5 Discussion and Conclusion

From completely new perspectives, this study advances the researches of trust in human-machine coordination in e-commerce scenarios to a new and promising area.

On a theoretical level, first, by leveraging guidelines for personalization and contextualization proposed by recent research, we bring a fresh perspective on trust model of emerging humanizing customer service chatbots. Grounding our arguments in specific antecedents of trust (i.e., personal habit and task creativity), we explain the mechanisms through which consumers’ trust can also be fostered by manipulating the personalized and contextual factors. Second, the studies pertaining to humanizing customer service chatbots are enriched. We break through the great body of current research about whether to accept anthropomorphic chatbots, such as attributes, adoption, working context and disclosure. The hypotheses are established directly on humanizing customer service chatbots, broadening horizons for the research in this topic. Third, we offer insights on other possible relationships between social presence and trust. Although previous literature has extensively examined the relationship between social presence and trust, this study is one of the first to explore the moderating effect of social presence with trust.

From organizational perspective, there are several managerial implications. First, our study highlights the importance of increasing popularity of customer service chatbots for e-commerce platform, building up consumers experience, thereby facilitating them to form relevant habit. With this, the goal of enhancing trust in humanizing customer service chatbots can be achieved over time. Second, it is critical to incorporate functions distinguishing consumers without (vs. with) habit of interacting with customer service chatbots by monitoring their operating proficiency or history for service provider. Consumers without habit are more keen on human customer service assisted under high creative task, in conjunction with certain visual or auditory stimulus for social presence. Moreover, especially for high creative task, 3D product display, voice communication together with virtual reality can be synthesized to maintain high social presence for all consumers. Finally, managers ought to not only emphasize on the anthropomorphic features and response rate of customer service chatbots, but also dedicate more time to training their employees to coordinate with chatbots appropriately.

Our study has some limitations should be noted. First, despite we designed and simulated scenarios, the data were self-reported and may be subject to respondents' cognitive bias or individual differences. Hence, realistic data can complement and extend our findings next. Second, although we have augmented interaction of habit and task creativity together with social presence to identify trust boundary, there is still much space to explore trust boundary in conjunction with qualitative study or experimental study. Third, this study validated hypotheses using cross-sectional data, however, trust is subjective and changing over time. Incorporating time series would be a more beneficial avenue for the future.

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References

1. Sheehan, B., Jin, H.S., Gottlieb, U.: Customer service chatbots: Anthropomorphism and adoption. *J. Bus. Res.* **115**, 14–24 (2020)
2. Roy, R., Naidoo, V.: Enhancing chatbot effectiveness: the role of anthropomorphic conversational styles and time orientation. *J. Bus. Res.* **126**, 23–34 (2021)
3. Schanke, S., Burtch, G., Ray, G.: Estimating the impact of “humanizing” customer service chatbots. *Inf. Syst. Res.* **32**, 736–751 (2021)
4. Blut, M., Wang, C., Wunderlich, N.V., Brock, C.: Understanding anthropomorphism in service provision: a meta-analysis of physical robots, chatbots, and other AI. *J. Acad. Mark. Sci.* **49**(4), 632–658 (2021). <https://doi.org/10.1007/s11747-020-00762-y>
5. Gefen, D., Straub, D.: Managing user trust in B2C e-services. *e-Service* 2(2), 7–24 (2003)
6. Shawar, B.A., Atwell, E.: Chatbots: are they really useful? *Ldv Forum* 22(1), 29–49 (2007)
7. Van Doorn, J., et al.: Domo arigato Mr. Roboto: emergence of automated social presence in organizational frontlines and customers' service experiences. *J. Serv. Res.* **20**(1), 43–58 (2017)
8. Touré-Tillery, M., McGill, A.L.: Who or what to believe: trust and the differential persuasiveness of human and anthropomorphized messengers. *J. Mark.* **79**(4), 94–110 (2015)

9. Araujo, T.: Living up to the chatbot hype: the influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions. *Comput. Hum. Behav.* **85**, 183–189 (2018)
10. Adam, M., Wessel, M., Benlian, A.: AI-based chatbots in customer service and their effects on user compliance. *Electron. Mark.* **31**(2), 427–445 (2020). <https://doi.org/10.1007/s12525-020-00414-7>
11. Cammy, C., et al.: Blame the bot: anthropomorphism and anger in customer–chatbot interactions. *J. Mark.* **86**(1), 132–148 (2022)
12. Jin, S.V., Youn, S.: Why do consumers with social phobia prefer anthropomorphic customer service chatbots? Evolutionary explanations of the moderating roles of social phobia. *Telemat. Inform.* **62**, 101644 (2021)
13. Mozafari, N., Weiger, W.H., Hammerschmidt, M.: The chatbot disclosure dilemma: desirable and undesirable effects of disclosing the non-human identity of chatbots. In: ICIS (2020)
14. Grimes, G.M., Schuetzler, R.M., Giboney, J.S.: Mental models and expectation violations in conversational AI interactions. *Decis. Supp. Syst.* **144**, 113515 (2021)
15. Shumanov, M., Johnson, L.: Making conversations with chatbots more personalized. *Comput. Hum. Behav.* **117**, 106627 (2021)
16. Dabholkar, P.A.: Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality. *Int. J. Res. Mark.* **13**(1), 29–51 (1996)
17. Kim, S.S., Malhotra, N.K.: A longitudinal model of continued IS use: an integrative view of four mechanisms underlying postadoption phenomena. *Manag. Sci.* **51**(5), 741–755 (2005)
18. Limayem, M., Hirt, S.G., Cheung, C.M.K.: How habit limits the predictive power of intention: the case of information systems continuance. *MIS Q.* **31**, 705–737 (2007)
19. Venkatesh, V., Thong, J.Y., Xu, X.: Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Q.* **36**, 157–178 (2012)
20. Dietvorst, B.J., Simmons, J.P., Massey, C.: Algorithm aversion: people erroneously avoid algorithms after seeing them err. *J. Exp. Psychol. Gen.* **144**(1), 114 (2015)
21. Renier, L.A., Mast, M.S., Bekbergenova, A.: To err is human, not algorithmic—Robust reactions to erring algorithms. *Comput. Hum. Behav.* **124**, 106879 (2021)
22. Castelo, N., Bos, M.W., Lehmann, D.R.: Task-dependent algorithm aversion. *J. Mark. Res.* **56**(5), 809–825 (2019)
23. Dietvorst, B.J., Simmons, J.P., Massey, C.: Overcoming algorithm aversion: People will use imperfect algorithms if they can (even slightly) modify them. *Manag. Sci.* **64**(3), 1155–1170 (2018)
24. Jifei, W., et al.: Impact of artificial intelligence recommendation on consumers’ willingness to adopt. *J. Manag. Sci.* **33**(5), 29–43 (2021)
25. Fulk, J., et al.: A social information processing model of media use in organizations. *Commun. Res.* **14**(5), 529–552 (1987)
26. Walther, J.B.: Relational aspects of computer-mediated communication: experimental observations over time. *Organ. Sci.* **6**(2), 186–203 (1995)
27. Mao, C., Yuan, Q.: Social presence theory and its application and prospect in the field of information system. *J. Intell.* **37**(8), 186–194 (2018)
28. Gefen, D., Straub, D.W.: Consumer trust in B2C e-Commerce and the importance of social presence: experiments in e-Products and e-Services. *Omega* **32**(6), 407–424 (2004)
29. Lu, B., Fan, W., Zhou, M.: Social presence, trust, and social commerce purchase intention: empirical research. *Comput. Hum. Behav.* **56**, 225–237 (2016)
30. Ogonowski, A., et al.: Should new online stores invest in social presence elements? The effect of social presence on initial trust formation. *J. Retail. Consum. Serv.* **21**(4), 482–491 (2014)
31. Ye, S., et al.: Enhancing customer trust in peer-to-peer accommodation: A “soft” strategy via social presence. *Int. J. Hospitality Manag.* **79**, 1–10 (2019)

32. Hajli, N., et al.: A social commerce investigation of the role of trust in a social networking site on purchase intentions. *J. Bus. Res.* **71**, 133–141 (2017)
33. Jiang, C., Rashid, R.M., Wang, J.: Investigating the role of social presence dimensions and information support on consumers' trust and shopping intentions. *J. Retail. Consum. Serv.* **51**, 263–270 (2019)
34. Srivastava, S.C., Chandra, S.: Social presence in virtual world collaboration: an uncertainty reduction perspective using a mixed methods approach. *MIS Q.* **42**(3), 779–804 (2018)
35. Hirschman, E.C., Holbrook, M.B.: Hedonic consumption: emerging concepts, methods and propositions. *J. Mark.* **46**(3), 92–101 (1982)
36. Strahilevitz, M., Myers, J.G.: Donations to charity as purchase incentives: how well they work may depend on what you are trying to sell. *J. Consum. Res.* **24**(4), 434–446 (1998)
37. Choi, J., Lee, H.J., Kim, Y.C.: The influence of social presence on customer intention to reuse online recommender systems: the roles of personalization and product type. *Int. J. Electron. Comm.* **16**(1), 129–154 (2011)
38. Hassanein, K., Head, M.: The impact of infusing social presence in the web interface: an investigation across product types. *Int. J. Electron. Commer.* **10**(2), 31–55 (2005)
39. Gefen, D.: E-commerce: the role of familiarity and trust. *Omega* **28**(6), 725–737 (2000)