

# That's so Embarrassing! When not to Design for Social Presence in Human–Chatbot Interactions

*Completed Research Paper*

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## Abstract

*Consumers increasingly rely on chatbots when interacting with firms. This is not only because it is convenient, but also because consumers do not feel judged by these artificial conversational agents. However, when compared to interacting with human employees, interactions with chatbots lack human warmth and sociability. To facilitate these social experiences, firms design their chatbots to convey social presence. Prior research shows that once perceptions of social presence are elicited, consumers' intentions to use the chatbot increase. However, the present work questions whether designing for social presence is always desirable by spotlighting settings in which the topic of the interaction is perceived as embarrassing by consumers. A scenario experiment shows that while designing for social presence by concealing the chatbot's identity increases usage intention in non-embarrassing contexts, it backfires in contexts perceived as embarrassing. These results challenge the current mantra of the salutary effects of social presence in human-chatbot interactions.*

**Keywords:** social presence, chatbots, human-chatbot interaction, chatbot identity, embarrassment, usage intentions

## Introduction

Chatbots, which are “user interfaces that emulate human-to-human communication” (Schuetzler et al. 2018, p. 283), have changed the innate nature of service interactions with firms (Rust and Huang 2014). In comparison to traditional information systems (IS), chatbots are characterized by a higher degree of interaction and intelligence (Maedche et al. 2016). Against this background, more and more firms employ chatbots in their service frontline in addition to human sales employees to help customers in answering questions, provide access to service functions, and facilitate purchase processes. In fact, industry reports predict that by 2025, 95% of customer interactions will be powered by artificial intelligence (Servion Global Solutions 2020). Although developments in natural language processing have made conversations with chatbots more fluent and less prone to misunderstandings (Adiwardana et al. 2020), firms are still concerned how to enhance social experiences for the customer when interacting with chatbots during service encounters (van Doorn et al. 2017).

To facilitate such experiences, firms actively design for social presence, which refers to the degree that the conversational partner is perceived as being there (Gunawardena 1995) and giving off feelings of human warmth and sociability (Gefen and Straub 2003). The goal is to make the customer feel that they are in presence of another social entity (Heerink et al. 2010). In fact, the emergence of social presence perceptions in human-bot interactions has been the focus of a variety of conceptual (e.g., van Doorn et al. 2017) and empirical (e.g., Go and Sundar 2019) studies. In a human-chatbot interaction context specifically, social presence has been one of the most frequently analyzed variables (Zierau et al. 2020). Prior research suggests that high levels of social presence are achieved through humanizing chatbots, often to the point that consumers are not sure whether they are interacting with a chatbot or a human person (Candello et al. 2017; Wuenderlich and Paluch 2017).

In fact, a recent meta-analysis by Blut et al. (2021) finds support for the idea that humanizing chatbots leads to higher social presence perceptions, which can lead to higher intentions to use the bot, largely disproving previously proposed negative consequences (e.g., the uncanny valley effect; Mori et al. 2012). Furthermore, research shows when a chatbot's identity is actively disclosed, it leads to a decrease in social presence (De Cicco et al. 2020; Hendriks et al. 2020) as well as usage (Luo et al. 2020). In sum, recent research supports firm's increased efforts in designing for social presence: On the one hand, research shows that if a chatbot interaction design creates perceptions of social presence, it fosters usage. On the other hand, if a firm chooses not to elicit social presence through specifically designing their chatbot's identity, usage declines. The positive relationship between social presence and usage intentions seems apparent, as humans like to be in social company and interact with someone they perceive as a warm and social being (van Doorn et al. 2017).

Interestingly, while the prevailing motivation for contacting a chatbot is convenience, triggered by around-the-clock availability and short response time (Brandtzaeg and Følstad 2017), another common argument for chatbot usage is that users do not feel judged by the conversation partner (Zamora 2017). This means that customers tend to rely on chatbots to address, for instance, embarrassing or otherwise uncomfortable topics that they prefer not to discuss with humans. In these contexts, it is questionable whether consumers appreciate a socially present conversational partner. Supporting this notion, traditional service research has found evidence for the fact that social presence is not desirable in contexts that create feelings of embarrassment (Dahl et al. 2001). Surprisingly, this topic remains largely unexamined in the context of human-chatbot interactions.

Therefore, we bring forth the argument that while presenting chatbot identity in a way that fosters social presence may be beneficial in neutral interaction contexts, this may not be the case for more sensitive, embarrassing contexts. Consequently, painting humanizing chatbots as a "silver bullet" undermines the existence of possible dark side effects. To gain a deeper understanding on the repercussions of chatbot identity design on usage intentions, prior research calls to include meaningful mediators, as well as different contexts in which the chatbot operates (Blut et al. 2021).

The research goal of this study is to examine the effect of chatbot identity (i.e., whether chatbot identity is disclosed or concealed) on usage intentions through social presence. We propose that while disclosing the chatbot's identity may lower social presence and therefore hamper usage in neutral contexts, this effect may not be present in contexts where social presence is not desired, i.e. in embarrassing contexts.

The rest of the article is structured as follows: We begin with presenting the theoretical background of the study, which includes a conceptualization of social presence and its impact on behavioral outcomes as well as a review of related work on chatbot identity. Based on this, we present our research framework and derive hypotheses, which are then tested in the empirical examination. We outline study design, sample, measures and manipulation checks before presenting and discussing results. The article closes with theoretical and practical contributions, limitations, future research directions and concluding comments.

## **Theoretical Background and Related Work**

In the following section, we discuss theories that deal with explaining social presence, as well as predicting the effect of social presence on behavior. Furthermore, we present related work on chatbot identity.

## ***Social Presence and Evaluation Apprehension***

To explain when (not) to design for social presence, we rely on social presence theory. Social presence theory is one of the most widely recognized communication theories (Moffett et al. 2020). Originally developed by Short et al. (1976), social presence is defined as the “degree of salience of the other person in the interaction” (Short et al. 1976, p. 65). Put more simply, the concept of social presence refers to the degree to which another person is perceived as being there (Gunawardena 1995) and is closely related to feelings of personal connection, human warmth and sensitivity (Kumar and Benbasat 2006). Social presence theory posits that different communication media differ in their capacity to create feelings of social presence (Short et al. 1976). While social presence was originally conceptualized as an objective media attribute, later works refer to it as a subjective perception of the nature of a communication medium (Steinfeld 1986; Walther 1992).

Social presence perceptions then again account for why people choose a certain medium for a specific interaction. Especially for interactions that require personal involvement, high social presence fosters usage (Miranda and Saunders 2003). Interestingly, social presence perceptions do not necessarily require actual human presence, it suffices for it to be imagined (Dahl et al. 2001). Therefore, the concept of social presence can be translated to situations that do not involve a human counterpart. Correspondingly, in the context of human-bot interactions, the concept of “automated social presence” has emerged, which refers to social presence perceptions in interactions with technology (van Doorn et al. 2017). In line with points brought forward in social presence theory, the authors’ framework suggests that automated social presence facilitates social cognition, i.e. warmth and competence perceptions (Fiske et al. 2007), which in turn causes desirable behavioral outcomes.

However, research from social psychology has shown that presence of others will not always facilitate behavior, but can also inhibit it (Zajonc 1965). The reasoning behind this effect is the apprehension of being evaluated (Cottrell et al. 1968; Geen 1983). That is, in a social interaction, individuals feel apprehensive over being judged by other present individuals. In embarrassing situations that threaten one’s self-presentation and hence involve an aversive emotional state, this evaluation is particularly unwanted (Dahl et al. 2001). In these settings, the apprehension of negative evaluation inhibits their behavioral response. Therefore, social presence – whether human (Short et al. 1976), imagined (Dahl et al. 2001) or automated (van Doorn et al. 2017) – may also backfire and cause undesirable behavioral outcomes.

All in all, social presence theory and evaluation apprehension theory represent two counteracting perspectives which have to be carefully balanced: While designing for social presence can satisfy the desire for social interaction, it may also increase the apprehension of being evaluated negatively. The next section reviews prior empirical work that covers how different representations of a conversational partner’s identity are used to elicit feelings of social presence and how this affects consumer responses.

## ***Related Work on the Impact of Chatbot Identity***

Prior work has established that information related to the identity of a conversational partner represents a simple lever to influence humanness perceptions (Go and Sundar 2019). This information triggers specific scripts that form certain impressions or evaluations, in order to reduce cognitive effort (Ashforth and Humphrey 1997). In service interactions, the conversational partner can either be an automated technology (i.e., a chatbot) or a human service representative. While the comparison of bots vs. humans has been the focus of various previous studies (e.g., Belanche et al. 2020), this paper addresses different ways of portraying chatbot identity. Chatbot identity can be disclosed (i.e., actively telling customers they are interacting with a technology and not a human), concealed (i.e., not actively revealing chatbot identity) or disguised as human (i.e., deceiving customers into believing they are interacting with a human being).<sup>1</sup>

In case chatbot identity is concealed (or even disguised as a human), the conversational partner should be perceived as more human, which leads individuals to evaluate the interaction based on their prior experience with human firm representatives. However, if chatbot identity is disclosed, the interaction will be processed based on individuals’ prior dispositions towards chatbots, rather than humans. Notably,

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<sup>1</sup> Note that this research focuses on disclosing chatbot identity vs. concealing it, but not disguising the chatbot as a human person, as this may be questionable from an ethical (Thomaz et al. 2020; Leong and Selinger 2019) and legal perspective (California Legislative Information 2018).

evaluations triggered by information on identity should have more weight in evaluating the conversational partner than the actual conversational quality (Koh and Sundar 2010).

When taking a look at empirical work that examines the impact of chatbot identity information, there seems to be an overarching consensus that disclosing chatbot identity has a negative effect on customer perceptions and behavior, compared to concealing it or disguising it as human. For example, Shi et al. (2020) find that customers are more likely to be persuaded by a chatbot whose identity is concealed than disclosed. Another study shows that customers are more likely to cooperate with a chatbot if it purports to be a human (Ishowo-Oloko et al. 2019). This seems not only to be the case in text-based interactions, as a study by Luo et al. (2020) shows. The authors find that if chatbot identity is disclosed in an interaction via telephone, customers are more likely to hang up and consequently less likely to make a purchase. While prior work has shown that chatbot disclosure can have positive effects in failure settings, still, in successful service interactions, disclosed chatbots are trusted less (Mozafari et al. 2021).

There is a small number of studies that examine the effect of chatbot identity on social presence. Findings are in line with the results presented above, in that disclosing chatbot identity negatively affects social presence (De Cicco et al. 2020; Go and Sundar 2019; Hendriks et al. 2020). Specifically, Go and Sundar (2019) find that disclosing chatbot identity lowers social presence perceptions in an online purchase setting. De Cicco et al. (2020) also examine reactions to chatbot identity in an online purchase setting and find that disclosing (vs. concealing) chatbot identity negatively affects social presence, which in turn negatively affects usage intentions. Finally, Hendriks et al. (2020) come to the same conclusion in that disclosing chatbot identity reduces social presence perceptions compared to concealing it or disguising it as human in a customer service setting where a purchased product is returned.

Interestingly, among the studies that examined the effect of chatbot identity on social presence, the contexts in which the interactions are set are neutral purchase or post-purchase settings. The choice and potential limitations of these contexts are not further discussed in the studies, as they are not central to the authors' lines of reasoning. However, studies that examine relevant chatbot usage contexts find that people like to rely on bots for sensitive content, which may be too embarrassing to ask a human service employee about (Zamora 2017). This could refer to chatbots answering embarrassing questions or purchasing a product that may be perceived as embarrassing through a chatbot. In fact, recent work by Pitardi et al. (2021) has found that feelings of embarrassment are more likely to emerge in interactions with human employees than with service robots. The authors point out that different robot configurations (e.g., different degrees of humanness) could affect consumer responses in embarrassing contexts differentially, this however remains unexamined in their work. On a related note, some empirical studies have investigated users' willingness to disclose sensitive information to bots. Results show that users are more likely to disclose sensitive issues to computers, rather than to human interviewers (Lind et al. 2013) and that a human-like chatbot produces more socially desirable answers to sensitive questions than a less human-like chatbot (Schuetzler et al. 2018).

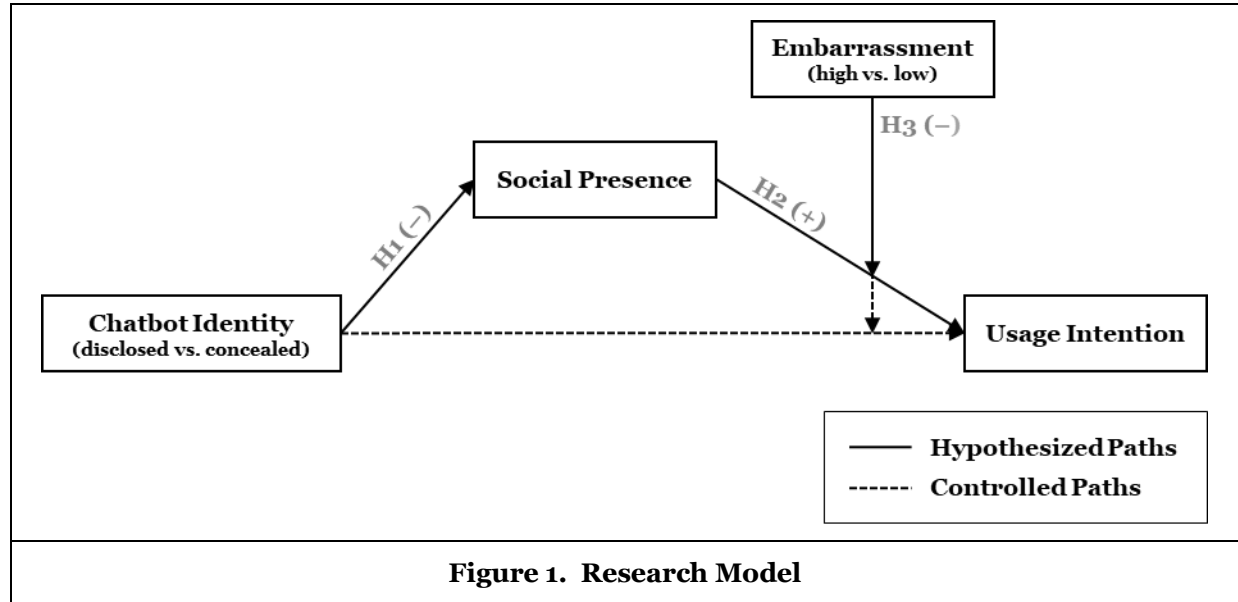
In summary, it can be stated that the majority of studies that analyze the effects of disclosing chatbot identity on social presence or behavioral outcomes focuses on the negative repercussions that are explained by negative dispositions towards chatbots. However, we are the first to stress that the dominance of negative dispositions can be a result of a lack of variety in considered contexts, or more specifically, that prior research on chatbot identity does not consider embarrassing contexts. Notably, the few studies that do examine the deployment of bots for embarrassing encounters emphasize the importance of bots in these settings. Yet, no prior work has thus far explored the repercussions of disclosing chatbot identity in purchase contexts that may elicit feelings of uncomfortableness and embarrassment.

## **Hypotheses**

In the following section, we present our research framework and derive hypotheses for the effect of chatbot identity on usage through social presence, as well as the moderating effect of embarrassment. For this purpose, we draw on social presence theory and evaluation apprehension theory.

## Research Framework

Figure 1 displays our research model. To understand in which contexts to design (or not to design) for social presence, we examine the effect of chatbot identity on usage intentions through social presence. We postulate that the effect of social presence on usage intentions is dependent on the nature of the interaction context, specifically whether feelings of embarrassment emerge. The model further depicts possible direct effects in the dotted arrows, which are included to test for partial or indirect-only mediation (Zhao et al. 2010).



### The Effect of Chatbot Identity on Usage Intention Through Social Presence

As all technology-mediated communication, human-chatbot interaction is generally characterized with low social presence perceptions, as social cues are filtered out (Walther 2011). Particularly chatbots have limited capabilities for conveying cues that are usually transmitted nonverbally in face-to-face interactions (e.g., empathy and warmth). To account for this and to create a stronger social experience, chatbots are usually equipped with cues that emulate those of human interactions (Feine et al. 2019). “By making humans out of robots” (Blut et al. 2021, p. 638), it is aimed to make people feel they are connecting or interacting with a live person. This in turn helps creating an interaction of emotional significance (Gooch and Watts 2015).

However, prior research shows that it may not be necessary to make a human out of a chatbot to elicit changes in social presence perceptions: Significant decreases in social presence can be a result of minor changes in chatbot design, namely whether the chatbot identity is disclosed or not (De Cicco et al. 2020; Go and Sundar 2019; Hendriks et al. 2020). When processing the information on the chatbot’s identity, consumers will rely on their prior disposition towards chatbots to evaluate their conversational partner. Chatbots are associated with lower warmth and perceived as less knowledgeable (Luo et al. 2020). By contrast, if the chatbot’s identity is concealed, the conversational partner should be perceived as less machine-like and more human-like, therefore social presence should be increased. Therefore, in line with prior findings, we postulate following hypothesis:

*H1: If chatbot identity is disclosed (vs. concealed), social presence decreases.*

Moreover, social presence theory suggests that social presence influences the choice of a communication medium. The question whether social presence mediates the relationship between chatbot or robot characteristics and positive user responses has been focus of a variety of other studies, e.g. studies on bots as caregivers (Kim et al. 2013), bots as companions (Heerink et al. 2008), and bots with different personalities (Lee et al. 2006). All studies are in accordance that once social presence is created, usage will follow. This is because social presence is associated with higher consumer trust (Gefen and Straub 2004;

Toader et al. 2020) as well as higher socialness (van Doorn et al. 2017). Therefore, high social presence should be positively associated with usage intentions, while low social presence should affect usage intentions negatively. Hence:

*H2: Social presence increases usage intention.*

### **The Moderating Role of Embarrassing Contexts**

The relationship posited in H2 should only exist if social presence is required in the interaction (Short et al. 1976). We take this one step further and postulate that there are contexts in which social presence may not only not be required, but not desired, i.e. embarrassing contexts.

We posit that findings from prior research on the positive effect of social presence on usage intentions will not apply in embarrassing contexts, as the desire for social presence is lower or even non-existent. This is further in line with the notion that presence of others elicits the apprehension of being evaluated, which then negatively affects behavioral outcomes (Geen 1983). If individuals feel they are in company of another social entity in an embarrassing context, evaluation apprehension increases as they fear being morally or socially judged negatively. As a consequence, behavior is inhibited.

Notably, service research shows that for reactions to social presence to occur, it suffices for the presence to be merely imagined (Dahl et al. 2001), for example through humanness cues of the communication medium used. Furthermore, not only social psychology but IS research supports the notion that a technology needs to fit to the task it fulfills, as stated in task-technology fit theory (Goodhue and Thompson 1995). Moreover, design science research proposes that social perceptions created through chatbot design have to match the context (Gnewuch et al. 2017). If chatbot perceptions and context do not match, usage intentions should be thwarted. In line with this, we assume that if a human-chatbot interaction is set in an embarrassing context, social presence creates feelings of being observed or negatively evaluated, which will then lower usage intentions. Therefore, we postulate the following hypothesis:

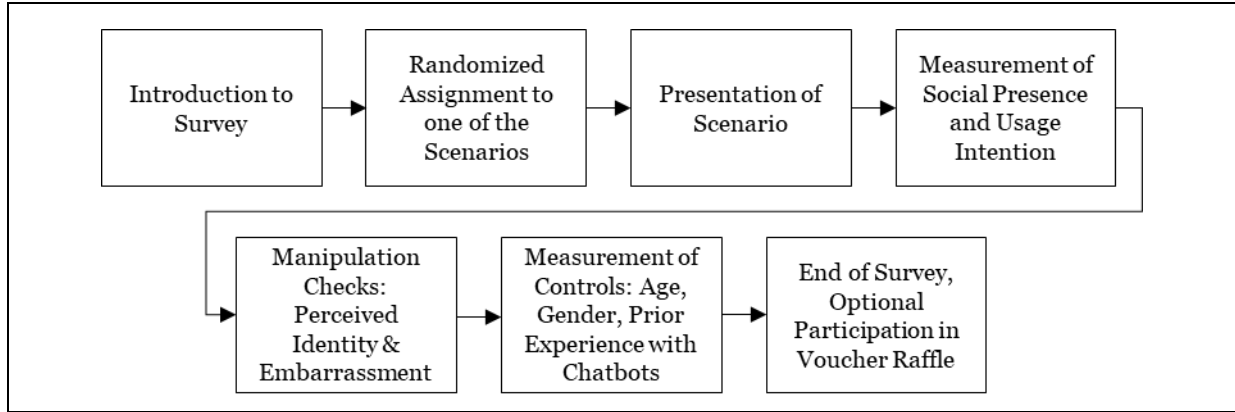
*H3: High embarrassment mitigates the positive effect of social presence on usage intention.*

## **Empirical Study**

The goal of the study is to test the effect of chatbot identity on social presence and usage intention, under the consideration of two different product contexts. The following sections describe design and sample, measures and manipulation checks as well as method and results.

### **Design and Sample**

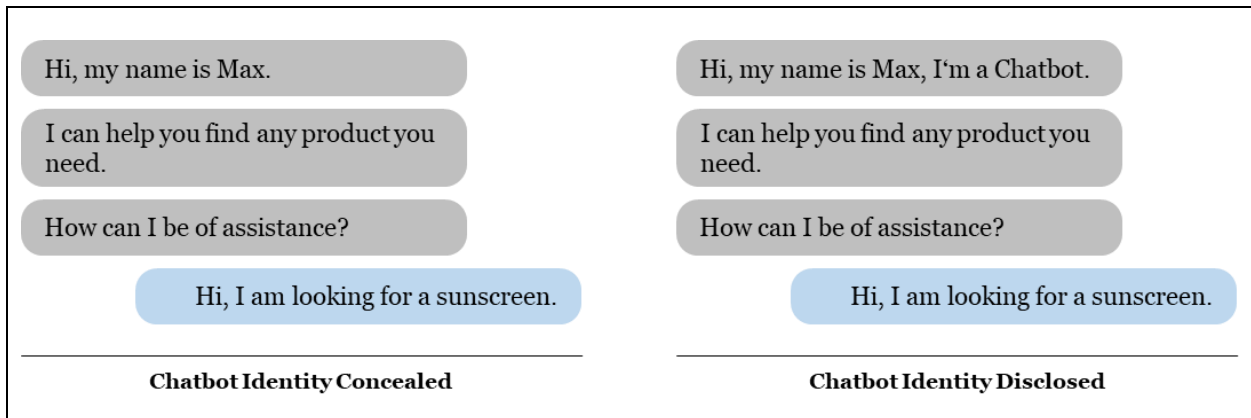
To test the hypotheses, we conducted a 2 (chatbot identity disclosed vs. concealed)  $\times$  2 (high vs. low embarrassment) between-subject scenario experiment. The full procedure of the experiment is displayed in Figure 2. Participants from a European university were recruited using distribution lists and social media. Participation was rewarded with a raffle of online shopping vouchers. All conversations were presented to participants as vignettes. This type of experimental design was chosen in order to control for confounding influences and to ensure high internal validity. In doing so, we could assure that the interactions were fully identical except for the respective manipulations.



**Figure 2. Experimental Procedure**

In the study, participants were instructed to imagine that they needed to buy a product via an online pharmacy. To find the right product, they decided to get in contact with a representative of the pharmacy via the online chat provided on the website. Participants were randomly assigned to one of the four scenarios. In the low embarrassment scenario, they were instructed to imagine they needed to buy a sunscreen lotion for their irritated skin. In the high embarrassment scenario, the respective product was a hemorrhoid cream for their irritated skin, which is naturally perceived as more sensitive and makes individuals more concerned about how others think about them than a sunscreen. The product category of creams was chosen based on prior studies on embarrassment perceptions (e.g., Annamalai et al. 2019). We specifically chose the respective products as they are gender neutral and their choice may require assistance, which is then provided by the chatbot in the online chat (Go and Sundar 2019). Further, we chose a purchasing situation instead of a non-purchase related service situation to be coherent to prior studies on the effect of chatbot identity on social presence.

In the chat conversation, the pharmacy representative either merely introduced himself as “Max” or added the information that he was a chatbot (see Figure 3). The rest of the conversation was identical in all scenarios, in that the conversational partner asked whether the customer had any allergies, how sensitive their skin was and if they wanted to purchase a product with natural ingredients only. In the end of the conversation, the conversational partner recommended a generic, fictitious sunscreen (hemorrhoid cream) to the customer.



**Figure 3. Manipulation of Chatbot Identity**

After going through the scenario, participants reported social presence and usage intention on 7-point-likert scales, anchored by 1 = strongly disagree and 7 = strongly agree. Further, we collected manipulation checks for chatbot identity and embarrassment as well as attention checks. The study closed with questions on age, gender as well as a control variable on prior experience with chatbots (“I am experienced in using chatbots” on 7-point-likert scale), as this might influence the dependent variables. The initial sample consisted of 197 participants. 28 participants were dropped from the sample as they did not answer attention checks correctly (attention checks included indicating the product they planned to purchase, indicating the name of the conversational partner and ticking scale point “2” when instructed to do so). The final sample consists of 169 participants, which are evenly distributed across the four scenarios. 66% of the sample is female, the mean age of participants is 28 years. Descriptive statistics and correlations can be found in Table 1.

	Mean/ Proportion	SD	1.	2.	3.	4.	5.	6.	7.
1. Chatbot Identity	50 %	-	1						
2. Social Presence	2.73	1.35	-0.10	1					
3. Embarrassment	51 %	-	-0.04	0.03	1				
4. Usage Intention	4.40	1.67	-0.04	0.39	0.05	1			
5. Age	28.33	9.51	0.00	-0.02	0.03	-0.21	1		
6. Gender	66 %	-	0.02	0.16	0.00	0.11	-0.13	1	
7. Prior Experience	4.41	1.69	0.18	0.20	-0.03	0.32	-0.16	-0.04	1

**Table 1. Descriptive Statistics and Correlations**

### **Manipulation Checks, Reliability and Validity**

The manipulation check for chatbot identity (perceived identity, “Please rate whether you think you talked to an automated chatbot or a human service employee” anchored by automated chatbot (1) and human service employee (7); Go and Sundar 2019) is significant, with respondents in the chatbot identity scenario perceiving their conversational partner significantly more as a chatbot than in the scenario where chatbot identity was concealed ( $M_{\text{Disclosed}} = 1.96$ ,  $SD = 1.3$ ;  $M_{\text{Concealed}} = 3.21$ ,  $SD = 1.8$ ;  $t = -5.26$ ,  $p \leq 0.001$ ). The manipulation check for perceived embarrassment (“The product is not embarrassing at all (1) / very embarrassing (7) to me”; Parrott and Smith 1991) is also significant, with respondents in the high embarrassment scenario perceiving it more embarrassing than in the low embarrassment scenario ( $M_{\text{HighEmbarrassment}} = 4.11$ ,  $SD = 1.6$ ;  $M_{\text{LowEmbarrassment}} = 1.14$ ,  $SD = 0.5$ ;  $t = -16.28$ ,  $p \leq 0.001$ ).

Multi-item constructs, i.e. social presence and usage intention, were measured by taking the mean of participants’ statements on the 7-point-likert scales. We examined construct reliability and validity of the two multi-item constructs by employing different methods. First, Cronbach’s alpha and composite reliability measures are above the threshold of 0.7, which indicated construct-level reliability (see Table 2) (Hulland et al. 2018). Further, the Fornell and Larcker (1981) test indicates initial evidence for convergent validity as the average variance extracted (AVE) for each multiple-item construct exceeds 0.50 and is larger than their shared variance. Finally, we rely on the heterotrait-monotrait method to demonstrate discriminant validity (Henseler et al. 2015; Krämer et al. 2020), which yields a value of 0.42, which is well-below the conservative cut-off value of 0.85. The upper limit of the 97.5% bias-corrected confidence interval is 0.56, which strengthens the confidence in the discriminant validity exhibited by the constructs.



Construct	Item	Item loadings	$\alpha$	AVE	CR
Social Presence (Gefen and Straub 2003)	I felt a sense of human contact with the conversational partner.	0.88	0.93	0.77	0.95
	I felt a sense of personalness with the conversational partner.	0.89			
	I felt a sense of sociability with the conversational partner.	0.85			
	I felt a sense of human warmth with the conversational partner.	0.88			
	I felt a sense of human sensitivity with the conversational partner.	0.89			
Usage Intention (Tang et al. 2004)	Assuming that I need to purchase a product at the online pharmacy, I intend to contact my conversational partner again.	0.97	0.93	0.97	0.97
	I intend to contact my conversational partner in the future.	0.97			
Notes: $\alpha$ = Cronbach's alpha; AVE = average variance extracted; CR = construct reliability; all item loadings are significant at $p \leq 0.001$					
<b>Table 2. Measures of Multi-item Constructs</b>					

## Method and Results

To test the individual effects, we conducted a seemingly unrelated regression (SUR). As the dependent variable in the social presence model represents the independent variable of the usage intention model, the equations are theoretically linked. This could result in correlating standard errors, which SUR readily accounts for. The method is thus able to provide more efficient estimates for coefficients than by simply estimating two separate equations (Zellner 1962). Furthermore, SUR can simultaneously estimate direct and indirect effects (Preacher and Hayes 2004; Zhao et al. 2010). The following two equations are estimated simultaneously:

$$(1) SP_i = \beta_0 + \beta_1 CI_i + \beta_2 AGE_i + \beta_3 GEN_i + \beta_4 EXP_i + \varepsilon_{1i}$$

$$(2) UI_i = \gamma_0 + \gamma_1 CI_i + \gamma_2 SP_i + \gamma_3 EMB_i + \gamma_4 EMB_i \times SP_i + \gamma_5 EMB_i \times CI_i + \gamma_6 AGE_i + \gamma_7 GEN_i + \gamma_8 EXP_i + \varepsilon_{2i}$$

where  $SP_i$  is social presence,  $UI_i$  is usage intention,  $CI_i$  is chatbot identity and  $EMB_i$  is embarrassment. The included control variables are:  $AGE_i$  for age,  $GEN_i$  for gender and  $EXP_i$  for prior experience with chatbots.  $\varepsilon_{1i}$  and  $\varepsilon_{2i}$  are the disturbance terms for each subject  $i$ . Equation (1) represents the social presence model, equation (2) represents the usage intention model.

Table 3 contains the results for the two equations. Supporting H1, disclosing chatbot identity decreases social presence perceptions ( $\beta_1 = -0.40$ ,  $p \leq 0.05$ ). Furthermore, social presence positively affects usage intention ( $\gamma_2 = 0.58$ ,  $p \leq 0.001$ ), supporting H2. Finally, there is also support for H3, as the interaction of embarrassment and social presence negatively affects usage intention ( $\gamma_4 = -0.34$ ,  $p \leq 0.05$ ).

Independent Variables	(1) Social Presence Model		(2) Usage Intention Model	
	Coeff.	SE	Coeff.	SE
Chatbot Identity (1 = disclosed, 0 = concealed)	-0.40*	0.20	-0.27	0.31
Social Presence	-	-	0.58***	0.12
Embarrassment (1 = high, 0 = low)	-	-	0.97	0.57
Embarrassment × Social Presence	-	-	-0.34*	0.17
Embarrassment × Chatbot Identity	-	-	0.23	0.44
Age	0.01	0.01	-0.02*	0.01
Gender (1 = female, 0 = not female)	0.50*	0.21	0.18	0.24
Prior Experience with Chatbots	0.19**	0.06	0.24***	0.07
Constant	1.59***	0.48	2.41***	0.65
R <sup>2</sup>	0.09		0.27	

Notes:  $n = 169$ ; Coeff. = coefficient; SE = standard error; \* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; \*\*\* $p \leq 0.001$

**Table 3. Results of Seemingly Unrelated Regression**

To estimate indirect effects and bias-corrected bootstrapped confidence intervals, a mediation analysis using the products of coefficient methods was applied (Zhao et al. 2010). Results can be found in Table 4. The results show, that when embarrassment is low, the indirect effect of chatbot identity on usage intention through social presence is negative ( $\beta_1\gamma_2 = -0.23$ , Lower level confidence interval [LLCI] =  $-0.53$ , upper level confidence interval [ULCI] =  $-0.02$ ) because the 95% confidence intervals do not include zero. However, when embarrassment is high, the indirect effect is positive ( $\beta_1\gamma_4 = 0.14$ , LLCI =  $0.01$ , ULCI =  $0.43$ ).

Furthermore, we included the direct effect of chatbot identity on usage, as well as the interaction between chatbot identity and embarrassment in our model to test for possible direct effects. Results in Table 3 show that there is neither a significant direct effect from chatbot identity ( $\gamma_2 = -0.27$ ,  $p = 0.382$ ), nor from the interaction of chatbot identity and embarrassment ( $\gamma_5 = 0.23$ ,  $p = 0.603$ ) on usage intention. Therefore, the mediation observed in Table 4 is indirect-only (Zhao et al. 2010).

Path	Coeff.	SE	LLCI	ULCI
Low Embarrassment: Chatbot Identity → Social Presence → Usage Intention	-0.23	0.13	-0.53	-0.02
High Embarrassment: Chatbot Identity → Social Presence → Usage Intention	0.14	0.10	0.01	0.43

Notes:  $n = 169$ ; number of bootstrap samples = 5000; Coeff. = coefficient; SE = standard error; LLCI = 95 % lower level confidence interval; ULCI = upper level confidence interval.

**Table 4. Results of Mediation Testing**

## **Discussion**

The goal of our study was to test the effect of disclosing chatbot identity on usage intentions, while considering social presence as a mediating mechanism. Further, we examined the moderating role of contexts with high versus low levels of embarrassment. The following section discusses the results and lays out how they contribute to current research on human-chatbot interactions. Furthermore, we shed light on possible limitations of our study, which should open further avenues for research.

### **Contributions**

The results of our study provide several theoretical and practical contributions. The empirical analysis shows that designing for social presence through merely concealing the chatbot's identity increases usage intentions in neutral interaction contexts that are not perceived as embarrassing. This finding supports the general notion of social presence having a positive effect on usage intentions. Generally, human-chatbot interactions are characterized through a low level of sociability, compared to interactions between two humans. However, consumers strive for personal interactions with human warmth (Gooch and Watts 2015). If this perception is created in human-chatbot interactions, usage is fostered. Our findings therefore contribute to prior findings on the positive relationship of social presence and usage. Additionally, our analysis shows that social presence fully mediates the relationship between chatbot identity and usage intentions, which should further demonstrate the relevance of the concept of social presence in human-chatbot interactions. This finding is in line with social presence theory and contributes to its understanding in the context of human-chatbot interactions.

Interestingly, the positive effect on usage through social presence is particularly pronounced when the chatbot identity is concealed in the chat interaction. It is worth noting that, while this resulted in participants perceiving the conversational partner less as a chatbot, they still were not under the assumption they were interacting with a human being, as the generally low mean values of the manipulation check demonstrate. This means, in order to enhance social presence, firms do not have to make "humans out of robots" (Blut et al. 2021, p. 638), but instead merely draw focus off the chatbot's identity and artificial nature. Our results support prior studies' findings in that social presence is higher when chatbot identity is concealed, compared to it being lower when chatbot identity is disclosed. Furthermore, our findings suggest that the increase in social presence through concealing chatbot identity is not a result of customers being deceived into thinking they are interacting with a human person, but rather because they are less aware of the chatbots artificial, automated nature. By contrast, disclosing chatbot identity draws focus on the conversational partner's machine nature, and therefore mitigates perceptions of human warmth and socialness. From a theoretical perspective, this finding is in line with the notion that identity labels trigger social scripts to form evaluations based on prior knowledge. If information on chatbot identity is concealed, these chatbot-related evaluations are less pronounced so that consumers perceive their conversational partner as more socially present.

Our study's main contribution lies in the consideration of embarrassing contexts in the relationship between social presence and usage intention. Our results show that in embarrassing purchase situations, social presence perceptions hinder usage. Our results suggest a mitigation of a positive relationship between social presence and usage, mediation testing further shows that the overall indirect effect is negative. To the best of our knowledge, we are the first to analyze how different chatbot designs affect usage intentions in this context, which in itself can be seen as a relevant contribution to the field (Davison and Martinsons 2016). In taking the moderating influence of context into consideration, we answer current calls for research (Blut et al. 2021). Finally, we show that designing for social presence through humanization of chatbots should not be seen as a silver bullet, as it may backfire. This finding supports arguments brought forward in social psychology, in that the effect of presence of others on one's behavior can be hindering under certain circumstances, which are fulfilled in the embarrassing human-chatbot interaction context.

Recently, designing for social presence has increasingly become an undisputed standard. However, our study contributes to research on designing for social presence, as it shows that this may not always be of benefit for the firm, or desired by the customer. In taking the context of chatbot interaction into consideration, practitioners should carefully assess whether a socially present conversational partner is desired by the consumer or not. In situations where customers might apprehend being judged, in reminding

consumers of the chatbot's artificial nature, firms can ease consumers concerns and therefore foster desirable behavioral outcomes.

### ***Limitations and Future Research***

Of course, our study is not free from limitations. First, our experimental design relied on vignettes of chatbot interactions to allow for systematic manipulation of chatbot identity on the one hand, and identical conversations across all participants on the other hand. This ensured high internal validity, as there were no possible confounds in the experimental design, such as varying length of conversation or possible chatbot errors occurring. However, we do acknowledge that for greater external validity, real-life chatbot interactions would be necessary. For future studies, we plan to corroborate the results presented here using real human-chatbot interactions.

Furthermore, the chatbot interaction in the experimental study was set in a purchasing context. This was done to be coherent with prior studies that examined embarrassment and social presence in traditional service encounters which are not technology-mediated (Dahl et al. 2001) as well as prior studies that examined the impact of chatbot identity on social presence (De Cicco et al. 2020; Go and Sundar 2019). However, most chatbots today are used for service encounters which are not necessarily purchase situations, but to get access to information or provide guidance (Salesforce 2019). For future research, it could be examined whether the role of embarrassment is not only prevalent in purchasing contexts, but in other service settings. However, as conversational commerce, i.e. transactions initiated through chat interfaces (Berkowitz 2016), promises to be “a new era for service business development” (Tuzovic and Paluch 2018), we actually do think that more research on human-chatbot interactions should focus on purchase settings.

Also, our study focused on the examination of an embarrassing product. Future research could broaden our understanding of the moderating role of embarrassment by further examining embarrassing services, instead of goods. Additionally, future research could also explore other contexts of sensitive nature. We chose the context of embarrassment as one possible operationalization of a sensitive context. As stated before, people choose to interact with chatbots for topic they do not feel secure talking to a human about (Zamora 2017). Future studies could therefore examine what other contexts this could entail, e.g. conversations about financial information, conversations about mental health or conversations about any other private issues. It can be assumed that with increasing complexity of topic, people might prefer to interact with humans or chatbots that can elicit perceptions of human warmth. Therefore, future studies should also control for the perceived competence required to address service inquiry adequately. Overall, these insights will contribute to research on whether and how to deploy chatbots in frontline services (Schuetzler et al. 2021).

Finally, our sample was collected in the context of a European university. Prior research has shown that social presence perceptions are dependent on anthropomorphism (Blut et al. 2021). However, the theory of anthropomorphism posits that perceptions of anthropomorphism are dependent on cultural factors (Epley et al. 2007). Therefore, additional research is necessary to strengthen the findings of this study in other cultural contexts.

### **Conclusion**

Research on perceptions of social presence make up a large part of currently existing empirical research on human-chatbot interactions (Zierau et al. 2020). However, thus far it has been mostly regarded as a dependent variable, in that prior studies examined how chatbots should be designed to elicit social presence perceptions. The (implicit) assumption of these studies is that designing for high social presence triggers beneficial user reactions. The present work sheds light on the fact that social presence is not only not required, but even not desired in certain contexts of human-chatbot interactions. The central findings are that a) differences in social presence perceptions can be created through minor levers in chatbot design, b) social presence does have positive consequences for usage intentions in interaction contexts that are not considered embarrassing and c) designing for social presence will backfire in embarrassing contexts. Our study applies and tests mechanisms from social presence theory and evaluation apprehension theory in a human-chatbot interaction context. The findings of our work aim to shed new light on the taken-for-granted

assumption of designing for social presence as a desirable goal and therefore to provide helpful guidance both researchers and firms.

## References

- Adiwardana, D., Luong, M.-T., So, D. R., Hall, J., Fiedel, N., Thoppilan, R., Yang, Z., Kulshreshtha, A., Nemade, G., Lu, Y., and Le V, Q. 2020. "Towards a Human-like Open-Domain Chatbot," Google Research.
- Annamalai, K. P., Mathew, S. K., and Iyer, L. S. 2019. "Embarrassment Products, Web Personalization and Online Buying Behavior: An Experimental Study," *The Data Base for Advances in Information Systems* (50:4), pp. 92-108.
- Ashforth, B. E., and Humphrey, R. H. 1997. "The Ubiquity and Potency of Labeling in Organizations," *Organization Science* (8:1), pp. 43-58 (doi: 10.1287/orsc.8.1.43).
- Belanche, D., Casaló, L. V., Flavián, C., and Schepers, J. 2020. "Robots or frontline employees? Exploring customers' attributions of responsibility and stability after service failure or success," *Journal of Service Management* (31:2), pp. 267-289 (doi: 10.1108/JOSM-05-2019-0156).
- Berkowitz, D. 2016. *Chatbots could change how we buy and sell goods*.  
<https://www.weforum.org/agenda/2016/09/chatbots-could-change-how-we-buy-and-sell-goods>. Accessed 29 April 2021.
- Blut, M., Wang, C., Wunderlich, N. V., and Brock, C. 2021. "Understanding anthropomorphism in service provision: a meta-analysis of physical robots, chatbots, and other AI," *Journal of the Academy of Marketing Science* (49), pp. 632-658 (doi: 10.1007/s11747-020-00762-y).
- Brandtzaeg, P. B., and Følstad, A. 2017. "Why people use chatbots," in *Proceedings of the 4<sup>th</sup> International Conference of Internet Science*, Thessaloniki, Greece.
- California Legislative Information 2018. *SB-1001 Bots: Disclosure*.  
[https://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=201720180SB1001](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB1001). Accessed 21 April 2020.
- Candello, H., Pinhanez, C., and Figueiredo, F. 2017. "Typefaces and the Perception of Humanness in Natural Language Chatbots," in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, Denver, Colorado, USA, ACM Press, pp. 3476-3487.
- Cottrell, N. B., Wack, D. L., Sekerak, G. J., and Rittle, R. H. 1968. "Social Facilitation of Dominant Responses by the Presence of an audience and the Mere Presence of Others," *Journal of Personality and Social Psychology* (9:3), pp. 245-250.
- Dahl, D. W., Manchanda, R. V., and Argo, J. J. 2001. "Embarrassment in Consumer Purchase: The Roles of Social Presence and Purchase Familiarity," *Journal of Consumer Research* (28:3), pp. 473-481 (doi: 10.1086/323734).
- Davison, R. M., and Martinsons, M. G. 2016. "Context is king! Considering particularism in research design and reporting," *Journal of Information Technology* (31:3), pp. 241-249 (doi: 10.1057/jit.2015.19).
- De Cicco, R., Da Costa e Silva, S. C. L., and Palumbo, R. 2020. "Should a Chatbot Disclose Itself? Implications for an Online Conversational Retailer," in *Conversations 2020 - the 4<sup>th</sup> International Workshop on Chatbot Research*. November 23-24.
- Epley, N., Waytz, A., and Cacioppo, J. T. 2007. "On Seeing Human: A Three-Factor Theory of Anthropomorphism," *Psychological Review* (114:4), pp. 864-886 (doi: 10.1037/0033-295X.114.4.864).
- Feine, J., Gnewuch, U., Morana, S., and Maedche, A. 2019. "A Taxonomy of Social Cues for Conversational Agents," *International Journal of Human-Computer Studies* (132), pp. 138-161 (doi: 10.1016/j.ijhcs.2019.07.009).
- Fiske, S. T., Cuddy, A. J. C., and Glick, P. 2007. "Universal dimensions of social cognition: warmth and competence," *Trends in cognitive sciences* (11:2), pp. 77-83 (doi: 10.1016/j.tics.2006.11.005).
- Fornell, C., and Larcker, D. F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research* (18:1), pp. 39-50 (doi: 10.1177/002224378101800104).
- Geen, R. G. 1983. "Evaluation Apprehension and the Social Facilitation/Inhibition of Learning," *Motivation and Emotion* (7:2), pp. 203-2012.

- Gefen, D., and Straub, D. W. 2003. "Managing User Trust in B2C e-Services," *e-Service Journal* (2:2), pp. 7-24 (doi: 10.2979/ESJ.2003.2.2.7).
- Gefen, D., and Straub, D. W. 2004. "Consumer trust in B2C e-Commerce and the importance of social presence: experiments in e-Products and e-Services," *Omega* (32:6), pp. 407-424 (doi: 10.1016/j.omega.2004.01.006).
- Gnewuch, U., Morana, S., and Maedche, A. 2017. "Towards Designing Cooperative and Social Conversational Agents for Customer Service," in *38<sup>th</sup> International Conference on Information Systems*, Seoul, South Korea.
- Go, E., and Sundar, S. S. 2019. "Humanizing Chatbots: The Effects of Visual, Identity and Conversational Cues on Humanness Perceptions," *Computers in Human Behavior* (doi: 10.1016/j.chb.2019.01.020).
- Gooch, D., and Watts, L. 2015. "The Impact of Social Presence on Feelings of Closeness in Personal Relationships," *Interacting with Computers* (27:6), pp. 661-674 (doi: 10.1093/iwc/iwu020).
- Goodhue, D. L., and Thompson, R. L. 1995. "Task-Technology Fit and Individual Performance," *MIS Quarterly* (19:2), p. 213 (doi: 10.2307/249689).
- Gunawardena, C. N. 1995. "Social Presence Theory and Implications for Interaction and Collaborative Learning in Computer Conferences," *International Journal of Educational Telecommunications* (1:2/3), pp. 147-166.
- Heerink, M., Kröse, B., Evers, V., and Wielinga, B. 2008. "The Influence of Social Presence on Acceptance of a Companion Robot by Older People," *Journal of Physical Agents* (2:2), pp. 33-40.
- Heerink, M., Kröse, B., Evers, V., and Wielinga, B. 2010. "Assessing Acceptance of Assistive Social Agent Technology by Older Adults: The Almere Model," *International Journal of Social Robotics* (2:4), pp. 361-375 (doi: 10.1007/s12369-010-0068-5).
- Hendriks, F., Ou, C., Amiri, A. K., and Bockting, S. 2020. "The power of computer-mediated communication theories in explaining the effect of chatbot introduction on user experience," in *Proceedings of the 53<sup>rd</sup> Hawaii International Conference on System Sciences*, pp. 271-278.
- Henseler, J., Ringle, C. M., and Sarstedt, M. 2015. "A new criterion for assessing discriminant validity in variance-based structural equation modeling," *Journal of the Academy of Marketing Science* (43:1), pp. 115-135 (doi: 10.1007/s11747-014-0403-8).
- Hulland, J., Baumgartner, H., and Smith, K. M. 2018. "Marketing Survey Research Best Practices: Evidence and Recommendations from a Review of JAMS articles," *Journal of the Academy of Marketing Science* (46:1), pp. 92-108 (doi: 10.1007/s11747-017-0532-y).
- Ishowo-Oloko, F., Bonnefon, J.-F., Soroye, Z., Crandall, J., Rahwan, I., and Rahwan, T. 2019. "Behavioural evidence for a transparency-efficiency tradeoff in human-machine cooperation," *Nature Machine Intelligence* (1:11), pp. 517-521 (doi: 10.1038/s42256-019-0113-5).
- Kim, K. J., Park, E., and Shyam Sundar, S. 2013. "Caregiving role in human-robot interaction: A study of the mediating effects of perceived benefit and social presence," *Computers in Human Behavior* (29:4), pp. 1799-1806 (doi: 10.1016/j.chb.2013.02.009).
- Koh, Y. J., and Sundar, S. S. 2010. "Heuristic Versus Systematic Processing of Specialist Versus Generalist Sources in Online Media," *Human Communication Research* (36:2), pp. 103-124 (doi: 10.1111/j.1468-2958.2010.01370.x).
- Krämer, T., Weiger, W. H., Gouthier, M. H. J., and Hammerschmidt, M. 2020. "Toward a theory of spirals: the dynamic relationship between organizational pride and customer-oriented behavior," *Journal of the Academy of Marketing Science* (22:1), pp. 1095-1115 (doi: 10.1007/s11747-019-00715-0).
- Kumar, N., and Benbasat, I. 2006. "Research Note: The Influence of Recommendations and Consumer Reviews on Evaluations of Websites," *Information Systems Research* (17:4), pp. 425-439 (doi: 10.1287/isre.1060.0107).
- Lee, K. M., Peng, W., Jin, S.-A., and Yan, C. 2006. "Can Robots Manifest Personality?: An Empirical Test of Personality Recognition, Social Responses, and Social Presence in Human-Robot Interaction," *The Journal of communication* (56:4), pp. 754-772 (doi: 10.1111/j.1460-2466.2006.00318.x).
- Leong, B., and Selinger, E. 2019. "Robot Eyes Wide Shut," in *Proceedings of the Conference on Fairness, Accountability, and Transparency - FAT\* '19*, Atlanta, GA, USA. 29.01.2019 - 31.01.2019, New York, New York, USA: ACM Press, pp. 299-308.
- Lind, L. H., Schober, M. F., Conrad, F. G., and Reichert, H. 2013. "Why Do Survey Respondents Disclose More When Computers Ask the Question?" *Public Opinions Quarterly* (77:4), pp. 888-935.
- Luo, X., Tong, S., Fang, Z., and Qu, Z. 2020. "Machines versus Humans: The Impact of AI Chatbot Disclosure on Customer Purchases," *Marketing Science* (38:6) (doi: 10.1287/mksc.2019.1192).

- Maedche, A., Morana, S., Schacht, S., Werth, D., and Krumeich, J. 2016. "Advanced User Assistance Systems," *Business & Information Systems Engineering* (58:5), pp. 367-370 (doi: 10.1007/s12599-016-0444-2).
- Miranda, S. M., and Saunders, C. S. 2003. "The Social Construction of Meaning: An Alternative Perspective on Information Sharing," *Information Systems Research* (14:1), pp. 87-106 (doi: 10.1287/isre.14.1.87.14765).
- Moffett, J. W., Folse, J. A. G., and Palmatier, R. W. 2020. "A theory of multiformat communication: mechanisms, dynamics, and strategies," *Journal of the Academy of Marketing Science*, pp. 1-21 (doi: 10.1007/s11747-020-00750-2).
- Mori, M., MacDorman, K., and Kageki, N. 2012. "The Uncanny Valley [From the Field]," *IEEE Robotics & Automation Magazine* (19:2), pp. 98-100 (doi: 10.1109/MRA.2012.2192811).
- Mozafari, N., Weiger, W. H., and Hammerschmidt, M. 2021. "Trust me, I'm a bot – Repercussions of chatbot disclosure in different service frontline settings," *Journal of Service Management* (doi: 10.1108/JOSM-10-2020-0380).
- Parrott, W. G., and Smith, S. F. 1991. "Embarrassment: Actual vs. typical cases, classical vs. prototypical representations," *Cognition & Emotion* (5:5), pp. 467-488 (doi: 10.1080/02699939108411053).
- Pitardi, V., Wirtz, J., Paluch, S., and Kunz, W. H. 2021. "Service Robots, Agency, and Embarrassing Service Encounters," *Journal of Service Management*, forthcoming.
- Preacher, K. J., and Hayes, A. F. 2004. "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models," *Behavior research methods* (36:4), pp. 717-731.
- Rust, R. T., and Huang, M.-H. 2014. "The Service Revolution and the Transformation of Marketing Science," *Marketing Science* (33:2), pp. 206-221 (doi: 10.1287/mksc.2013.0836).
- Salesforce 2019. *Key Chatbot Statistics to Know in 2019*. <https://www.salesforce.com/blog/chatbot-statistics/>. Accessed 29 April 2021.
- Schuetzler, R. M., Giboney, J. S., Grimes, G. M., and Nunamaker, J. F., JR. 2018. "The Influence of Conversational Agents on Socially Desirable Responding," in *Proceedings of the 51<sup>st</sup> Hawaii International Conference on System Sciences*, T. Bui (ed.), Hawaii, USA, pp. 283-292.
- Schuetzler, R. M., Grimes, G. M., Giboney, J. S., and Rosser, H. K. 2021. "Deciding Whether and How to Deploy Chatbots," *MIS Quarterly Executive* (20:1), pp. 1-15.
- Servion Global Solutions 2020. *AI will power 95% of customer interactions by 2025*. <http://servion.com/blog/ai-will-power-95-customer-interactions-2025/>.
- Shi, W., Wang, X., Oh, Y. J., Zhang, J., Sahay, S., and Yu, Z. 2020. "Effects of Persuasive Dialogues: Testing Bot Identities and Inquiry Strategies," in *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, Hawaii, USA.
- Short, J., Williams, E., and Christie, B. 1976. *The social psychology of telecommunications*, London: Wiley.
- Steinfeld, C. W. 1986. "Computer-Mediated Communication in an Organizational Setting: Explaining Task-Related and Socioemotional Uses," *Annals of the International Communication Association* (9:1), pp. 777-804 (doi: 10.1080/23808985.1986.11678637).
- Tang, T.-I., Lin, H.-H., Wang, Y.-S., and Wang, Y.-M. 2004. "Toward An Understanding of the Behavioral Intention to Use Mobile Banking Services," in *Proceedings of the Pacific Asia Conference on Information Systems (PACIS)*.
- Thomaz, F., Salge, C., Karahanna, E., and Hulland, J. 2020. "Learning from the Dark Web: leveraging conversational agents in the era of hyper-privacy to enhance marketing," *Journal of the Academy of Marketing Science* (48:1), pp. 43-63 (doi: 10.1007/s11747-019-00704-3).
- Toader, D.-C., Boca, G., Toader, R., Măcelaru, M., Toader, C., Ighian, D., and Rădulescu, A. T. 2020. "The Effect of Social Presence and Chatbot Errors on Trust," *Sustainability* (12:1), p. 256 (doi: 10.3390/su12010256).
- Tuzovic, S., and Paluch, S. 2018. "Conversational Commerce – A New Era for Service Business Development?" in *Service Business Development*, M. Bruhn and K. Hadwich (eds.), Wiesbaden: Springer Fachmedien Wiesbaden, pp. 81-100.
- van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., and Petersen, J. A. 2017. "Domo Arigato Mr. Roboto," *Journal of Service Research* (20:1), pp. 43-58 (doi: 10.1177/1094670516679272).
- Walther, J. B. 1992. "A longitudinal experiment on relational tone in computer-mediated and face to face interaction," in *Proceedings of the 25<sup>th</sup> Hawaii International Conference on System Sciences*, pp. 220-231.

- Walther, J. B. 2011. "Theories of Computer-mediated Communication and Interpersonal Relations," *The Handbook of Interpersonal Communication* (4), pp. 443-479.
- Wuenderlich, N., and Paluch, S. 2017. "A Nice and Friendly Chat with a Bot: User Perceptions of AI-Based Service Agents," in *Proceedings of the 38<sup>th</sup> International Conference on Information Systems*, Seoul, Korea.
- Zajonc, R. B. 1965. "Social Facilitation," *Science* (149), pp. 269-274.
- Zamora, J. 2017. "I'm Sorry, Dave, I'm Afraid I Can't Do That," in *Proceedings of the 5<sup>th</sup> International Conference on Human Agent Interaction - HAI '17*, Bielefeld, Germany, pp. 253-260.
- Zellner, A. 1962. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias," *Journal of the American Statistical Association* (57:298), pp. 348-368.
- Zhao, X., Lynch, J. G., and Chen, Q. 2010. "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis," *Journal of Consumer Research* (37:2), pp. 197-206 (doi: 10.1086/651257).
- Zierau, N., Elshan, E., Visini, C., and Janson, A. 2020. "A Review of the Empirical Literature on Conversational Agents and Future Research Directions," in *Proceedings of the 41<sup>st</sup> International Conference on Information Systems*.