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How to leverage anthropomorphism for chatbot service interfaces: The interplay of communication style and personification

Andreas Janson

Institute of Information Management (IWI-HSG), University of St.Gallen, Switzerland

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ABSTRACT

Although chatbots are oftentimes used in customer service encounters, interactions are oftentimes perceived as not satisfactory. One key aspect for designing chatbots is the use of anthropomorphic design elements. In this experimental study, we examine the two anthropomorphic chatbot design elements of personification, which includes a human-like appearance, and social orientation of communication style, which means a more sensitive and extensive communication. We tested the influence of the two design elements on social presence, satisfaction, trust and empathy towards a chatbot. First, the results show a significant influence of both anthropomorphic design elements on social presence. Second, our findings illustrate that social presence influences trusting beliefs, empathy, and satisfaction. Third, social presence acts as a mediator for both anthropomorphic design elements for satisfaction with a chatbot. Our implications provide a better understanding of anthropomorphic chatbot design elements when designing chatbots for short-term interactions, and we offer actionable implications for practice that enable more effective chatbot implementations.

1. Introduction

Due to recent technological developments such as generative artificial intelligence (AI; Dwivedi et al., 2023), various platform providers are now offering and widely adopting conversational user interfaces, often colloquially called chatbots, to facilitate interaction between humans and machines (e.g., Araujo, 2018). Especially in customer service, where short-term, one-time only interaction processes are oftentimes coupled with service failure (Choi et al., 2020; Singh & Bridge, 2023), chatbots provide a convenient way to get help and offer immediate 24/7 service assistance instead of having lengthy cues in customer service hotlines (Evanschitzky et al., 2011). In the same way, chatbots enable companies to handle the rapid increase of digital customer requests better, for example, on social media (Xu et al., 2017). Thus, we[1] see that these conversational agents evolve to one of the most important customer interfaces (Dwivedi et al., 2020; Larivière et al., 2017; McLean & Osei-Frimpong, 2019) and gradually substitute service employees (Larivière et al., 2017).

Nonetheless, the application of chatbots in digital service encounters may also be problematic due to several reasons that contribute to the divide between user expectations and experiences (Luger & Sellen, 2016). First, interaction processes might feel artificial (Chaves et al., 2022; Chaves & Gerosa, 2020) and customers may favor human agents instead of chatbots (Adam et al., 2020). Second, conversations have the potential to be eerie and awkward if conversations are either too natural or contain hyper-realistic avatars who try to mimic human appearances (Ciechanowski et al., 2019). In consequence, the benefits of the chatbot technology for customer service could be jeopardized if the implementation is not reliable. In this context, the thoughtful consideration of anthropomorphic design elements (Munnukka et al., 2022; Pfeuffer, Benlian, et al., 2019) in the implementation of chatbots are oftentimes a solution to avoid the outlined problems by increasing social presence and positively influencing chatbot outcomes (e.g., Araujo, 2018). Though, Niβen et al. (2021) indicated in their comprehensive review that for short-term chatbot interactions, such as in customer services, anthropomorphic design features are least important. Thus, we tackle this theoretically and practically important gap regarding the distinct influence of anthropomorphic design elements by examining the impact of personification (Pizzi, Scarpi, & Pantano, 2021) and social orientation of communication style (Chaves et al., 2022; Keeling et al., 2010; Verhagen et al., 2014) on social presence and the outcomes of chatbots, namely satisfaction, empathy, and trust. We complement prior studies

E-mail address: andreas.janson@unisg.ch.

[1] The use of "we" throughout this paper refers to the author's decision to adopt the editorial convention of employing the first-person plural for clarity and readability during the double-blind peer review process.

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(e.g., Araujo, 2018; Qiu & Benbasat, 2009; Roy & Naidoo, 2021) by uncovering the central role of social presence for chatbot outcomes while at the same time consider the distinct effects of personification and communication style as anthropomorphic design decisions on satisfaction. In addition, we also shed light on how increased social presence through anthropomorphic chatbots contributes to trust and empathy, both crucial constructs in service recovery (e.g., DeWitt et al., 2008; Wei et al., 2020) when researching chatbots. Finally, we highlight the crucial role of the thoughtful consideration of anthropomorphic design for leveraging social presence and customer chatbot outcomes in short-term, one-time only interactions (Niβen et al., 2021). Hence, the goal of our study is to explore the application, design, and effects of anthropomorphic chatbots in customer services by conducting a systematic experiment. The guiding research question (RQ) for our study is as follows.

RQ. How do anthropomorphic design elements, i.e., personification and social orientation of communication style, influence the perception of chatbots in customer service interactions?

With our research, we expect to provide answers to our overall RQ as well as get a more detailed understanding of the anthropomorphic design for chatbots and of the central role of social presence for chatbots. Our study addresses the interface of information systems (IS) and customer service research, thus contributing to the current challenges in these fields by explaining and predicting (Gregor, 2006) the influence of anthropomorphic design elements on chatbot perceptions. Our paper is organized as follows. First, we provide an overview of the theoretical background. Next, we develop our hypotheses and theoretical model. In section four, we present the research method to evaluate the theoretical model. Afterwards, we discuss implications, limitations, and future research. The paper closes with a conclusion.

2. Related work and theoretical foundations

2.1. Chatbot foundations and their role as customer service interface

Chatbots, also known as chatterbots, conduct text- or language-based dialogs with people based on natural language (Schlesinger et al., 2018; Schöbel et al., 2023). The term chatbot refers to the words 'chat' and 'robot' highlighting that these dialog systems try to make the user feel as if they are interacting with a human being by simulating a chat. In literature, the term is often replaced by synonyms such as Avatar, Virtual Assistant, Digital Assistant, Conversational Interface, or Conversational Agent (Dale, 2016; Jain et al., 2018; Portela & Granell-Canut, 2017; Schuetzler et al., 2018; Seeger et al., 2018). With the progress of natural speech recognition, the term chatbot is also used in voice user interfaces (Schmitt et al., 2023). These voice user interfaces allow to chat via spoken language with AI-based artifacts such as Siri or Alexa that are nowadays typically embedded as stand-alone devices and general assistants into the household (Knote et al., 2021). Though, much more common for service encounters are text-based interfaces (Elshan et al., 2022). Thus, we define and focus on chatbots as IS that are offering natural language capabilities for conversing with human users utilizing text-based conversational interfaces (Brandtzaeg & Følstad, 2017; Murtarelli, Gregory, & Romenti, 2021; Sheehan et al., 2020).

The interest of interaction between humans and machines with text-based conversational interfaces began a couple of decades ago with the computer program ELIZA (Schöbel et al., 2023), and nowadays chatbots are an important part of human-computer interaction (Følstad et al., 2021) and as customer interfaces (Adam et al., 2020; Chung et al., 2020; Sheehan et al., 2020). The aim is to make the conversations between two parties as natural as possible so that they resemble a person-to-person conversation (Schuetzler et al., 2014; Seeger et al., 2018). Over the years, the technologies and therefore the chatbots have clearly evolved concerning their capabilities (Araujo, 2018; Shah et al., 2016). Initially, decision trees were used to determine what the rule-based chatbots would reply to in the next step. Today, most chatbots are based on AI and Natural Language Processing (NLP) to analyze user input for a pre-defined set of user intents and generate corresponding output based on the results (Nguyen et al., 2021). These chatbots also ask for a more detailed explanation or change the topic if they cannot find any keywords in the input text (Benner et al., 2021). Going further, the development of chatbots based on generative AI (Bommasani et al., 2022), such as OpenAI's ChatGPT or Google's Bard, also approach general tasks by relying on large language models that enable them to respond to nearly all requests that are not forbidden by the guardrails of the language model provider (Schöbel et al., 2023; Sison et al., 2023).

Chatbots can also be divided into disembodied and embodied agents (Araujo, 2018). Embodied agents, typically human 3D representations, not only conduct verbal dialogs (via text or speech) but can also communicate with people on a non-verbal level by using body language, such as gestures, facial expressions, and body movements, in real-time (Nunamaker et al., 2011; Sebastian & Richards, 2017). Especially kiosk-based interfaces (Nunamaker et al., 2011) at the point-of-sale belong to this category and mimic oftentimes sales or service staffs. In contrast, chatbots as disembodied agents cannot exhibit these traits (Araujo, 2018; Cassell, 2001) and appear as disembodied conversational partners by typically communicating with users via text-based messages in service encounters. Due to the lack of non-verbal cues, which are indispensable in human communication, users often find it difficult to understand the context and meaning of the chatbot messages they receive (Araujo, 2018). In order to interpret the information correctly, linguistic characteristics are extracted by customers from the texts that at the end determine how users perceive the interaction with the chatbots (Tolzin & Janson, 2023). We take in the next section a closer look at those characteristics covered by the aspects of anthropomorphic design of chatbots.

2.2. Anthropomorphic design of chatbots

Anthropomorphic design characteristics and social character traits can lead to an increased familiarity and thus acceptance of robots (Fink, 2012). Anthropomorphism is the *tendency to assign human characteristics to objects and inanimate animals in order to rationalize their actions more easily* (Fink, 2012). There are two main reasons why humans anthropomorphize non-human objects. First, humans try to understand the environment in which the agents are located and to minimize uncertainties. Second, there is a fundamental need to establish social contact with other actors (Epley et al., 2007). Anthropomorphic characteristics include external characteristics, e.g., human-like appearance and the use of facial expressions, as well as internal characteristics, such as language style and other traits and behaviors (Fink, 2012). In their seminal study, Fong et al. (2002) assume that humans want to interact with machines in the same way as they do with each other. In their study, they describe robots that have social and human characteristics, such as the perception and expression of feelings, the establishment of social relationships, or distinct personalities. Other studies show that the social interaction between person and machine is comparable to interactions between people (e.g., Nass & Moon, 2000; Reeves & Nass, 1996), also described as the overall "Computers are Social Actors" (CASA) paradigm that is oftentimes used to understand the perception of anthropomorphic chatbot designs (Munnukka et al., 2022; Schuetzler et al., 2018; Xu et al., 2022). Since research around the anthropomorphic design of IS in general, as well as chatbots in specific, is proliferating (e.g., also Feine et al., 2019; Pfeuffer, Benlian, et al., 2019; Li & Suh, 2022), we present in Table 1 an overview and review of seminal and more recent empirical research on anthropomorphic designs for chatbots. As seen in our study positioning below as well as prior review studies on conversational agent design (Diederich et al., 2022; Feine et al., 2020; Knote et al., 2021; Niβen et al., 2021), research concerning chatbots and anthropomorphic design elements is nowadays rather mature. However, up until now, attempts to integrate experimental tests

Table 1
Review on anthropomorphic chatbot design and study positioning.

Source	Study	Main Results and Contributions
Adam et al. (2020)	Influence of anthropomorphic design elements and foot-in-the-door technique on user compliance.	Positive effect of anthropomorphic design elements and foot-in-the-door technique on compliance for answering chatbot requests. In addition, social presence mediates the influence anthropomorph design on user compliance.
Araujo (2018)	Influence of name and language style on perception of anthropomorphism.	Greater perceived anthropomorphism in chatbot with human name and informal language style. Stronger emotional connection to the company through human chatbot.
Hill et al. (2015)	Differences in the quality and content of conversations between humans and humans interacting with machines.	Dialogs between people were more diverse and longer. More messages were used in a dialog between human and chatbot.
Keeling et al. (2010)	Influence of communication styles on trust and intention to visit the website.	Task-oriented communication style influences trust, especially for search goods/services. Socially oriented communication contributes to trust, especially for trust goods. Trust increases the intention to visit.
Kim and Im (2023)	Influence of agent appearances, intelligence dimensions on anthropomorphic chatbot response.	Anthropomorphic response depends on perceptions of agent appearance and intelligence. Users perceive more humanness in intelligent but disembodied agents rather than in intelligent, poorly designed agents.
Köhler et al. (2011)	Influence of conversational content and style of an agent on the adaptation to new customers.	Both functional and social communication contents have a positive influence on customer adaptation. However, there must be a balance between the two conversational styles.
Konya-Baumbach et al. (2023)	Influence of anthropomorphic chatbot design on social presence and customer outcomes.	Chatbot anthropomorphism has significant positive effects on trust, purchase intention, word of mouth, and satisfaction with the shopping experience and identifies social presence as the underlying mediating mechanism of these effects.
Qiu and Benbasat (2009)	Influence of anthropomorphic design in terms of modality and embodiment on recommendation agent outcomes.	Embodiment and voice (compared to just text) communication positively influence social presence, as well as trust, perceived enjoyment, and intentions to use the recommendation agent.
Roy and Naidoo (2021)	Influence of anthropomorphic conversational styles and time orientation on chatbot effectiveness.	Chatbot effectiveness depends on the time orientation of users and the according conversational style (warmth and competence). Brand perceptions mediate effects of conversational styles.
Schuetzler et al. (2020)	Influence of conversational skills on social presence, perceived humanness and perceived engagement.	Chatbots with higher conversational skill are perceived more humanlike and more engaging. Conversational skills require not only conversational variety but also skilled responses.
Seeger et al. (2018)	Influence of human identity, non-verbal and verbal cues on perceived anthropomorphism.	More anthropomorphic design elements do not increase perception of anthropomorphic characteristics and might also decrease perceived anthropomorphism.
Shamekhi et al. (2018)	Effect on interaction with a conversational agent by using a face.	The conversational agent with a face was perceived more positively and a closer connection was established with him.
Sheehan et al. (2020)	Influence of how chatbots deal with errors on anthropomorphism and adoption.	Unresolved chatbot errors reduce anthropomorphism and adoption intent. There is no difference between an error-free chatbot and one which seeks clarification. The higher the need for human interaction of a consumer, the stronger the anthropomorphism - adoption relationship.
Verhagen et al. (2014)	Anthropomorphism and communication style as moderators in relation to the perception of social presence and personalization.	Socially oriented communication style strengthens the positive influence of friendliness or competence on the personalization or social presence of the virtual agent. Social presence and personalization have a positive effect on the satisfaction of the users regarding the agent.
This Study	Influence of anthropomorphic design elements personification and communication style on chatbot perceptions.	Personification of a chatbot as well as social orientation of communication have a distinct influence on chatbot perceptions. Both positively influence social presence, but only communication style influences satisfaction with a chatbot directly. In addition, social presence is a central mediator and influences chatbot outcomes such as trusting beliefs, empathy perceptions and satisfaction with the chatbot.

of the isolated effects of different anthropomorphic design possibilities for chatbots on customer service outcomes in the domain of customer service remain scarce and cluttered (e.g., Araujo, 2018 as an example). In addition, although recognized as central in multiple papers (e.g., Verhagen et al., 2014 as an example), the role of social presence for mediating the distinct influence of anthropomorphic design elements on IS outcomes has not been explicitly recognized up until now, as prior studies such as Konya-Baumbach et al. (2023) only researched anthropomorphic design from a holistic perspective without explicating the anthropomorphic design elements, e.g., communication style and personification with their distinct effects. This is especially important as the prior review of Nguyen et al. (2021) indicated that typically chatbots with short-term interactions, such as in customer service encounters (see for an example Zhou et al., 2023), are less relying on various anthropomorphic design features to achieve their outcomes. Thus, we look at those isolated effects of anthropomorphic design as well as the central role of social presence in the next section.

3. Hypotheses development

For the development of our hypotheses, we draw on the CASA paradigm as an overarching theoretical basis and, therefore, embed the hypotheses in a nomological network with a focus on theoretical constructs that prescribe technology human-like attributes, such as social presence, interpersonal trust, satisfaction and empathy for the understanding of chatbots and their design.

When considering chatbots as social actors with anthropomorphic characteristics, perceptions of social presence are a complex phenomenon studied in various fields. Gunawardena (1995, p. 151) defines social presence as *"the degree to which a person is perceived as a 'real person' in mediated communication"*. According to Biocca et al. (2003), the other person does not necessarily have to be a human but can also be an AI. The feeling of social presence plays an essential role in human-computer interaction and occurs, for example, when the user communicates with a chatbot, and interaction takes place on a social level (Schuetzler et al., 2020). The social presence theory of Short et al. (1976) states that the perception of social presence and, thus, the feeling of interaction depends, for example, on the communication medium, since it is essential in which form information is transmitted, especially when considering factors such as media richness (e.g., Dennis & Kinney, 1998).

In addition to the information transmission mode, non-verbal cues have another important function. They form the interaction process and ensure that the dialog partner interprets the information correctly (Tolzin & Janson, 2023), e.g., individuals form anthropomorphic

responses related to the appearance of a chatbot (Kim & Im, 2023). In contrast to face-to-face communication, such characteristics are mostly missing in computer-mediated communication (Walther, 1992), which makes it more impersonal, objective and task-oriented and reduces the degree of social presence (Rice & Love, 1987). Therefore, chatbots as text-based, bodiless dialog systems that do not interact face-to-face with their users, face challenges how to generate perceptions of social presence.

We suggest that personification, defined as the *provision of human-like cues that relate for example to a name or physical appearance* (Sannon et al., 2018), induce social presence perceptions related to chatbots for the following reasons: Individuals feel the need to attribute a personality to chatbots, even when little information is available (Pradhan & Lazar, 2021; Purington et al., 2017; Tolzin & Janson, 2023). Additional information such as a name or a picture helps users to better assess their counterparts and, if necessary, to establish a closer relationship (Go & Sundar, 2019). For example, if the name of the chatbot is displayed during the conversation (Diederich et al., 2022), users perceive their conversation partner as more human and less abstract, which increases their well-being (Wuenderlich & Paluch, 2017) and helps to compensate for a possible impersonal communication of a chatbot (Go & Sundar, 2019). The findings of Araujo (2018) show that an emotional bond is established between customers and companies when people communicate with a chatbot that, among other things, has a human name. The face of a person mainly represents the person's identity, whereby interfaces can be designed in a human-like way (Sproull et al., 1996). In their seminal paper, Koda and Maes (1996) investigated the reactions of people to different faces of a software agent and found that the appearance of an agent with a face was perceived more sympathetically and pleasantly than without a face. This pleasantness might therefore also positively contribute to a more satisfying service encounter with a chatbot (Tsai et al., 2021). In our case, we, therefore, define satisfaction with the chatbot as *the attitude of a customer and chatbot user about the experienced service interaction* (Barger & Grandey, 2006). The study by Parise et al. (1999) in addition shows that people cooperate with a software agent represented by an anthropomorphic face in the same way as with another real person. Sannon et al. (2018) finds evidence for greater levels of disclosure with personified chatbots. For these reasons, we assume that the degree of personification of a chatbot has a positive effect on social presence as well as the satisfaction with the chatbot.

Hypothesis H1a. The provision of personification positively influences the social presence of a chatbot.

Hypothesis H1b. The provision of personification positively influences the satisfaction with the chatbot.

Anthropomorphism can be triggered not only by the personification of a chatbot but also by a socially oriented communication, defined as *informal conversational strategies with relational dialogs that involve social (non-task) interactions including for example customary greetings, small talk, emotional* support*, and positive expressions to achieve socioemotional goals* (Chattaraman et al., 2019). For this reason, we assume that the perception of social presence, as well as the satisfaction with the chatbot, depends on the communication style of the chatbot. A task-oriented interaction style focuses on goal-oriented and efficient task processing, is rather formal, and concentrates on the actual communication purpose (Chattaraman et al., 2019; Williams & Spiro, 1985). In the case of a service encounter, this could also include a "technomorph" communication (Marakas et al., 2000). In contrast, a socially oriented communication style is rather informal, in which the exchange of affective and emotional information is in the foreground (Kreijns et al., 2003). For instance, the use of acronyms and human symbols, so-called emoticons, provide the written message with a certain emotional expression and highlight important parts of messages (Tsai et al., 2021). Furthermore, colloquial expressions take place in written communication in order to counteract the absence of non-verbal signals and thus a possible loss of information (Lahaie, 2007; Liebrecht et al., 2021). Through this kind of socially oriented conversation, an attempt is made to establish an interpersonal relationship and familiarity between the users and a chatbot (Froehle, 2006), provide information about the mental model (Tolzin & Janson, 2023), and also indicating a human partner in a conversation and leading to more social presence and satisfaction in service encounters (Wuenderlich & Paluch, 2017). Therefore, we hypothesize.

Hypothesis H2a. The provision of social orientation of communication style positively influences the social presence of a chatbot.

Hypothesis H2b. The provision of social orientation of communication style positively influences the satisfaction with a chatbot.

Besides considering the isolated effects of both anthropomorphic design elements, we also hypothesize that the overall degree of existing anthropomorphic design elements triggers social presence. If we combine both the social orientation of a chatbot with the personification of the chatbot, the degree of perceived social presence should be leveraged. The general theory of anthropomorphism (Epley et al., 2007) provides a rationale for this thinking due to the assumption that appearance (personification of the chatbot) as well as the behavior (social orientation of communication style) are equally important and form a linear relationship for anthropomorphic perceptions such as social presence (Seeger et al., 2018; Tsai et al., 2021). Following the assumptions outlined above, we hypothesize.

Hypothesis H3a. The provision of personification positively moderates the effect of social orientation of communication style on the social presence of a chatbot.

Besides the combined as well as direct influence of both anthropomorphic design elements that we consider in our study, we also hypothesize that social presence is a central construct when considering the impact of anthropomorphic design elements on the outcomes of IS (Choi et al., 2001), such as in our case chatbots (Park et al., 2022, pp. 1–13). Instead of anthropomorphic design elements only directly impacting satisfaction, customers might abstract the perception of the chatbot with its anthropomorphic design and relate social presence to a satisfactory service encounter. As such, a more socially present chatbot will further influence satisfaction, thus mediating the influence of the anthropomorphic design elements. In consequence, we hypothesize.

Hypothesis H3b. Social presence mediates the influence of anthropomorphic design elements on the satisfaction with a chatbot.

An important factor regarding the use of IT artifacts (e.g., Gefen et al., 2003) such as chatbots is trust (e.g., Mozafari et al., 2021). We define trust in an interpersonal-focused relationship between a customer and a chatbot as *the "willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party"* (Mayer et al., 1995, p. 712). The underlying mechanism behind this relationship is that social presence induces trust cues by conveying more information and social cues that make chatbot interactions transparent and trustworthy (Rheu et al., 2020). In addition, social presence perceptions shorten the perceived social distance between a chatbot and a customer with the outcome that building trust relationships is easier with a lower social distance induced through social presence (Pavlou et al., 2007). Examples for building trust through social presence on websites are for instance the inclusion of displaying social text and image elements (Hassanein & Head, 2007), human images (Cyr et al., 2009), or presenting an avatar (Etemad-Sajadi, 2016) that are also from importance for the trustworthy design of chatbots (Rheu et al., 2020). Building on the logic described above, we hypothesize the following for the case of chatbots.

Hypothesis H4. Social presence positively influences the trusting beliefs towards a chatbot.

Furthermore, we assume that a higher degree of perceived social presence increases the satisfaction of chatbot users, thus highlighting the central role of social presence. By providing perceptions of a more comprehensive customer service interaction through higher levels of perceived social presence, customers may experience more satisfactory service encounters that are more comparable to offline service interactions than low social presence interactions (Tsai et al., 2021). We expect that the positive effects of social presence therefore outweigh the negative effects of unfavorable relationships that also may be triggered in a service failure context where less focus on social presence could be relevant (Huang & Dootson, 2022). Also, several studies showed that promoting social presence positively influences satisfaction such as in online learning environments (Bulu, 2012; Hostetter & Busch, 2006; Richardson & Swan, 2003), computer conferencing (Gunawardena & Zittle, 1997) and online customer services (Verhagen et al., 2014). Thus, we also hypothesize for the context of chatbots in service interactions.

Hypothesis H5. Social presence positively influence the satisfaction with a chatbot.

Finally, we assume that higher degrees of social presence trigger empathy that occurs in interpersonal relationships when *a person feels, understands, and responds to the feelings and emotions of his fellow human being* (Kohut, 1984; Levenson & Ruef, 1992; Pfeil & Zaphiris, 2007). Especially in human communication, empathy plays an important role and ensures a familiar relationship between two parties (Comfort, 1984; Pfeil & Zaphiris, 2007). Thus, empathy is both important for fostering relationships between a company and a customer and also helps to overcome service failure in customer service by prosocial behavior (Lajante & Remisch, 2023; Wei et al., 2022; Wieseke et al., 2012). However, it is sometimes difficult to recognize empathy in digital environments (Pfeil & Zaphiris, 2007). In contrast to offline communication, typically nonverbal cues that transmit emotions are missing here (see also the seminal paper from Sundaram & Webster, 2000 for an overview in offline encounters), which makes the perception of expressed empathy of the counterpart much more difficult. Thus, social presence is considered as an essential antecedent for inducing empathy in digital service interactions with chatbots (Chin et al., 2020; Huang & Rust, 2018). Following these thoughts, we hypothesize.

Hypothesis H6. Social presence positively influences empathy perceptions towards a chatbot.

In conclusion, our research model is depicted in Fig. 1.

4. Research design and method

4.1. Participants

To test the underlying hypotheses of the research model, we conducted an online experiment with a subsequent survey. The participants were recruited on several social media platforms and university courses to reach a diverse audience representing customers of internet service providers. Their participation was voluntary, and the subjects had the chance to win vouchers for a well-known e-commerce shop as an incentive to participate. In total, 284 people participated in the experiment, and we collected 272 valid data sets in total. We had to drop the data sets of participants that did not comply with the experimental procedures, e.g., failure in recognizing the experimental manipulation, unusually short time to complete the survey, or a large amount (above 20%) of missing values. The final sample consisted of 132 female and 140 male participants with an average age of 29.9 years. Table 2 depicts the demographics of the participants in the present study.

4.2. Experimental procedures and tasks

The online experiment is based on a fully randomized 2 × 2 between-subjects design with a control group and three treatment groups. The treatment relates to two different anthropomorphic design dimensions as outlined in the hypotheses' development and in section 4.3.

The experiment proceeded as follows: Within the online experiment, the participants first received an exact description of the procedure. In this vignette (Aguinis & Bradley, 2014), study participants should act as customers of the Stay Connected company while assuming that their broadband internet service does not work anymore. We also introduced in the vignette that the participants will interact with a chatbot. Participants should visit the company website to fix the problem and contact customer service. To do so, participants should click their way through the website, from the start page to the service malfunction subpage where the participants should interact with a customer service chatbot to solve the internet service problem. Each participant was randomly assigned to one of the chatbots in the experimental setup. In the interaction process, participants interacted with the chatbot to solve the internet-service-related issue. The process of finding a solution to the problem finished with a detection of a more severe problem and a scheduling procedure for a follow-up on-site inspection with the customer. After this conclusion of the chatbot interaction, participants were directed to the survey, where we asked the participants about the experiment content to ensure that the experiment was conscientiously completed. Thus, we checked the manipulation with two items referring to each manipulation (in total 4 items) ensuring that participants recognized the manipulation of the chatbot interaction. Successful manipulation was confirmed by an analysis of mean differences across groups ($p < 0.001$). Fig. 2 shows the experimental process.

4.3. Design of the experimental manipulation

The first treatment group (TG1) interacted with a chatbot to which we assigned a personification. The chatbot was impersonated by a woman wearing a headset on her head to illustrate the function of a service advisor in a call center. She also has a friendly expression on her face and she smiles. According to the study by Nunamaker et al. (2011), a smiling facial expression leads to more sympathy and trust. Furthermore, humans perceive a female face as more likeable than a male face (Nunamaker et al., 2011). In the selection process, we also made sure that the person had a certain degree of attractiveness in order to use the halo effect. This effect means that the overall impression of an attractive person is often perceived more positively than that of less attractive people due to a single characteristic, e.g., their external appearance (Cialdini, 2014). Her name, which we showed under the picture, is Julia. Whenever the chatbot responded to the user's message, we display the name and face in the chat window. We took care to ensure that the two features were not too small so that the test persons could clearly see them. At the beginning and end of the conversation, the chatbot introduced itself with its name. The chatbot sent the grey text modules and the orange text reflects the message of the respondent. All text modules were displayed as "text bubbles" that are common for chatbots.

The subjects assigned to the second treatment group (TG2) had a chatbot, which was using a socially oriented communication style. The chatbot responded more extensively and sensitively. The response latencies of the chatbot were adapted to the length of the respective message. This is to prevent a changed ratio of pause and text length from additionally influencing the perception of the users. Another reason is that users have enough time between the messages to be able to follow them. We assigned no name to this chatbot version; it introduces itself as a generic chatbot.

Finally, treatment group 3 (TG3) combined both experimental manipulations (personification + social orientation of communication style), while the control group (CG) had a generic chatbot without the described manipulations. All experimental conditions were pre-tested to ensure manipulation. Table 3 presents the experimental groups with the different chatbot manipulations and Appendix A presents additional information about the implementation of the chatbot conditions.

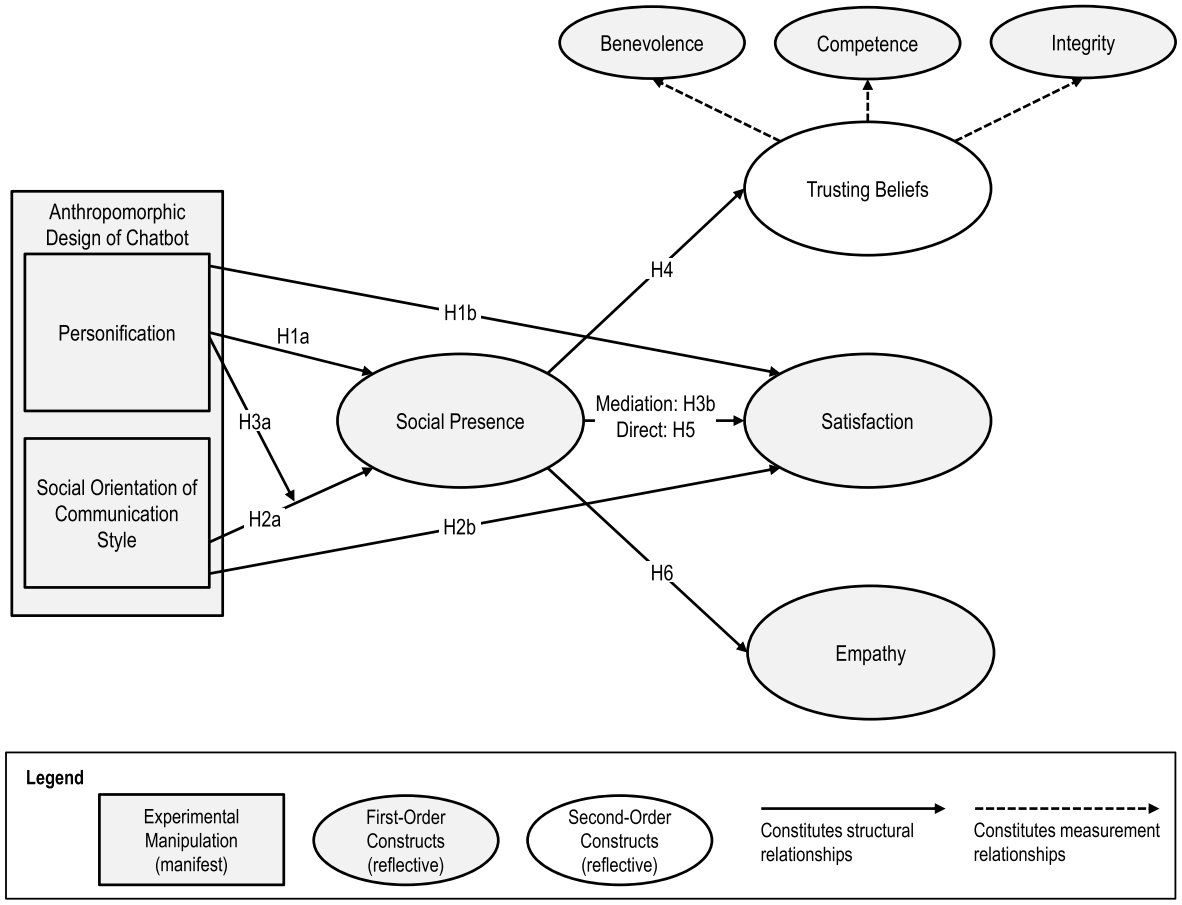

Fig. 1. Research model.

Table 2
Demographics.

Personal Information		CG	TG1	TG2	TG3	Total	Percentage
Number of People in Groups		66	63	67	76	272	–
Gender	Male	37	27	36	40	140	51.5%
	Female	29	36	31	36	132	48.5%
Age (Ø 29.9)	<21	9	14	8	10	41	15.1%
	21–30	34	36	36	45	151	55.5%
	31–40	8	5	13	9	35	12.9%
	41–50	8	3	4	4	19	7.0%
	>50	7	5	6	8	26	9.6%
Vocational Education	High School Diploma	25	30	28	39	122	44.8%
	University Degree	34	31	33	36	134	49.3%
	Other	7	2	6	1	16	5.9%
Employment Status	Pupil	3	4	3	1	11	4.0%
	Apprentice (Vocational)	2	1	4	7	14	5.1%
	College Student	17	31	22	26	96	35.3%
	Employee	43	25	35	38	141	51.8%
	Not employed	0	0	0	1	1	0.4%
	Pensioner	0	1	0	0	1	0.4%
	Other	1	1	3	3	8	2.9%

*Legend: CG = Control Group; TG1 = Treatment Group 1; TG2 = Treatment Group 2; TG3 = Treatment Group 3.

4.4. Common method variances

We controlled common method variances (CMV) that are caused by the measurement method rather than the construct measures with several procedural remedies (Podsakoff et al., 2003): To ensure a psychological separation of measurement, we did not reveal the purpose of the experiment and provided a cover story in the vignette. Additionally, we assured the anonymity and controlled for effects such as socially desirable responses (Paulhus, 2001) through the assurance that there were no wrong answers, and that respondents should answer questions as honestly as possible (Podsakoff et al., 2003). As a statistical remedy, we conducted the Harmann's Single Factor Test (Podsakoff et al., 2003). We performed an exploratory factor analysis with all of the model indicators and examined the unrotated factor solution. Because more than one factor emerged and the first factor did not account for the majority of covariance among the measures, common method variances should not be a major problem within this study (Podsakoff et al., 2003).

Fig. 2. Experimental process.

Table 3
Overview of groups and experimental implementation[a].

Group	Manipulation	Experimental Implementation
Control Group	No manipulation Generic chatbot without anthropomorphic design elements	I'm a chat bot. I work on the basis of artificial intelligence. Your request? The wi-fi doesn't work anymore. Green router light on? Yes No
Treatment Group 1	Personification Chatbot was manipulated through female picture and name of chatbot.	Julia I am Julia, your personal assistant. I operate on the basis of artificial intelligence. Your request? The wi-fi doesn't work anymore. Julia Green router light on? Yes No
Treatment Group 2	Social Orientation of Communication Style Extensive and sensitive communication with adapted response latencies.	Hello, I'm a chat bot. Artificial intelligence helps me answer your questions. How can I help you? The wi-fi doesn't work anymore. Oh, I'm sorry about that. I know how annoying it is to have to get by without WLAN.. I will try to fix your problem as soon as possible. Please check if the light on your router is green. Is this the case? Yes No
Treatment Group 3	Personification + Social Orientation of Communication Style See above concerning the two manipulations.	Julia Hello, I'm Julia. I am today your personal assistant. Artificial intelligence helps me answer your questions. How can I help you? The wi-fi doesn't work anymore. Julia Oh, I'm sorry about that. I know how annoying it is to have to get by without WLAN.. I will try to fix your problem as soon as possible. Please check if the light on your router is green. Is this the case? Yes No

[a] Exemplary conversations were translated from the original language to English.

4.5. Instrument development

For the operationalization of our research model, we used well-established scales and adapted them to the context of chatbots in customer services. Table 4 shows the latent construct and the corresponding literature sources of the indicators (see Appendix B for the survey instrument). We measured all latent variables with reflective indicators. For this purpose, we evaluated the measurement instrument with regards to its suitability to measure the constructs in a reflective manner (Jarvis et al., 2003). We used a 7-point Likert response scale that ranges from 1 ("strongly disagree") on the left side to 7 ("strongly agree") on the right side, with 4 as a neutral point to assess the indicators (except for the satisfaction construct, which was measured with the anchors "not satisfied at all" and "fully satisfied" on a 7-point scale). The experimental manipulations were each coded as binary variables.

4.6. Modeling methods

To evaluate the proposed research model in this study, we used structural equation modeling (SEM) with the variance-based partial least squares (PLS) approach (Chin, 1998; Wold, 1982). We chose PLS for its flexibility to deal with higher-order constructs, the prediction-oriented approach as well as its ability to better deal with single item constructs such as experimental manipulations (Hair et al., 2011; Petter, 2018). We used SmartPLS 3.2.8 (Ringle et al., 2015) as well as SPSS 24 (analysis of group differences concerning manipulation checks and descriptive analysis) as our analysis tools. Since our model includes trusting beliefs as a hierarchical latent variable, a type I reflective-reflective model was applied (Jarvis et al., 2003). We followed the suggestions of Ringle et al. (2012) to use the two-stage approach instead of the repeated indicator approach. We first obtained latent

Table 4
Quality criteria of reflective first-order constructs[a].

Construct Information and Literature Source		Indicator	Loading	Composite Reliability	AVE
Social Presence		SP1	0.887	0.957	0.816
Scales adapted from:		SP2	0.919		
Cyr et al. (2009)		SP3	0.901		
		SP4	0.919		
		SP5	0.890		
Trusting Beliefs	Benevolence	BEN1	0.859	0.887	0.725
Scales adapted from:		BEN2	0.912		
Wang and Benbasat (2005)		BEN3	0.778		
	Competence	COM1	0.836	0.931	0.730
		COM2	0.886		
		COM3	0.877		
		COM4	0.819		
		COM5	0.852		
	Integrity	INT1	0.717	0.797	0.568
		INT2	0.813		
		INT3	0.726		
Satisfaction		SAT1	0.818	0.908	0.768
Scales adapted from:		SAT2	0.900		
Verhagen et al. (2014)		SAT3	0.908		
Empathy		EMP1	0.786	0.886	0.661
Scales adapted from:		EMP2	0.789		
Escalas and Stern (2003)		EMP3	0.859		
		EMP4	0.816		

[a] One item of the original item set of the empathy construct was dropped due to low loadings (<0.7) in the initial analysis.

variable scores (LVS) of the trusting beliefs' sub-constructs and used the LVS afterwards as reflective indicators for the main-construct trusting beliefs, as suggested by Wang and Benbasat (2005).

5. Results

5.1. Measurement models

The evaluation of the model followed a two-step process (Hair et al. 2011, 2012). In the first step, the evaluation focused on the measurement models in order to reveal the reliability and validity of criteria that are associated with latent variables. The evaluation of the inner model and the structural relationships followed in the second step (Henseler et al., 2009). The outer model evaluation included only the first-order constructs. The quality criteria of the outer model are reported in Table 4.

We measured indicator reliability with the standardized indicator loadings. All indicators load above the minimum value of 0.700 (Hulland, 1999). Internal consistency of the latent variables was indicated by the composite reliability of all constructs. (Hair et al., 2012; Henseler et al., 2009). Values above the threshold of 0.700 show that the composite reliability is acceptable for this study and thus substantiate the internal consistency of the latent variables (Bagozzi & Yi, 1988). We measured convergent validity using the average variance extracted (AVE) and values above the minimum value of 0.500 which indicate that at least half of the variance of a latent construct is explained by the related indicators and therefore acceptable (Bagozzi & Yi, 1988).

In the following, we assessed the discriminant validity with the Fornell-Larcker criterion (Fornell & Larcker, 1981) as well as with the heterotrait-monotrait ratio (HTMT) and the heterotrait-monotrait inference criteria ($HTMT_{inference}$; Henseler et al., 2015). The analysis in Table 5 show that discriminant validity through consideration of the Fornell-Larcker Criterion and the conservative $HTMT_{85}$ measure (indicated through all HTMT measures under 0.850) is established. Also, the $HTMT_{inference}$ values are all significantly below the threshold of 1.[2]

Moreover, the results of the cross-loadings in Appendix C indicate that all indicators load the highest on their own construct (Chin, 1998). Thus, the evaluation of the measurement models shows that they fulfill the desired quality criteria.

5.2. Structural model

The results of the structural model consist of path coefficients, the explained variance, significance levels, the effect sizes, and the predictive relevance (Ringle et al., 2012). We applied the path weighting scheme PLS algorithm with 300 iterations for the model evaluation (Henseler, 2010), and we used the bootstrapping procedure with 5000 samples to determine the significance levels. The respective results of the structural model are summarized in Fig. 3.

The results of the structural model show that, except for the relationships between the personification and satisfaction (rejecting H1b), all direct relationships in the SEM are significant at a level of $p < 0.010$. However, the relationship between social orientation of communication style and satisfaction is significantly negative instead of positive. Thus, we have to reject H2b. An analysis of the interaction effects between the anthropomorphic design elements to understand their combined impact on social presence indicated that there is no significantly stronger effect when both anthropomorphic design elements are present (rejecting H3a).

Furthermore, we analyzed the central role of social presence as a mediator for the effect of both anthropomorphic design elements following the recommendations of Nitzl et al. (2016) by estimating the significance of the direct effects and the indirect effects. The bootstrapping of the sampling distribution of the indirect effects shows that both effects were significant as shown in Table 6. The analysis shows that social presence mediates the effect of both personification and social orientation of communication style on satisfaction, thus confirming H3b. A closer look at the mediation effects shows that there is an indirect-only, full mediation present for the effect of personification on satisfaction (mediated through social presence), since the direct effect of personification on satisfaction is insignificant without the mediator present ($\beta = 0.088$; $p > 0.05$). In contrast, for social orientation of communication style, a competitive, partial mediation effect of social orientation on satisfaction (mediated through social presence) is present, indicated by two reasons: First, the positive and significant direct relationship of social orientation of communication style on satisfaction ($\beta = 0.128$; $p < 0.05$) without the mediator present; second, the negative sign of the product of the indirect and direct effect. In this case, social

[2] For the sake of brevity, we refrained from additionally depicting the HTMTinference statistics, but they are available upon request.

Table 5
Discriminant validity of first-order constructs[a].

Construct	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Personification	*NA*							
(2) Social Orientation	0.043 (0.043)	*NA*						
(3) Social Presence	0.152 (0.156)	0.593 (0.610)	*0.903*					
(4) Benevolence	0.053 (0.060)	0.193 (0.220)	0.423 (0.490)	*0.851*				
(5) Competence	0.018 (0.037)	0.184 (0.190)	0.483 (0.516)	0.593 (0.690)	*0.854*			
(6) Integrity	0.087 (0.106)	0.004 (0.089)	0.245 (0.308)	0.504 (0.702)	0.448 (0.589)	*0.753*		
(7) Satisfaction	0.091 (0.099)	0.096 (0.117)	0.437 (0.483)	0.422 (0.512)	0.648 (0.742)	0.324 (0.448)	*0.876*	
(8) Empathy	0.046 (0.063)	0.377 (0.395)	0.579 (0.644)	0.366 (0.449)	0.393 (0.450)	0.221 (0.306)	0.398 (0.477)	*0.813*

[a] Diagonal elements (in italics) are square roots of the AVE and off-diagonal elements are correlations of the latent variables. The computation of the Fornell-Larcker criterion was omitted for the manifest variables (NA). Values in parenthesizes show the HTMT criterion, whereby .85 represents a conservative threshold. Therefore, the values show that the conservative HTMT $_{85}$ criterion is fully satisfactory and confirming discriminant validity.

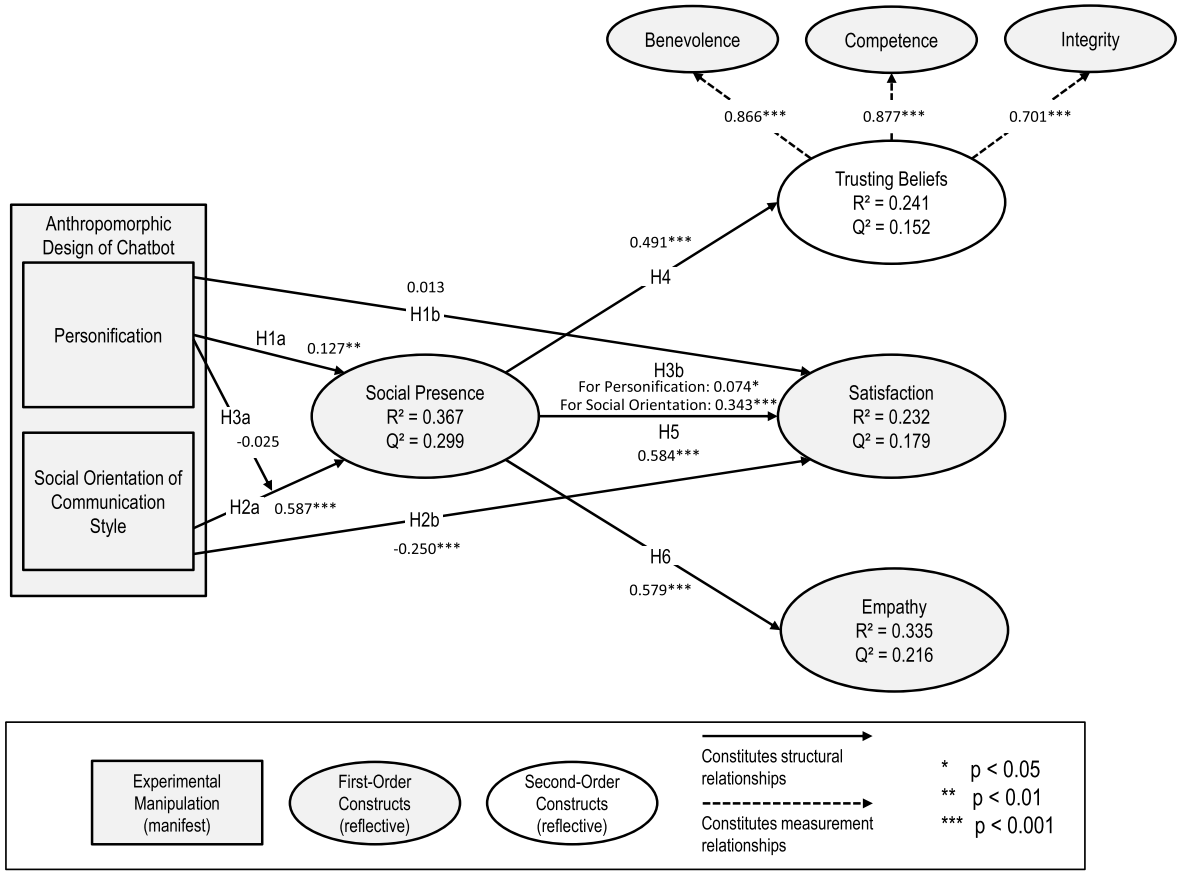

Fig. 3. Results of the structural model.

presence acts as a suppressor for social orientation of communication style with the result of decreasing the effect of social orientation as shown by the highly significant negative direct effect. In conclusion, we can confirm all hypotheses except for H1b, H2b and H3a. Table 6 summarizes the results of the model evaluation.

In addition, we took the explained variance, effect sizes as well as predictive relevance of the model into account. Whereas the R^2 values for trusting beliefs and satisfaction are considered as weak ($R^2 \geq 0.190$). The R^2 values for social presence and empathy are described as moderate ($R^2 \geq 0.330$). For the sake of brevity, R^2 values are depicted in Fig. 3. In a next step, we considered the effect sizes of the direct relationships (Cohen, 1988). Values above 0.020, 0.150, and 0.350 indicate a low, moderate, or high effect on the structural level (Henseler et al., 2009). The results for the significant relationships therefore indicate that the effects of personification on social presence ($f^2 = 0.025$) and social orientation of communication style on satisfaction ($f^2 = 0.043$) can be considered as low, while the effect of social presence on satisfaction ($f^2 = 0.199$) is moderate, and social orientation of communication style on social presence ($f^2 = 0.543$) is high. The Q^2 values are all above the threshold value of 0, thus indicating predictive relevance (see Fig. 3). Similar to f^2, the results of q^2 indicate that the relative predictive relevance of social orientation of communication style on satisfaction ($q^2 = 0.038$) can be considered as low, the effect of social presence on satisfaction ($q^2 = 0.200$) is moderate, and the relative predictive relevance of social orientation of communication style on social presence ($q^2 = 0.399$) is high.

6. Discussion and implications

6.1. Discussion of findings

There are several major findings of this study. As seen in our fully

Table 6
Results of the structural model.

Hypotheses	Path Coefficients	f^2	q^2	t-value	Hypothesis Supported?
H1a: Personification →(+) Social Presence	0.127	0.025	0.019	2.695	✓
H1b: Personification →(+) Satisfaction	0.013	0.000	0.004	0.371	×
H2a: Social Orientation →(+) Social Presence	0.587	0.543	0.399	14.300	✓
H2b: Social Orientation →(+) Satisfaction	−0.250	0.043	0.038	3.430	×
H3a: Personification x Social Orientation →(+) Social Presence	−0.025	–	–	0.753	×
H3b: Anthropomorphic Design Elements →(+) Social Presence →(+) Satisfaction	Mediation Analysis				✓
Personification →(+) Social Presence →(+) Satisfaction	0.074	–	–	2.470	✓
Social Orientation →(+) Social Presence →(+) Satisfaction	0.343	–	–	6.517	✓
H4: Social Presence →(+) Trusting Beliefs	0.491	–	–	10.693	✓
H5: Social Presence →(+) Satisfaction	0.584	0.199	0.200	8.137	✓
H6: Social Presence →(+) Empathy	0.579	–	–	13.937	✓

randomized experiment and corresponding model analysis, we investigated the impact of anthropomorphic design elements of chatbots for customer services on consumers' perceptions of social presence as the central construct. Within the experiment, we tested two anthropomorphic design elements: First, the personification manipulation referred to a more human-like appearance of the chatbot and was induced through a picture of the chatbot and a name. Second, socially oriented communication referred to the behavioral dimension of chatbots and was induced through a more sensitive and extensive communication behavior. We evaluated the two anthropomorphic design elements individually and in combination. We found significant evidence for the positive effect of both anthropomorphic design elements on social presence. Thus, we complement prior research on highlighting that anthropomorphic design also is important for short-term interactions (Niβen et al., 2021). However, we did not observe a significant influence on the satisfaction with the chatbot induced through the personification of a chatbot. Also, we found that social orientation of communication style even negatively triggers customer satisfaction with a chatbot, although we found a highly significant and positive relationship between social presence and satisfaction. Deeper analysis related to the mediating role of social presence revealed that both anthropomorphic design elements were positively mediated through social presence. Social presence fully mediates the relationship between personification and satisfaction, whereas social presence even acts as a suppressor variable in a competitive mediation concerning the positive influence of the social orientation of communication style on satisfaction. Therefore, we complement prior research on the crucial role of social presence for conversational agent interaction (Konya-Baumbach et al., 2023; Qiu & Benbasat, 2009). Thus, customers may not directly relate the anthropomorphic design with their satisfaction perceptions, they rather form perceptions on the basis of social presence that, in turn, are positively related to customer satisfaction even in short-term interactions. When combining the effects of both anthropomorphic design elements, we observed that there was no significantly higher level of perceived social presence. Accordingly, we recognize that the perception of social presence is not a direct function of anthropomorphic design elements, and social orientation of communication style more effectively triggers social presence.

For example, Seeger et al. (2018) highlighted this more nuanced view on anthropomorphic design in the context of health services, also indicating the presence of the uncanny valley phenomenon, which was first introduced in the 1970s and predicted that a certain degree of human-likeness might evoke negative affect (Mori et al., 2012). For instance, a text-based chatbot might be perceived as less weird and uncanny compared to an animated avatar-based chatbot (Ciechanowski et al., 2019). Nonetheless, movements and animations might amplify the effects (Mori et al., 2012). The latter fact could be a reasonable explanation for the rather positive effects of personification with a non-moving avatar.

Also, we should consider the user of chatbots, and that social presence may also trigger unfavorable relationships between both parties when there is a mismatch between the preferred and experienced levels of social presence. While some users of customer service chatbots may feel more connected and valued through a conversational partner in a service failure context through emotion-focused coping, other users have problem-based coping processes and prefer a chatbot that is more machine-like, efficient, and less socially present through providing factual information, instructions, and avoiding personalization (Huang & Dootson, 2022). This could be the case when interpersonal perceptions get in the way of productive processes to solve the service failure (see also Weidlich et al., 2022 for the educational domain).

When considering the central role of social presence, we further found evidence that social presence acts as a powerful antecedent concerning important outcomes in online service interactions. Besides the already discussed mediating and direct effect on the satisfaction with a chatbot in online service encounters, we found a significant relationship concerning the formation of trusting beliefs towards the chatbot. Finally, we also found evidence that higher levels of social presence are associated with higher levels of perceived empathy, which is recognized as central for high touch services in digital interaction processes (Giebelhausen et al., 2014; Huang & Rust, 2018). All in all, we are able to show that social presence acts as a central construct for understanding chatbots in customer service encounters, and it could be positively leveraged through the recognition of anthropomorphic design elements when designing chatbot interaction processes.

6.2. *Implications for theory, practice and policy*

Our study results especially contribute to the body of knowledge concerning the understanding of online customer services as well as to the understanding of anthropomorphic user interface designs for chatbots and other conversational agents. First, we contribute to theory with our results by highlighting the role of social presence and its impact on consumers' perceptions concerning satisfaction and empathy, as well as the associated formation of trusting beliefs. Second, we are able to show that the thoughtful consideration of anthropomorphic design elements leads to a desirable state of social presence and therefore contributes to the success of effective chatbots in customer service encounters. Thus, our results contribute to the effective design of chatbot user interfaces (Diederich et al., 2022; Moore et al., 2017; Niβen et al., 2021).

Second, in consideration of the embeddedness of chatbots in customer service interactions, our findings have several implications for practice. Practitioners should strive for a certain level of induced anthropomorphic design instead of maximizing humanness with new technologies. Personification should be adopted wisely, if, for example, behavioral anthropomorphic design elements offer very rich cues of humanness that might push a chatbot into the uncanny valley. Due to the recent development in AI and algorithms, such as transformer-based models in chatbots like ChatGPT (Dwivedi et al., 2023; Haque et al., 2022; Teubner et al., 2023), that are able to resemble more empathic and social conversations with users, additional rich appearances such as 3D-animated avatars may be counter-effective. Therefore, empathic and

socially oriented conversations should be designed to leverage favorable service perceptions, especially when considering service failure as in our example, where trust, satisfaction as well as empathy was leveraged through social presence. This is also an enabler when considering the so-called "feeling AI" that is an important element for innovative service interaction processes (Benke et al., 2021; Huang & Rust, 2020).

Third, our findings have several implications for policy makers who are concerned with the ethical and social aspects of chatbot design and use. Policy makers should be aware of the potential risks and benefits of different levels of anthropomorphic design in chatbots, and provide guidelines and regulations to ensure that chatbots are designed and used in a responsible and transparent manner. An important recent example is the proposal of the European AI act that includes an information of users that they are interacting with a bot for the case it would not be contextually obvious (Veale & Zuiderveen Borgesius, 2021). This holds especially true if anthropomorphic design tactics are utilized that mimic humans. As chatbots like ours oftentimes draw upon stereotypic anthropomorphic design features (see for instance also the study of Lin et al., 2020 who designed for cute avatars of women in service encounters), policy makers should also promote the development and adoption of chatbots that can enhance social inclusion, accessibility, and diversity in customer service interactions, and avoid chatbots that may create or reinforce biases, stereotypes, or discrimination. Furthermore, the collaboration and dialog among different stakeholders, such as chatbot developers, service providers, customers, researchers, to foster the ethical and social awareness and responsibility of chatbot design and use should be encouraged by policy makers, especially for the case of service chatbots are to some extent persuasive (Benner et al., 2022). Providing design best practices, e.g., formalized through design patterns (Dickhaut et al., 2023), that offer guidance on how to specify legislation for novel AI technology could be a way to ensure that we could overcome the technological neutrality of legal acts.[3]

7. Limitations and future research

We acknowledge several limitations to this study that underline a demand for future research. The study is limited to the investigation of a customer service process of an internet service provider. Thus, we cannot necessarily assume that a chatbot in another service, e.g., health service, is perceived differently. Hence, research should take other service delivery contexts into account. Second, the study examined a short-term interaction process with the chatbot. Hence, the necessity arises to conduct longitudinal studies investigating how chatbot perceptions change related to anthropomorphic design features as indicated by Nguyen et al. (2021). Third, characteristics of the convenience sample could threaten the external statistical generalizability.

Additional threats to the external validity could occur from the use of a web-based prototype of the chatbot. Although it was ensured that the prototype reflects the typical functions and usability, the prototype cannot fully substitute a real-life customer service process, since the participants have to adhere to the experimental protocol. Therefore, future research should assess the model within field experiments, also considering interaction data in addition to survey-based perceptions. This also leads to an avenue for future research concerning our used trust measures. Since trust is a multidimensional construct that can relate to multiple foci (e.g., Lankton et al., 2015), future studies should delineate this relationship more clearly. Nonetheless, we focused in our study on perceptions related to personal characteristics of chatbot, and, thus, we focused on trust in the chatbot. From an ethical perspective, we would also point out that we utilized a personification through a face of a Woman to maximize treatment effects. Future research should therefore also account for the depiction of another gender or even through gender-neutral personifications to avoid gender stereotyping of customer chatbots (Pfeuffer, Adam, et al., 2019; Sutton, 2020; Tolmeijer et al., 2021). Finally, the fictitious service provider in our controlled online experiment is a certain limitation because participants know that the websites do not exist in real life. Future research should take more prominent internet service providers into account or compare famous and fictitious ones. However, we consciously accepted this limitation to control for brand predisposition and reputation. In this context, future research could also investigate the central role of social presence in field experiments while also looking at user and service failure specific boundary conditions that may influence how effective or unfavorable anthropomorphic design is in practice.

8. Conclusion

To uncover how anthropomorphic design relates to social presence, chatbot outcomes, and to answer our overarching RQ, we conducted an empirical study in the domain of customer service encounters. We implemented a chatbot prototype and collected data in a between-subject experiment. Our findings showed the positive influence of an anthropomorphic design on social presence. On top of that, we were able to show the central role of social presence that mediated the impact of an anthropomorphic design on the satisfaction with a chatbot. Specifically, we found a full mediation for personification and a competitive mediation for social orientation of communication style. As part of the consequences of social presence, we were able to show significant relationships of social presence related to trusting beliefs, satisfaction, and empathy. Thus, our contribution is twofold. On the one hand, we contribute to theory by explaining and predicting (Gregor, 2006) how personification and social orientation of communication style of chatbots relates to social presence and chatbot outcomes. On the other hand, we provide guidance for practitioners for anthropomorphic chatbot designs that are perceived with a higher degree of social presence, seem more trustworthy and empathic, and ultimately avoid the uncanny valley. This enables practitioners to ensure that their service chatbots are improved, which in turn could lead to, for example, higher satisfaction with service provision in the long run. Thus, research should take our results as a starting point and further investigate how chatbots, their anthropomorphic design and customer service encounter outcomes are intertwined, e.g., by also considering service chatbots in other contexts.

CRediT authorship contribution statement

Andreas Janson: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The author does not have permission to share data.

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[3] A noteworthy example is the design guideline on voice assistants from the European Data Protection Board (edpb) (2021) that presents implementation advice related to the European General Data Protection Regulation. Same guidelines could be issued for anthropomorphic design of AI-based systems that help to specify the European AI act or other regulations.

Melanie Schwede for her work on earlier drafts of this paper.

Appendix A

Comparison of Chatbot Conditions

As shown in Figure A1 below, the participants were randomly assigned to four chatbot conditions that manipulated the anthropomorphic design elements regarding a) whether there is personification present and b) whether there is a socially-oriented communication style present. All chatbot conditions featured the same structure of the experiment (see also Fig. 2 in the main body of the paper) and participants were asked the same set of questions. The chatbot interfaces without the personification relied simply on the depiction of the conversation bubbles without any personification present. The chatbot interfaces with the anthropomorphic design element present depicted a depiction of the female call center agent "Julia". The chatbot interfaces without a socially-oriented communication style asked straight questions without any social aspects involved in the communication.

The chatbot interfaces with a socially-oriented communication style featured the same questions to solve the issue of the internet connection with the same amount of turns. We relied on the conceptualization of social orientation of communication styles on Chattaraman et al. (2019) as follows. The script therefore was in groups CG and TG1 (both without social orientation of communication style) formal with limited chatbot interaction that only relates to the necessary aspects related to performing a task and there is no social conversation except for an initial greeting message. In comparison, the social orientation of communication style provides functional guides and information. In addition, the chatbot scripted informal conversation aspects through small talk, questions to reassure aspects with the user, provides exclamatory feedback, and encouragement that is especially relevant to solving customer service issue. In sum, Figure A2 provides a comparison with two script output exhibits of both communication styles and disentangles the different aspects of the communication styles.

Fig. A1. Direct Comparison of all Experimental Groups with the Interface.

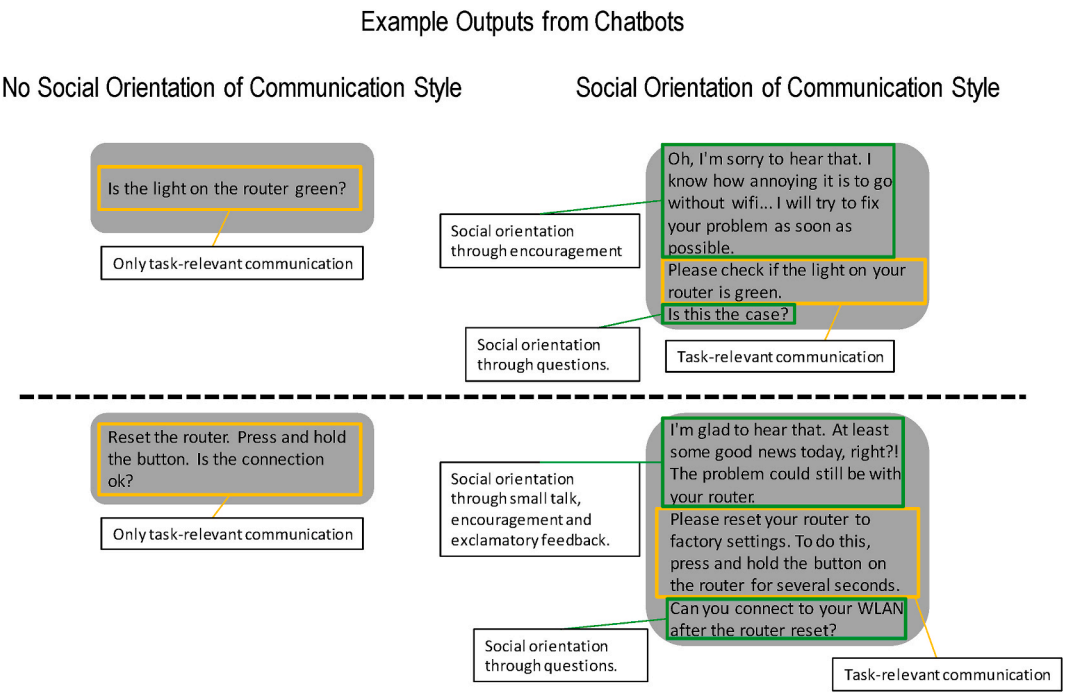

Fig. A2. Comparison of Exemplary Scripts from Chatbots regarding Communication Style. All script outputs translated to English.

Appendix B

Table B.1
Final Survey Instrument

Construct Information and Literature Source		Indicator	Statements
Social Presence		SP1	There is a sense of human contact in the Chatbot.
Scales adapted from:		SP2	There is a sense of personalness in the Chatbot.
Cyr et al. (2009)		SP3	There is a sense of sociability in the Chatbot.
		SP4	There is a sense of human warmth in the Chatbot.
		SP5	There is a sense of human sensitivity in the Chatbot.
Trusting Beliefs	Benevolence	BEN1	This Chatbot puts my interests first.
Scales adapted from:		BEN2	This Chatbot keeps my interests in mind.
Wang and Benbasat (2005)		BEN3	This Chatbot wants to understand my needs and preferences.
	Competence	COM1	This Chatbot is like a real expert in assessing digital cameras.
		COM2	This Chatbot has the expertise to understand my needs and preferences about digital cameras.
		COM3	This Chatbot has the ability to understand my needs and preferences about digital cameras.
		COM4	This Chatbot has good knowledge about digital cameras.
		COM5	This Chatbot considers my needs and all important attributes of digital cameras.
	Integrity	INT1	This Chatbot provides unbiased product recommendations.
		INT2	This Chatbot is honest.
		INT3	I consider this Chatbot to possess integrity.
Satisfaction		SAT1	How satisfied are you with the Chatbot's advice?
Scales adapted from:		SAT2	How satisfied are you with the way the Chatbot treated you?
Verhagen et al. (2014)		SAT3	How satisfied are you with the overall interaction with the Chatbot?
Empathy		EMP1	While using the Chatbot, I experienced feeling as if the events were really happening to me.
Scales adapted from:		EMP2	While using the Chatbot, I felt as if the events in the conversation were really happening to me.
Escalas and Stern (2003)		EMP3	While using the Chatbot, I experienced many of the same feelings that the characters portrayed.
		EMP4	While using the Chatbot, I felt as if the using the Chatbot's feelings were my own.

Appendix C

Table C.1
Cross Loadings

	Construct*							
Indicator	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P	**1.000**	0.043	0.152	0.054	0.018	0.087	0.091	0.046
SO	0.043	**1.000**	0.593	0.193	0.184	0.004	0.096	0.377
SP1	0.127	0.425	**0.887**	0.413	0.512	0.248	0.525	0.544
SP2	0.188	0.506	**0.919**	0.361	0.432	0.206	0.433	0.561
SP3	0.088	0.548	**0.901**	0.361	0.387	0.180	0.334	0.507
SP4	0.161	0.556	**0.919**	0.370	0.410	0.213	0.339	0.495
SP5	0.121	0.643	**0.890**	0.403	0.433	0.253	0.336	0.507
BEN1	0.065	0.129	0.301	**0.859**	0.490	0.410	0.364	0.262
BEN2	0.040	0.111	0.314	**0.912**	0.551	0.431	0.379	0.294
BEN3	0.031	0.263	0.477	**0.778**	0.470	0.448	0.334	0.385
COM1	−0.0398	0.1114	0.3421	0.4577	**0.836**	0.364	0.622	0.324
COM2	0.0386	0.1735	0.466	0.544	**0.886**	0.450	0.557	0.375
COM3	0.0416	0.2598	0.4952	0.5285	**0.877**	0.377	0.535	0.389
COM4	0.0004	0.0627	0.2791	0.4265	**0.819**	0.339	0.528	0.245
COM5	0.0303	0.1672	0.4639	0.5671	**0.852**	0.377	0.531	0.335
INT1	0.0561	−0.0317	0.1494	0.3746	0.348	**0.717**	0.256	0.157
INT2	0.031	−0.0487	0.0987	0.2807	0.287	**0.813**	0.225	0.128
INT3	0.1016	0.0775	0.285	0.4603	0.364	**0.726**	0.245	0.205
SAT1	0.068	−0.023	0.303	0.369	0.568	0.320	**0.818**	0.298
SAT2	0.054	0.138	0.428	0.386	0.552	0.283	**0.900**	0.369
SAT3	0.116	0.123	0.410	0.357	0.588	0.255	**0.908**	0.374
EMP1	0.115	0.201	0.466	0.280	0.313	0.206	0.392	**0.786**
EMP2	0.042	0.140	0.369	0.280	0.310	0.191	0.339	**0.789**
EMP3	−0.015	0.421	0.503	0.359	0.344	0.161	0.321	**0.859**
EMP4	0.015	0.411	0.520	0.268	0.310	0.167	0.255	**0.816**

*Note:(1) Personification (P) (2) Social Orientation of Communication Style (SO) (3) Social Presence (SP) (4) Benevolence (BEN) (5) Competence (COM) (6) Integrity (INT) (7) Satisfaction (SAT) (8) Empathy (EMP).

References

Adam, M., Wessel, M., & Benlian, A. (2020). AI-based chatbots in customer service and their effects on user compliance. *Electronic Markets, 9*(2), 204.

Aguinis, H., & Bradley, K. J. (2014). Best practice recommendations for designing and implementing experimental vignette methodology studies. *Organizational Research Methods, 17*(4), 351–371.

Araujo, T. (2018). Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions. *Computers in Human Behavior*, (85), 183–189.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*(1), 74–94.

Barger, P. B., & Grandey, A. A. (2006). Service with A Smile and encounter satisfaction: Emotional contagion and appraisal mechanisms. *Academy of Management Journal, 49*(6), 1229–1238.

Benke, I., Gnewuch, U., & Maedche, A. (2021). Understanding the impact of control levels over emotion-aware chatbots. *Computers in Human Behavior, 85*(3–4), Article 107122.

Benner, D., Elshan, E., Schöbel, S., & Janson, A. (2021). *"What do you mean? A review on recovery strategies to overcome conversational breakdowns of conversational agents,"*. ICIS 2021 Proceedings.

Benner, D., Schöbel, S. M., Janson, A., & Leimeister, J. M. (2022). How to achieve ethical persuasive design: A review and theoretical propositions for information systems. *AIS Transactions on Human-Computer Interaction, 14*(4), 548–577.

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators and Virtual Environments, 12*(5), 456–480.

Bommasani, R., Hudson, D. A., Adeli, E., Altman, R., Arora, S., Arx, S., von, Bernstein, M. S., Bohg, J., Bosselut, A., Brunskill, E., Brynjolfsson, E., Buch, S., Card, D., Castellon, R., Chatterji, N., Chen, A., Creel, K., Davis, J. Q., … Liang, P. (2022). *On the opportunities and risks of foundation models. arXiv preprint arXiv: 2108.07258*.

Brandtzaeg, P. B., & Følstad, A. (2017). Why people use chatbots. In A. Satsiou, G. Carle, A. Passani, E. Kontopoulos, S. Diplaris, D. McMillan, P. B. Brandtzaeg, & A. Følstad (Eds.), *International Conference on internet science: INSCI 2017, I. Kompatsiaris, J. Cave* (pp. 377–392). Cham: Springer International Publishing.

Bulu, S. T. (2012). Place presence, social presence, co-presence, and satisfaction in virtual worlds. *Computers & Education, 58*(1), 154–161.

Cassell, J. (2001). Embodied conversational agents: Representation and intelligence in user interfaces. *AI Magazine, 22*(4), 67.

Chattaraman, V., Kwon, W.-S., Gilbert, J. E., & Ross, K. (2019). Should AI-based, conversational digital assistants employ social- or task-oriented interaction style?: A task-competency and reciprocity perspective for older adults. *Computers in Human Behavior*, (90), 315–330.

Chaves, A. P., Egbert, J., Hocking, T., Doerry, E., & Gerosa, M. A. (2022). Chatbots Language design: The influence of language variation on user experience with tourist assistant chatbots. *ACM Transactions on Computer-Human Interaction, 29*(2), 1–38.

Chaves, A. P., & Gerosa, M. A. (2020). How should my chatbot interact?: A survey on social characteristics in human–chatbot interaction design. *International Journal of Human-Computer Interaction, 6*(7), 1–30.

Chin, W. W. (1998). The partial least squares approach for structural equation modeling. In G. A. Marcoulides (Ed.), *Mahwah, N.JModern methods for business research* (pp. 295–336). Lawrence Erlbaum.

Chin, H., Molefi, L. W., & Yi, M. Y. (2020). Empathy is all you need: How a conversational agent should respond to verbal abuse. In *Proceedings of the 2020 CHI conference on human factors in computing systems* (pp. 1–13). New York, NY, USA: Association for Computing Machinery.

Choi, S., Mattila, A. S., & Bolton, L. E. (2020). To err is human(-oid): How do consumers react to robot service failure and recovery? *Journal of Service Research, 6*(3), Article 109467052097879.

Choi, Y. K., Miracle, G. E., & Biocca, F. (2001). The effects of anthropomorphic agents on advertising effectiveness and the mediating role of presence. *Journal of Interactive Advertising, 2*(1), 19–32.

Chung, M., Ko, E., Joung, H., & Kim, S. J. (2020). Chatbot e-service and customer satisfaction regarding luxury brands. *Journal of Business Research*, (117), 587–595.

Cialdini, R. B. (2014). *Influence: Science and practice*. Harlow, Essex: Pearson.

Ciechanowski, L., Przegalinska, A., Magnuski, M., & Gloor, P. (2019). In the shades of the uncanny valley: An experimental study of human–chatbot interaction. *Future Generation Computer Systems*, (92), 539–548.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Comfort, A. (1984). *Reality and empathy: Physics, mind, and science in the 21st century*. Albany: State University of New York Press.

Cyr, D., Head, M., Larios, H., & Pan, B. (2009). Exploring human images in website design: A multi-method approach. *MIS Quarterly, 33*(3), 539.

Dale, R. (2016). The return of the chatbots. *Natural Language Engineering, 22*(5), 811–817.

Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information Systems Research, 9*(3), 256–274.

DeWitt, T., Nguyen, D. T., & Marshall, R. (2008). Exploring customer loyalty following service recovery. *Journal of Service Research, 10*(3), 269–281.

Dickhaut, E., Janson, A., Söllner, M., & Leimeister, J. M. (2023). Lawfulness by design – development and evaluation of lawful design patterns to consider legal requirements. *European Journal of Information Systems, 375*(6578), 1–28.

Diederich, S., Brendel, B. A., Morana, S., & Kolbe, L. (2022). On the design of and interaction with conversational agents: An organizing and assessing review of human-computer interaction research. *Journal of the Association for Information Systems, 23*(1), 96–138.

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A., & Wang, Y. (2020). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management, 13*(1), Article 102168.

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., … Wright, R. (2023). So what if ChatGPT wrote it?: " multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management, 71*(2), Article 102642.

Elshan, E., Zierau, N., Engel, C., Janson, A., & Leimeister, J. M. (2022). Understanding the design elements affecting user acceptance of intelligent agents: Past, present and future. *Information Systems Frontiers, 24*(3), 699–730.

Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: A three-factor theory of anthropomorphism. *Psychological Review, 114*(4), 864–886.

Escalas, J. E., & Stern, B. B. (2003). Sympathy and empathy: Emotional responses to advertising dramas. *Journal of Consumer Research, 29*(4), 566–578.

Etemad-Sajadi, R. (2016). The impact of online real-time interactivity on patronage intention: The use of avatars. *Computers in Human Behavior*, (61), 227–232.

European Data Protection Board (edpb). (2021). Guidelines 02/2021 on virtual voice assistants: *Version 2.0*. Adopted on 7 Jully 2021 https://edpb.europa.eu/system/files/2021-07/edpb_guidelines_202102_on_vva_v2.0_adopted_en.pdf.

Evanschitzky, H., Brock, C., & Blut, M. (2011). Will you tolerate this?: The impact of affective commitment on complaint intention and postrecovery behavior. *Journal of Service Research, 14*(4), 410–425.

Feine, J., Gnewuch, U., Morana, S., & Maedche, A. (2019). A taxonomy of social cues for conversational agents. *International Journal of Human-Computer Studies*, (132), 138–161.

Feine, J., Gnewuch, U., Morana, S., & Maedche, A. (2020). Gender bias in chatbot design. In A. Følstad, T. Araujo, S. Papadopoulos, E. L.-C. Law, O.-C. Granmo, E. Luger, & P. B. Brandtzaeg (Eds.), *Gender bias in chatbot design: Chatbot research and design* (pp. 79–93). Springer International Publishing.

Fink, J. (2012). *"Anthropomorphism and human likeness in the design of robots and human-robot interaction," social robotics. ICSR* (Vol. 7621). Lecture Notes in Computer Science, 2012.

Følstad, A., Araujo, T., Law, E. L.-C., Brandtzaeg, P. B., Papadopoulos, S., Reis, L., Baez, M., Laban, G., McAllister, P., Ischen, C., Wald, R., Catania, F., Meyer von Wolff, R., Hobert, S., & Luger, E. (2021). Future directions for chatbot research: An interdisciplinary research agenda. *Computing, 85*(1), 183.

Fong, T., Nourbakhsh, I., & Dautenhahn, K. (2002). *A survey of socially interactive robots: Concepts, design and applications*. Pittsburgh, PA USA: Carnegie Mellon University. http://uhra.herts.ac.uk/bitstream/2299/3821/1/101193.pdf.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Froehle, C. M. (2006). Service personnel, technology, and their interaction in influencing customer satisfaction. *Decision Sciences, 37*(1), 5–38.

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51–90.

Giebelhausen, M., Robinson, S. G., Sirianni, N. J., & Brady, M. K. (2014). Touch versus tech: When technology functions as a barrier or a benefit to service encounters. *Journal of Marketing, 78*(4), 113–124.

Go, E., & Sundar, S. S. (2019). Humanizing chatbots: The effects of visual, identity and conversational cues on humanness perceptions. *Computers in Human Behavior, 97*(1), 304–316.

Gregor, S. (2006). The nature of theory in information systems. *MIS Quarterly, 30*(3), 611–642.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications, 1*(2), 147–166.

Gunawardena, C. N., & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8–26.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 18*(2), 139–152.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science, 40*(3), 414–433.

Haque, M. U., Dharmadasa, I., Sworna, Z. T., Rajapakse, R. N., & Ahmad, H. (2022). *I think this is the most disruptive technology": Exploring Sentiments of ChatGPT Early Adopters using Twitter Data*.

Hassanein, K., & Head, M. (2007). Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. *International Journal of Human-Computer Studies, 65*(8), 689–708.

Henseler, J. (2010). On the convergence of the partial least squares path modeling algorithm. *Computational Statistics, 25*(1), 107–120.

Henseler, J., Ringle, C. M., & 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), 115–135.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics, & P. N. Ghauri (Eds.), *Advances in international marketing* (pp. 277–320). Bingley: Emerald.

Hill, J., Randolph Ford, W., & Farreras, I. G. (2015). Real conversations with artificial intelligence: A comparison between human–human online conversations and human–chatbot conversations. *Computers in Human Behavior*, (49), 245–250.

Hostetter, C., & Busch, M. (2006). Measuring up online: The relationship between social presence and student learning satisfaction. *The Journal of Scholarship of Teaching and Learning, 6*(2), 1–12.

Huang, Y.-S., & Dootson, P. (2022). Chatbots and service failure: When does it lead to customer aggression. *Journal of Retailing and Consumer Services, 68*(2), Article 103044.

Huang, M.-H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research, 21*(2), 155–172.

Huang, M.-H., & Rust, R. T. (2020). Engaged to a robot?: The role of AI in service. *Journal of Service Research, 93*(11), Article 109467052090226.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal, 20*(2), 195–204.

Jain, M., Kota, R., Kumar, P., & Patel, S. N. (2018). Convey. In R. Mandryk, M. Hancock, M. Perry, & A. Cox (Eds.), *Montreal QC, CanadaProceedings of the 2018 CHI conference on human factors in computing systems - CHI '18* (pp. 1–6). New York, New York, USA: ACM Press.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30*(2), 199–218.

Keeling, K., McGoldrick, P., & Beatty, S. (2010). Avatars as salespeople: Communication style, trust, and intentions. *Journal of Business Research, 63*(8), 793–800.

Kim, J., & Im, I. (2023). Anthropomorphic response: Understanding interactions between humans and artificial intelligence agents. *Computers in Human Behavior, 139*(11), Article 107512.

Knote, R., Janson, A., Söllner, M., & Leimeister, J. M. (2021). Value Co-creation in smart services: A functional affordances perspective on smart personal assistants. *Journal of the Association for Information Systems, 22*(2), 418–458.

Koda, T., & Maes, P. (1996). Agents with faces: The effect of personification. In *RO-MAN '96 tsukuba: Proceedings of the 5th IEEE international Workshop on Robot and human communication., tsukuba, Japan. 11-14 nov. 1996* (pp. 189–194). Piscataway, NJ: Institute of Electrical and Electronics Engineers.

Köhler, C. F., Rohm, A. J., Ruyter, K. de, & Wetzels, M. (2011). Return on interactivity: The impact of online agents on newcomer adjustment. *Journal of Marketing, 75*(2), 93–108.

Kohut, H. (1984). *How does analysis cure? Chicago, Ill*. Bristol: University of Chicago Press; University Presses Marketing [distributor.

Konya-Baumbach, E., Biller, M., & Janda, S. von (2023). Someone out there?: A study on the social presence of anthropomorphized chatbots. *Computers in Human Behavior, 139*(4), Article 107513.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior, 19*(3), 335–353.

Lahaie, U. (2007). Strategies for creating social presence online. *Nurse Educator, 32*(3), 100–101.

Lajante, M., & Remisch, D. (2023). Frontline employees' empathy in service recovery: A systematic literature review and agenda for the future. *Customer Needs and Solutions, 10*(1), Article 1892924.

Lankton, N., McKnight, D., & Tripp, J. (2015). Technology, humanness, and trust: Rethinking trust in technology. *Journal of the Association for Information Systems, 16*(10).

Larivière, B., Bowen, D., Andreassen, T. W., Kunz, W., Sirianni, N. J., Voss, C., Wünderlich, N. V., & Keyser, A. de (2017). Service Encounter 2.0": An investigation into the roles of technology, employees and customers. *Journal of Business Research*, (79), 238–246.

Levenson, R. W., & Ruef, A. M. (1992). Empathy: A physiological substrate. *Journal of Personality and Social Psychology, 63*(2), 234–246.

Liebrecht, C., Sander, L., & van Hooijdonk, C. (2021). Too informal? How a chatbot's communication style affects brand attitude and quality of interaction. In A. Følstad, T. Araujo, S. Papadopoulos, E. L.-C. Law, E. Luger, M. Goodwin, & P. B. Brandtzaeg (Eds.), *Chatbot research and design* (pp. 16–31). Cham: Springer International Publishing.

Lin, Y.-T., Doong, H.-S., & Eisingerich, A. B. (2020). Avatar design of virtual salespeople: Mitigation of recommendation conflicts. *Journal of Service Research, 29*(2), Article 109467052096487.

Li, M., & Suh, A. (2022). Anthropomorphism in AI-enabled technology: A literature review. *Electronic Markets, 32*(4), 2245–2275.

Luger, E., & Sellen, A. (2016). Like having a really bad PA": The gulf between user expectation and experience of conversational agents. In *Proceedings of the 2016 CHI conference on human factors in computing systems* (pp. 5286–5297). New York, NY, USA: Association for Computing Machinery.

Marakas, G. M., Johnson, R. D., & Palmer, J. W. (2000). A theoretical model of differential social attributions toward computing technology: When the metaphor becomes the model. *International Journal of Human-Computer Studies, 52*(4), 719–750.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20*(3), 709–734.

McLean, G., & Osei-Frimpong, K. (2019). "Hey Alexa … examine the variables influencing the use of artificial intelligent in-home voice assistants". *Computers in Human Behavior*, (99), 28–37.

Moore, R. J., Arar, R., Ren, G.-J., & Szymanski, M. H. (2017). *Conversational UX design," CHI EA '17 Proceedings of the 2017 CHI conference extended Abstracts on human Factors in computing systems*.

Mori, M., MacDorman, K., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics and Automation Magazine, 19*(2), 98–100.
Mozafari, N., Weiger, W. H., & Hammerschmidt, M. (2021). Trust me, I'm a bot – repercussions of chatbot disclosure in different service frontline settings. *Journal of Service Management, 33*(2), 221–245.
Munnukka, J., Talvitie-Lamberg, K., & Maity, D. (2022). Anthropomorphism and social presence in Human–Virtual service assistant interactions: The role of dialog length and attitudes. *Computers in Human Behavior, 62*(3), Article 107343.
Murtarelli, G., Gregory, A., & Romenti, S. (2021). A conversation-based perspective for shaping ethical human–machine interactions: The particular challenge of chatbots. *Journal of Business Research, (129), 927-935*.
Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues, 56*(1), 81–103.
Nguyen, Q. N., Sidorova, A., & Torres, R. (2021). User interactions with chatbot interfaces vs. Menu-based interfaces: An empirical study. *Computers in Human Behavior, 61*(5), Article 107093.
Nitzl, C., Roldan, J. L., & Cepeda, G. (2016). Mediation analysis in partial least squares path modeling. *Industrial Management & Data Systems, 116*(9), 1849–1864.
Nißen, M. K., Selimi, D., Janssen, A., Cardona, D. R., Breitner, M. H., Kowatsch, T., & Wangenheim, F.v. (2021). See you soon again, chatbot?: A design taxonomy to characterize user-chatbot relationships with different time horizons. *Computers in Human Behavior, 85*(2), Article 107043.
Nunamaker, J. F., Derrick, D. C., Elkins, A. C., Burgoon, J. K., & Patton, M. W. (2011). Embodied conversational agent-based kiosk for automated interviewing. *Journal of Management Information Systems, 28*(1), 17–48.
Parise, S., Kiesler, S., Sproull, L., & Waters, K. (1999). Cooperating with life-like interface agents. *Computers in Human Behavior, 15*(2), 123–142.
Park, G., Yim, M. C., Chung, J., & Lee, S. (2022). *Effect of AI chatbot empathy and identity disclosure on willingness to donate: The mediation of humanness and social presence*. Behaviour & Information Technology.
Paulhus, D. L. (2001). Socially desirable responding: The evolution of a construct. In H. I. Braun, D. N. Jackson, D. E. Wiley, & S. Messick (Eds.), *The role of constructs in psychological and educational measurement* (pp. 49–69). Mahwah, NJ: L. Erlbaum.
Pavlou, P., Liang, H., & Xue, Y. (2007). Understanding and mitigating uncertainty in online exchange relationships: A principal-agent perspective. *Management Information Systems Quarterly, 31*(1), 105–136.
Petter, S. (2018). Haters gonna hate": PLS and information systems research. *ACM SIGMIS - Data Base, 49*(1), 10–13.
Pfeil, U., & Zaphiris, P. (2007). Patterns of empathy in online communication. *CHI Proceedings, 2007*.
Pfeuffer, N., Adam, M., Toutaoui, J., Hinz, O., & Benlian, A. (2019). Mr. and mrs. Conversational agent-gender stereotyping in judge-advisor systems and the role of egocentric bias. *ICIS 2019 Proceedings*.
Pfeuffer, N., Benlian, A., Gimpel, H., & Hinz, O. (2019). Anthropomorphic information systems. *Business & Information Systems Engineering, 61*(4), 523–533.
Pizzi, G., Scarpi, D., & Pantano, E. (2021). Artificial intelligence and the new forms of interaction: Who has the control when interacting with a chatbot? *Journal of Business Research, (129), 878–890*.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903.
Portela, M., & Granell-Canut, C. (2017). A new friend in our smartphone?: Observing interactions with chatbots in the search of emotional engagement. *Proceedings of Interacción, '17*.
Pradhan, A., & Lazar, A. (2021). Hey Google, do you have a personality? Designing personality and personas for conversational agents. In *CUI 2021 - 3rd conference on conversational user interfaces*. New York, NY, USA: Association for Computing Machinery.
Purington, A., Taft, J. G., Sannon, S., Bazarova, N. N., & Taylor, S. H. (2017). Alexa is my new BFF": Social roles, user satisfaction, and personification of the amazon echo. In *Proceedings of the 2017 CHI conference extended abstracts on human factors in computing systems* (pp. 2853–2859). Denver, Colorado, USA: ACM.
Qiu, L., & Benbasat, I. (2009). Evaluating anthropomorphic product recommendation agents: A social relationship perspective to designing information systems. *Journal of Management Information Systems, 25*(4), 145–182.
Reeves, B., & Nass, C. I. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. Stanford, Calif, New York: CSLI Publications; Cambridge University Press.
Rheu, M., Shin, J. Y., Peng, W., & Huh-Yoo, J. (2020). Systematic review: Trust-building factors and implications for conversational agent design. *International Journal of Human-Computer Interaction, 16*(4), 1–16.
Rice, R. E., & Love, G. (1987). Electronic emotion. *Communication Research, 14*(1), 85–108.
Richardson, J., & Swan, K. (2003). Examining social presence in online courses in relation to student's perceived learning and satisfaction. *JALN, 7*(1).
Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). A critical look at the use of PLS-SEM in MIS quarterly. *MIS Quarterly, 36*(1), iii–xiv. s3-s8 (supplement).
Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3*. SmartPLS GmbH.
Roy, R., & Naidoo, V. (2021). Enhancing chatbot effectiveness: The role of anthropomorphic conversational styles and time orientation. *Journal of Business Research, 126*(2), 23–34.
Sannon, S., Stoll, B., DiFranzo, D., Jung, M., & Bazarova, N. N. (2018). How personification and interactivity influence stress-related disclosures to conversational agents. Jersey City, NJ, USA. 03.11.2018 - 07. In V. Evers (Ed.). *Companion of the 2018 ACM conference on computer supported cooperative work and social computing* (Vol. 11, pp. 285–288). New York NY: ACM, 2018.
Schlesinger, A., O'Hara, K. P., & Taylor, A. S. (2018). *Let's talk about race: Identity, chatbots, and AI," CHI 2018 proceedings*.
Schmitt, A., Zierau, N., Andreas Janson, & Jan Marco Leimeister. (2023). The role of AI-based artifacts' voice capabilities for agency attribution. *Journal of the Association for Information Systems, 24*(4), 980–1004.
Schöbel, S., Schmitt, A., Benner, D., Saqr, M., Janson, A., & Leimeister, J.M. (2023). Charting the evolution and future of conversational agents: A research agenda along five waves and new frontiers. Information Systems Frontiers, (online first).
Schuetzler, R. M., Grimes, M., Giboney, J., & Buckman, J. (2014). Facilitating natural conversational agent interactions: Lessons from a deception experiment. *ICIS 2014 Proceedings*.
Schuetzler, R. M., Grimes, G., Giboney, J., & Nunamaker, J. (2018). The influence of conversational agents on socially desirable responding. *Proceedings of the 51st Hawaii International Conference on System Sciences*, 283–292.
Schuetzler, R. M., Grimes, G. M., & Scott Giboney, J. (2020). The impact of chatbot conversational skill on engagement and perceived humanness. *Journal of Management Information Systems, 37*(3), 875–900.
Sebastian, J., & Richards, D. (2017). Changing stigmatizing attitudes to mental health via education and contact with embodied conversational agents. *Computers in Human Behavior, 73*(2), 479–488.
Seeger, A.-M., Pfeiffer, J., & Heinzl, A. (2018). Designing anthropomorphic conversational agents: Development and empirical evaluation of a design framework. *ICIS 2018 Proceedings*.
Shah, H., Warwick, K., Vallverdú, J., & Wu, D. (2016). Can machines talk?: Comparison of Eliza with modern dialogue systems. *Computers in Human Behavior*, (58), 278–295.
Shamekhi, A., Liao, Q. V., Wang, D., Bellamy, R. K. E., & Erickson, T. (2018). Face value? Exploring the effects of embodiment for a group facilitation agent. In R. Mandryk, M. Hancock, M. Perry, & A. Cox (Eds.), *Montreal QC, CanadaProceedings of the 2018 CHI conference on human factors in computing systems - CHI '18* (pp. 1–13). New York, New York, USA: ACM Press.
Sheehan, B., Jin, H. S., & Gottlieb, U. (2020). Customer service chatbots: Anthropomorphism and adoption. *Journal of Business Research, 115*(2), 14–24.
Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: Wiley.
Singh, J., & Bridge, R. G. (2023). Interfaces, interactions, time, and the frontline nexus: Foundational constructs and focus for the field of organizational frontlines. *Journal of Service Research, 100*(3), Article 109467052311773.
Sison, A. J. G., Daza, M. T., Gozalo-Brizuela, R., & Garrido-Merchán, E. C. (2023). ChatGPT: More than a "weapon of mass deception" ethical challenges and responses from the human-centered artificial intelligence (HCAI) perspective. *International Journal of Human-Computer Interaction*, 1–20 (0:0).
Sproull, L., Subramani, M., Kiesler, S., Walker, J., & Waters, K. (1996). When the interface is a face. *Human-Computer Interaction, 11*(2), 97–124.
Sundaram, D. S., & Webster, C. (2000). The role of nonverbal communication in service encounters. *Journal of Services Marketing, 14*(5), 378–391.
Sutton, S. J. (2020). Gender ambiguous, not genderless: Designing gender in voice user interfaces (VUIs) with sensitivity. *Proceedings of the ACM Conversational User Interfaces*.
Teubner, T., Flath, C. M., Weinhardt, C., van der Aalst, W., & Hinz, O. (2023). Welcome to the Era of ChatGPT et al. *Business & Information Systems Engineering, 65*(2), 95–101.
Tolmeijer, S., Zierau, N., Janson, A., Wahdatehagh, J. S., Leimeister, J. M., & Bernstein, A. (2021). Female by default? – Exploring the effect of voice assistant gender and pitch on trait and trust attribution. In Y. Kitamura, A. Quigley, K. Isbister, & T. Igarashi (Eds.), *Yokohama Japan. 08 05 2021 13 05 2021Extended abstracts of the 2021 CHI conference on human factors in computing systems* (pp. 1–7). New York, NY, USA: ACM.
Tolzin, A., & Janson, A. (2023). Mechanisms of common ground in human-agent interaction: A systematic review of conversational agent research. *HICSS 2023 Proceedings, (56), 342-351*.
Tsai, W.-H. S., Liu, Y., & Chuan, C.-H. (2021). How chatbots' social presence communication enhances consumer engagement: The mediating role of parasocial interaction and dialogue. *The Journal of Research in Indian Medicine, 15*(3), 460–482.
Veale, M., & Zuiderveen Borgesius, F. (2021). Demystifying the Draft EU Artificial Intelligence Act — analysing the good, the bad, and the unclear elements of the proposed approach. *Computer Law Review International, 22*(4), 97–112.
Verhagen, T., van Nes, J., Feldberg, F., & van Dolen, W. (2014). Virtual customer service agents: Using social presence and personalization to shape online service encounters. *Journal of Computer-Mediated Communication, 19*(3), 529–545.
Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction. *Communication Research, 19*(1), 52–90.
Wang, W., & Benbasat, I. (2005). Trust in and adoption of online recommendation agents. *Journal of the Association for Information Systems, 6*(3), 72–101.
Weidlich, J., Göksün, D. O., & Kreijns, K. (2022). Extending social presence theory: Social presence divergence and interaction integration in online distance learning. *Journal of Computing in Higher Education*, 1–22.
Wei, C., Liu, M. W., & Keh, H. T. (2020). The road to consumer forgiveness is paved with money or apology?: The roles of empathy and power in service recovery. *Journal of Business Research*, (118), 321–334.
Wei, J., Wang, Z., Hou, Z., Meng, Y., & Angabe, K. (2022). The influence of empathy and consumer forgiveness on the service recovery effect of online shopping. *Frontiers in Psychology, 13*, Article 842207.
Wieseke, J., Geigenmüller, A., & Kraus, F. (2012). On the role of empathy in customer-employee interactions. *Journal of Service Research, 15*(3), 316–331.
Williams, K. C., & Spiro, R. L. (1985). Communication style in the salesperson-customer dyad. *Journal of Marketing Research, 22*(4), 434–442.

Wold, H. O. A. (1982). Soft modeling: The basic design and some extensions. In K. G. Jöreskog, & H. O. A. Wold (Eds.), *Systems under indirect observation: Causality, structure, prediction* (pp. 1–54). Amsterdam: North-Holland.

Wuenderlich, N., & Paluch, S. (2017). A nice and friendly chat with a bot: User perceptions of AI-based service agents. *ICIS 2017 Proceedings*.

Xu, K., Chen, X., & Huang, L. (2022). Deep mind in social responses to technologies: A new approach to explaining the computers are social actors phenomena. *Computers in Human Behavior, 134*(1), Article 107321.

Xu, A., Liu, Z., Guo, Y., Sinha, V., & Akkiraju, R. (2017). A new chatbot for customer service on social media. In G. Mark, S. Fussell, C. Lampe, m.c. schraefel, J. P. Hourcade, C. Appert, & D. Wigdor (Eds.), *Denver, Colorado, USA. 06.05.2017 - 12.05.2017Proceedings of the 2017 CHI conference on human factors in computing systems - CHI '17* (pp. 3506–3510). New York, New York, USA: ACM Press.

Zhou, Q., Li, B., Han, L., & Jou, M. (2023). Talking to a bot or a wall?: How chatbots vs. human agents affect anticipated communication quality. *Computers in Human Behavior, 13*(3), Article 107674.