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Can Humanizing Voice Assistants Unleash the Potential of Voice Commerce?

Completed Research Paper

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Abstract

Voice commerce allows customers to carry out sales dialogues with voice assistants (VAs) through natural spoken language. However, its adoption remains limited. To help determine how to overcome existing barriers to adoption, we conducted a series of three empirical pre-studies and a laboratory experiment (N = 323) investigating the role of VAs' humanness in interactions with customers; research has reached no consensus on this matter. Our results reveal that humanizing VAs increases customers' perceptions of social presence and parasocial interaction, thereby enhancing perceived relationship quality and ultimately leading to increased intentions to shop using the VA. Although, we also find a negative direct effect of humanization on parasocial interaction, it is offset by the larger positive indirect effect via social presence. This may provide one explanation for the inconsistencies in the literature. For practitioners, our findings highlight the importance of careful design in humanizing VAs to increase voice commerce adoption.

Keywords: Conversational Agent, Voice Assistants, Voice Commerce, Humanness, Social Response Theory, Parasocial Interaction Theory, Experiment

Introduction

Until recently, technologies struggled to understand and correctly interpret human speech; it was impossible to hold conversations with them using voice alone. This is now feasible, thanks to major advancements in artificial intelligence (AI), including natural language processing. Such developments have fostered the rise of voice assistants (VAs) with over a third of U.S. adults having access to them via smart speakers, such as Amazon Echo or Google Home (Voicebot 2020).

This trend presents companies with a new means of reaching customers: they can develop their own VAs to be employed in various functions, such as online shopping. This so-called voice commerce offers convenience by enabling users to verbalize product wishes; ask context-related questions; and order products in a hands-free, speech-based dialogue with round-the-clock availability (Puntoni et al. 2021; Rzepka et al. 2020; Son and Oh 2018).

Despite its advantages, voice commerce use remains limited. Only 14.3% of smart-speaker owners turn to them regularly for purchases (Voicebot 2020). Initial qualitative research has revealed that users value the convenience of voice commerce but are still uncomfortable using it (Rzepka et al. 2020; Voicebot and Voysis 2018). A key barrier to a pleasant buying experience and positive intentions to use VAs for voice commerce is the failure to establish a good relationship with VAs (Cowan et al. 2017; Mari and Algesheimer 2021; Rzepka et al. 2020).

According to the literature, the key drivers of success in traditional sales are enabling social interactions and building relationships with customers, which allow companies to provide a comfortable shopping experience (Bickmore and Picard 2005; Neslin and Greenhalgh 1983). In voice commerce, a company's VA can act as a virtual salesperson for its customers, as users recognize VAs as entities in their own right (Pitardi and Marriott 2021). The VA can provide services such as product recommendations or orders in a speech-based conversation (Son and Oh 2018), which customers are more likely to rely on as they build a relationship with the VA (Mari and Algesheimer 2021). However, customers primarily perceive humanness and build social relationships through interpersonal conversations, which are generally lacking in the online context (Bickmore and Picard 2005). Therefore, the key questions for research and practice are how can companies provide more social aspects in voice commerce and whether more humanness is beneficial in this context.

Research on human–computer interaction (HCI) has shown that companies can augment their VAs with humanlike design elements that relate to facets of human behavior—such as tone of voice or speech rate; Nass and Gong 2000)—also known as social (anthropomorphic) cues (Diederich et al. 2022; Feine et al. 2019; Riquel et al. 2021; Schanke et al. 2021; Seeger et al. 2021). According to the "computers are social actors" (CASA) paradigm (Nass and Moon 2000; Nass et al. 1994; Reeves and Nass 1996), integrating social cues into a technology can increase its perceived humanness and make interacting with it feel more social.

In the context of VAs, implementing social cues has been shown to have both positive and negative impacts. On the one hand, it reduces user concerns about privacy invasion by, for example, addressing the need for social contact and compensating for a lack of trust (Benlian et al. 2019). Furthermore, a more humanlike voice leads users to draw certain assumptions about the VA, seeing it as more advanced and competent (Cowan et al. 2015; Guzman 2019). On the other hand, however, as VAs already convey a certain level of social characteristics through their more natural and intuitive form of interaction (Chattaraman et al. 2019; McLean and Osei-Frimpong 2019), humanizing could lead users to compare the VAs to real people. This could trigger unrealistic expectations and thus alienate users (Puntoni et al. 2021). Furthermore, it can be challenging to find the right balance of humanness to prevent users from perceiving the interaction as awkward or manipulative, which can result in less affinity for the technology ("uncanny valley phenomenon"; Diederich et al. 2020; Mori et al. 2012). In summary, there is no consensus in the literature as to whether humanizing VAs is helpful for the broader adoption of voice commerce.

To exploit the full potential of voice commerce, the obstacles to its adoption must be mitigated. In the offline world, having a positive customer–salesperson relationship can increase one's intention to shop at the store. In the case of voice commerce, however, it is unclear to what extent companies can foster such a relationship through perceived humanness and social aspects such as social presence (the extent to which people interacting with a VA feel they are in the presence of another social entity; Gefen and Straub 2003) and parasocial interaction (users viewing VAs as more social, friend-like interlocutors). Therefore, recent research has called for examining the role of humanness in interactions with VAs (e.g., Maedche et al. 2019; Puntoni et al. 2021). We address this research gap and pose the following research question:

RQ: How does humanizing VAs influence social presence, parasocial interaction, the user–VA relationship, and ultimately users' intentions to use the VA for voice commerce?

To answer this question, we conducted a laboratory experiment with 323 participants who carried out a real-time buying process using a VA with either a low or high level of perceived humanness. The key contribution of our paper lies in revealing the effect of humanizing VAs on intention to use the VA for voice commerce. First, we provide empirical evidence that humanizing VAs influences the social aspects that users perceive in interacting with them. In doing so, our results also reveal novel, yet counterintuitive, insights: Humanizing VAs has direct and indirect effects that point in opposite directions. Contrary to our theorizing, there is an unexpected negative (rather than positive) direct effect of VA humanization on parasocial interaction. However, a larger positive indirect effect via social presence leads to a positive total effect of humanization on parasocial interaction. Second, we contribute to understanding how to overcome

existing barriers in voice commerce by demonstrating that companies can boost relationship quality by fostering perceptions of VAs as socially present and thus allowing for more parasocial interactions. Third, we offer evidence that relationship quality increases users' intentions to use the VAs for voice commerce.

In the following, we briefly describe the current use of VAs, highlight the importance of social cues, and introduce social response theory and parasocial interaction theory as a basis for our research model. We then hypothesize various effects of humanizing VAs in the context of voice commerce, explain our research design, and present our results. Finally, we discuss these results, derive their theoretical and practical implications, critically review some limitations of our study, and highlight opportunities for future research.

Theoretical Foundations and Related Work

In recent years, rapid developments in the field of AI have enabled interactions with so-called virtual conversational agents (CAs) using natural language via text (chatbots) or voice (VAs). To capitalize on these developments in AI, companies have been rolling out a flood of third-party VAs (e.g., so-called skills for Amazon Alexa). VA users primarily employ them to listen to music, ask questions (e.g., weather), or use their favorite third-party VAs (e.g., to track their daily fitness progress with Fitbit or request a ride from Uber; Voicebot 2020). Although companies have more recently been given the ability to use the VAs to exploit the enormous potential of voice commerce (Sun et al. 2019), customers still harbor reservations about this new sales channel (Rzepka et al. 2020). It is therefore important to examine how social presence, parasocial interaction, and relationship quality influence the success of user–VA interactions, as they do for traditional sales interactions.

Social Response Theory: Computers are Social Actors

The CASA paradigm establishes that interactions between people and technologies are fundamentally social (Nass et al. 1994). Based on this paradigm, social response theory states that people apply social rules to technologies that exhibit humanlike traits and therefore treat technologies as if they were human (Nass and Moon 2000; Nass et al. 1994). Social cues in the context of interacting with technologies can prompt people to apply social scripts to the situation, eliciting the same social behaviors that they would apply to another human, despite knowing that the technology has no feelings or human motivations (Moon 2000; Nass and Moon 2000; Nass et al. 1994).

To leverage the implications of social response theory, prior research on information systems (IS) and HCI has classified social cues related to VA design into three main categories: auditory, verbal, and invisible (Feine et al. 2019). Auditory cues are those that can be heard but are nonverbal, such as pitch range (Lee and Nass 2003; Schroeder and Epley 2016) and voice tempo (Cowell and Stanney 2005). This dimension is a defining feature of VAs, differentiating them from traditional e-commerce websites and chatbots (Moriuchi 2021). VAs express verbal cues with spoken words, such as greetings and farewells ("Hi," "Goodbye"; Bickmore and Picard 2005), while invisible cues are those that cannot be seen or heard, such as response time (Cowell and Stanney 2005; Gnewuch et al. 2022; Schanke et al. 2021).

These social cues can be implemented into the VAs design in various ways. For example, Amazon's Alexa and Google's Assistant have their own personalities, voices and slang (Moriuchi 2021), leading some users to personify Alexa as a "she" instead of an "it" (Hernandez-Ortega and Ferreira 2021). Hence, VAs can also be social actors, suggesting that their appearance and social aspects play an important role in helping users develop positive attitudes toward (Pfeuffer et al. 2019b; Pitardi and Marriott 2021) and intentions to reuse them (Moriuchi 2021).

Parasocial Interaction Theory

To explain how humanizing VAs affects consumers' perceptions of social aspects in interacting with them and influences relationship building, we also draw on the theory of parasocial interaction (Horton and Wohl 1956). Originating from the field of media psychology and communication, the theory of parasocial interaction describes how the perceived humanness of a media figure can result in the audience experiencing a sort of two-way human-to-human social interaction, even with no real interaction (Hartmann 2008; Whang and Im 2021). These parasocial interactions arise because people mentally connect with the person, establishing links between mass media communication and interpersonal (face-

to-face) settings (Hartmann 2008; Lee 2018). Lim and Kim (2011) also found that parasocial interaction can alleviate loneliness in older consumers. This may be particularly relevant during times like COVID-19 pandemic, when people lack companionship (Xie and Pentina 2022).

In recent years, this theory has been developed further and increasingly applied in the fields of psychology and marketing to better understand consumer perceptions of such interactions (Hartmann 2008). Notable cases include the analyses of intentions to continue using a mobile app (Lee 2018) and interactions with websites (Zhou and Jia 2018). In line with these studies, we define parasocial interactions between consumers and VAs as social, friend-like exchanges in which the consumers feel at ease. Such interactions may be particularly relevant for VAs, as their greater interactivity (advanced communicative ability with back-and-forth dialogues) and intelligence (possibility of personalization through AI) already renders them more conversational and social than traditional technologies (Maedche et al. 2019; McLean and Osei-Frimpong 2019; Whang and Im 2021; Zierau et al. 2020).

To address the aforementioned challenges facing voice commerce and the uncertainty regarding how VA humanization, social presence, and parasocial interaction affect it, we conducted a study manipulating a VA's design in terms of humanness.

Research Model and Hypotheses

To address our research question, we propose hypotheses specific to voice commerce and present the research model depicted in Figure 1. We draw on social response theory and parasocial interaction theory as a guiding theoretical lens for understanding the social aspects of interactions and how they influence relationships and behavioral intentions (Lee 2018; Nass and Moon 2000; Nass et al. 1994; Reeves and Nass 1996). In our model, we define humanness as the perception of humanlike characteristics in VAs. We hypothesize that a VA's humanness positively affects users perceptions of its social presence and the level of parasocial interaction. This should in turn improve perceptions of relationship quality and ultimately increase users' intentions to use the VA for voice commerce. Our research model is detailed in the subsections below.

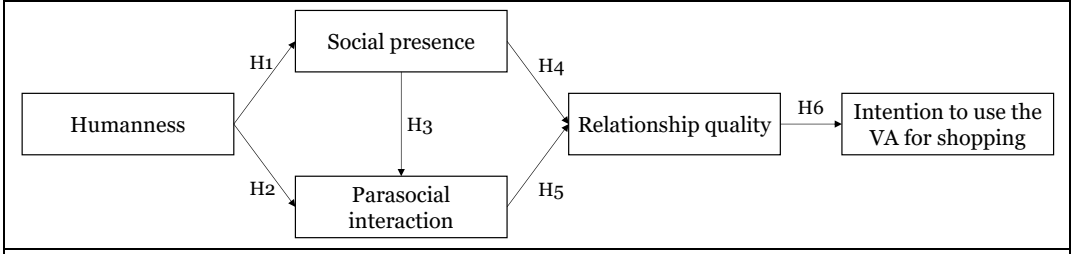

Figure 1. Research Model

Perceiving Social Presence

Social presence has emerged as a key success factor for technologies and e-commerce (Gefen and Straub 2003; McLean and Osei-Frimpong 2019). By creating interactions with a sense of social presence, it is not only people but also technologies that can be perceived as salespersons (Lee and Nass 2003).

Humanizing technologies can have psychological and behavioral effects that lead people to perceive associated social characteristics, thus giving rise to greater social presence. This is the core tenet of social response theory, which posits that social cues trigger people to apply social rules when gauging social presence (Lee and Nass 2003; Nass and Moon 2000). Previous research has supported the positive effect of humanizing technologies on social presence, evaluating social cues such as customer praise via dialog box on a computer screen (Fogg 2003) or a combination of cues in chatbots (Diederich et al. 2020). Furthermore, Qiu and Benbasat (2009) showed that users perceive greater social presence when interacting with a website-based recommendation agent where the output is a human voice containing many social cues as opposed to an unnatural, computer-synthesized one. Because comparable social cues can also be employed in VAs, we propose that their incorporation would have a similar effect in voice commerce, making the VAs seem more humanlike and engendering a sense of social presence in the user's mind:

H_1: Increasing a VA's humanness has a positive effect on the user's perceptions of the VA's social presence.

Perceiving Parasocial Interaction

An important aspect closely related to humanness and social presence is the phenomenon of parasocial interaction, which can be extended to interactive settings with technologies (Giles 2002; Hartmann 2008). While social presence refers to the feelings of warmth, sociability, and human contact created by the VA (Gefen and Straub 2003), parasocial interaction refers to more interpersonal, friendship-like interactions, feelings of intimacy, and that users tend to develop mental connections to the VA (Giles 2002; Hartmann 2008; Horton and Wohl 1956; Whang and Im 2021). The phenomenon of parasocial interaction requires the interaction to have a certain degree of perceived authenticity and social aspects (Hartmann 2008; Zhou and Jia 2018). When people interact with a more humanlike and socially present technology, they perceive it to be more real and authentic than artificial, leading to more interpersonal interactions (Hartmann 2008; Nass and Moon 2000; Reeves and Nass 1996; Whang and Im 2021).

Parasocial interaction theory states that the media audience gather information about a persona as they would about a friend—for example, observing and interpreting their appearance, voice, and conversations (Horton and Wohl 1956). Similarly, research on chatbots has shown that people perceive a more humanlike bot to be more familiar (Diederich et al. 2021). A humanized VA could promote even more similarity and attraction by, for example, adopting the same language patterns of users in conversations (Cowan et al. 2015). This in turn could increase the perceived authenticity of and intimacy with the VA, leading to greater parasocial interaction (Hartmann 2008). For example, Hernandez-Ortega and Ferreira (2021) showed that consumers' positive experiences with VAs engender a kind of passion and a stronger overall intimacy with them—a feeling that is closely related to parasocial interaction (Hartmann 2008). Furthermore, Blut et al. (2021) concluded that people perceive more humanlike service robots to be more intelligent and likeable because they are more similar to themselves. Moreover, they found that increasing a service robot's humanness makes users feel more secure about the risk and privacy invasion when interacting with it. Along similar lines, Benlian et al. (2019) demonstrated that smart home assistants with more humanlike design features have lesser or non-intrusive privacy effects, as their humanness compensates for a lack of trust and increases perceived control. Based on these considerations, we argue that a more humanlike VA increases users' sense of safety in interactions, which is generally a characteristic of friendship-like conversations and thus leads to stronger perceptions of parasocial interactions. Hence, we hypothesize the following:

H_2: Increasing a VA's humanness has a positive effect on the user's perceptions of parasocial interaction.

Based on social response theory, a technology's humanlike characteristics make interactions more social and enjoyable because they address fundamental social needs (e.g., socializing and building trust with interlocutors and experiencing companionship) and trigger more socially appropriate human behavior (Benlian et al. 2019; Nass and Gong 2000). When people perceive social presence in VAs, they apply personality-based social rules such as similarity attraction to them (Nass and Moon 2000); this familiar behavior should lead users to view interaction with VAs as more parasocial (Han and Yang 2018; Hernandez-Ortega and Ferreira 2021). Furthermore, research in the context of websites has shown that people sometimes personify a brand as a good friend and feel greater intimacy with it (meaning they experience a more parasocial interaction) when its website provides a virtual experience comparable to having a real face-to-face dialogue (Zhou and Jia 2018). We therefore propose the following hypothesis:

H_3: An increase in a VA's social presence has a positive effect on the user's perceptions of parasocial interaction.

Perceiving Relationship Quality

Relationship quality reflects the overall strength of a customer–salesperson bond (Rajaobelina and Bergeron 2009). Ideally, this connection should be particularly strong in situations where customers face uncertainties, such as sales transactions in e-commerce (Bickmore and Picard 2005; Crosby et al. 1990). Prior research has shown that relationship quality is a multidimensional construct that is mostly conceptualized through trust and satisfaction, which are critical determinants of how customers perceive the relationship (Bickmore and Picard 2005; Crosby et al. 1990; Rajaobelina and Bergeron 2009).

Traditionally, when customers have in-store conversations with human salespersons, they evaluate the salesperson's appearance, social skills, and similarities to themselves. A relationship can be built based on these social aspects (Bickmore and Picard 2005; Crosby et al. 1990). Little empirical research has been

conducted on how these social aspects affect the relationship quality in voice commerce. In related research, it has been found that humanizing VAs can mitigate the technology's negative effects and increase trust in the technology by making it seem more socially present (Benlian et al. 2019). This positive influence of social presence on the perception of trust has been demonstrated in studies focusing on websites (Gefen and Straub 2003), recommendation agents (Qiu and Benbasat 2009), and VAs (Pitardi and Marriott 2021). In addition, research has shown that perceiving social presence in chatbots increases user satisfaction with the technology and service (Verhagen et al. 2014). Such social presence, in that chatbots behave more socially, can be discerned through a chatbot's use of social cues—for example, a name and self-references (Diederich et al. 2021) or more humanlike response times (Gnewuch et al. 2022). Social presence thus appears to improve relationship quality by enhancing its key dimensions, trust and satisfaction. Hence:

H_4: An increase in a VA's social presence has a positive effect on the user's perceptions of relationship quality.

In addition to social presence, research has indicated that parasocial interaction can influence relationship quality. Zhou and Jia (2018) found that parasocial interaction can act as a mediator between website quality and relationship quality. Interestingly, Whang and Im (2021) noted that consumers may view VAs to be more of independent entities than they do commercial websites that more or less directly convey a brand's message. Therefore, parasocial interaction with VAs should have even greater effects on relationship quality compared to websites. In the context of social chatbots, research has found that the human–technology relationship is stronger if the technology has more social and friend-like attributes, such as being understanding (Skjuve et al. 2021; Xie and Pentina 2022). Furthermore, a more personalized interaction (which is presumably more parasocial) enhances trust in the VA (Reinkemeier and Gnewuch 2022) and satisfaction with the experience (Verhagen et al. 2014). Recently, Hernandez-Ortega and Ferreira (2021) showed that natural interactions with a VA can lead users to establish intimate relationships with the technology, as if it were human. Overall, research has shown that people react socially to technology (Fogg 2003) and that having parasocial interactions makes the exchange more comfortable (Zhou and Jia 2018). This relaxed interaction is important for how users perceive their relationships with technologies (Skjuve et al. 2021) and should lead to a more positive assessment. We therefore propose the following:

H_5: An increase in parasocial interaction with a VA has a positive effect on the user's perceptions of relationship quality.

Impact on Intention to Use the VA for Shopping

Consumers' shopping intentions reflect their intentions to use a specific sales channel—in our case a VA—to purchase products and to recommend using the channel to others (Arnett et al. 2003). It is important for companies in e-commerce to maximize these intentions, allowing them to reach new customers without the typical high costs of acquirement and ideally boost revenue (Rajaobelina and Bergeron 2009). To achieve this, companies must cultivate high-quality relationships, as they are closely connected to users' future actions (Bickmore and Picard 2005; Crosby et al. 1990).

The relationship marketing literature and studies in contexts such as recommendation agents (Qiu and Benbasat 2009) have shown that relationship quality (or certain aspects of it) has a positive effect on use and recommendation intentions. For example, a closer relationship can reduce uncertainties in the purchasing process and lead to a more convenient shopping experience, which is likely to encourage both use and endorsement of the channel (Qiu and Benbasat 2009; Wong et al. 2007). Consistent with prior research, we therefore propose a final hypothesis:

H_6: An increase in relationship quality with a VA has a positive effect on the user's intentions to use the VA for shopping.

Research Design

In our main study, we tested our hypotheses by conducting a laboratory experiment employing a between-subjects design with two conditions (low vs. high level of VA humanness). In a simulated purchasing process, participants were tasked to order a specific book using natural language via VA. Before conducting the main experiment, we carried out three pre-studies to (1) determine suitable products for the purchasing process, (2) develop a reliable experimental design, and (3) verify our stimuli. Table 1 provides an overview of our four data-collection phases, which are explained in greater detail below.

Study	Purpose of Study	Method	Sample
Pre-study 1	Choosing a suitable product category	Online survey	$N = 82$
Pre-study 2	Building and training a fluent prototype	Laboratory experiment	$N = 8$
Pre-study 3	Validating the manipulation (selecting social cues)	Laboratory experiment	$N = 157$
Main study	Analyzing the impact of a VA's humanness	Laboratory experiment	$N = 323$

Table 1. Overview of Studies Conducted

Pre-study 1: Choosing a Suitable Product Category

Similar to previous studies with VAs (e.g., Whang and Im 2021), we conducted an online survey ($N = 82$) to determine a suitable product category for the subsequent experiments. We examined four categories (personal care, books, groceries, beverages) that have been used in previous research and represent realistic voice-commerce scenarios (i.e., are relatively easy to order/reorder by voice and do not typically require intensive sales conversations) (Sun et al. 2019). As participants indicated that they were significantly more likely to purchase books via VA than items from the other categories ($p < .001$), we chose books as our focal category.

Pre-study 2: Building and Training a Fluent Prototype

Next, we built and trained a VA prototype to carry out the main experiment. We built the VAs using Amazon's Alexa Skills Kit, which enabled us to customize various functions (using coding schemes on speech synthesis markup language with JavaScript to implement specific humanlike design elements) and create our own interaction model. We employed Amazon's Alexa engine for natural language processing and chose to run it on Amazon Echo Dot (3rd Generation) smart speakers, which allow only voice for in- and output communication and have no human embodiment. To minimize associations with the Amazon brand, we anonymized the appearance of the smart speakers and did not use the words "Amazon" or "Alexa" at any point in our experiments. We trained our interaction model with various conversational expressions to allow it to recognize different formulations of the same conversational intention from participants and thereby enable engagement (Moriuchi 2021). During this process, participants ($N = 8$) were asked to test the VA prototype several times and provide direct qualitative feedback. Thus, we collected various sample questions to ensure more fluent communication. We used the same trained underlying interaction model in all subsequent experiments to minimize external influences on our findings.

Pre-study 3: Manipulating the Voice Assistant's Degree of Humanness

We aimed to develop a VA exhibiting a higher degree of humanness in the treatment condition than in the control. Previous research has found that a combination of several social cues in CAs can conflict with one another and that increasing the number of cues does not necessarily lead to a more humanlike design (Seeger et al. 2018; Seeger et al. 2021). Therefore, we conducted a between-subjects laboratory experiment ($N = 157$) with four different humanness conditions to establish which design users perceive as most humanlike. We selected social cues—such as natural speech pauses, greetings and farewells, a VA name, and acknowledgments—based on the following criteria: First, the cues had to be able to convey a more humanlike design, as confirmed by numerous previous studies using comparable cues (e.g., Cowell and Stanney 2005; Fogg 2003; Gnewuch et al. 2022; Schanke et al. 2021). Second, the design elements had to be practically feasible, meaning that designers could implement them when modifying VAs. While the control version included no intentionally implemented social cues, the three treatment versions integrated progressively more of them. Participants were randomly assigned to one of the four conditions and were instructed to order an assigned book via VA. Afterward, they rated the VA's humanness on a 9-point semantic differential scale (Holtgraves and Han 2007), which has been validated in the context of chatbots (Diederich et al. 2019). As the participants perceived the VA with the highest number of social cues to be most humanlike, we used this design as the treatment condition in our main study. Unlike Seeger et al. (2018) discovered for text-based CAs, we did not find that social cues applied in conjunction conflict with one another in terms of fostering perceived humanness; the data from our post-experimental survey reveal that the VA with the highest number of intentionally implemented social cues was perceived as the most humanlike. Hence, there does not appear to be an overload of cues in our case.

Main Study

Treatment, Data Collection, Experimental Procedure, and Sample

After analyzing the third pre-study's results which included qualitative feedback from the survey's free-form field, and conducting a sparring session with two consulting experts in the branch, we made minor technical improvements and adjustments for a more fluent interaction. Finally, we created two updated versions of the VAs, which were identical except for the use of different social cues. The control VA exhibited a lower level of humanness. We speak of a lower level of humanness because, for our study, interaction should still be natural and not intentionally more machinelike; a VA inherently possesses some degree of humanness (Chattaraman et al. 2019). Following a similar procedure used in prior research on chatbots (e.g., Diederich et al. 2021; Riquel et al. 2021; Schanke et al. 2021), the treatment condition VA included a combined set of social cues to render the interaction more humanlike and social. We used voices of the same gender (female) for both VAs to avoid gender-related effects and because most current VAs are designed to be female by default (Reinkemeier and Gnewuch 2022). Figure 2 illustrates a sample of the two manipulated dialogues for the main study.

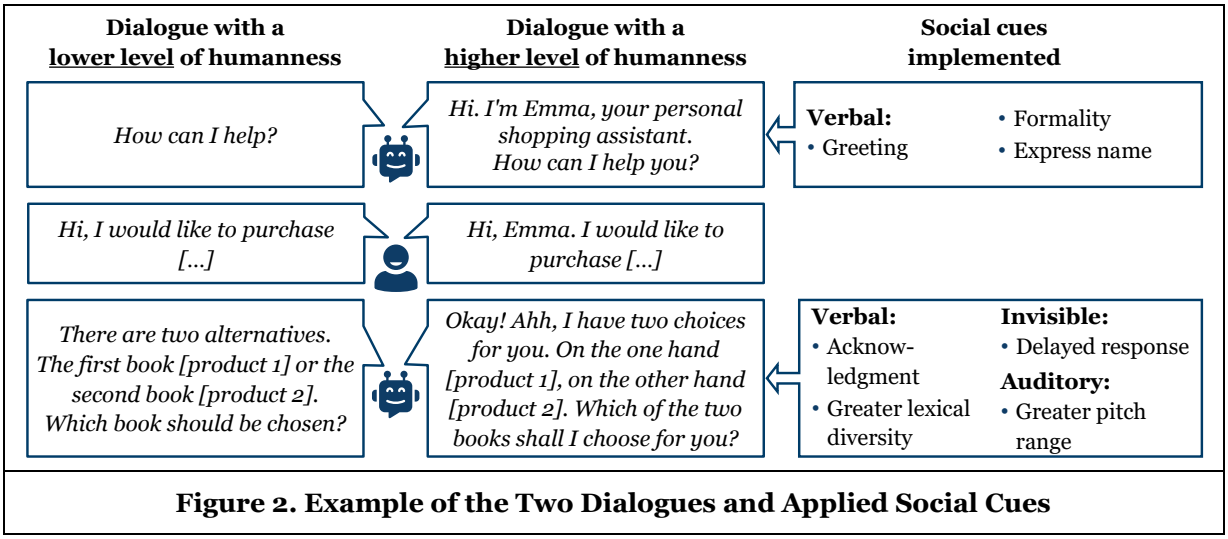

Figure 2. Example of the Two Dialogues and Applied Social Cues

We recruited our participants directly at the university via flyers, recruitment booth, and personal networks. To ensure high enrollment, we rewarded participation with immediate incentives and a raffle entry. Participation in the experiment involved several steps, including completing a purchase in real time via VA: (1) To avoid participants behaving in an impaired manner due to the presence of another human, each was left alone in a separate experimentation room. Participants were directed to state the anonymous ID they were given and read the experiment's scenario instructions on tablet PCs. This included their assigned task: imagining being in their living rooms and buying a specific novel or academic textbook. (2) Next, participants had to activate the smart speaker using the wake word "computer" and a predefined neutral invocation name. (3) Upon waking the speaker, participants confirmed their comprehension of the task, triggering the VA to begin the buying process. (4) Participants were randomly assigned to one of two scenarios: low or high VA humanness. To ensure comparability, we followed similar research (e.g., Pfeuffer et al. 2019a; Riquel et al. 2021) in selecting a rather guided dialogue flow that was the same for both experiment groups, although participants received tailored answers based on their choices. The buying process included eight interaction points where participants had to communicate naturally with the VA and make decisions (see Figure 3). (5) Afterward, they filled out a survey on tablet PCs.

A total of 365 participants completed our laboratory experiment without any technical issues or suspicious click-through behavior. We omitted results from 4 respondents who had already taken part in the second or third pre-study and 38 who failed to pass the two attention checks or the comprehension question. The final sample consisted of 323 participants (50.2% female, average age = 24.68 years), almost equally distributed between the two groups.

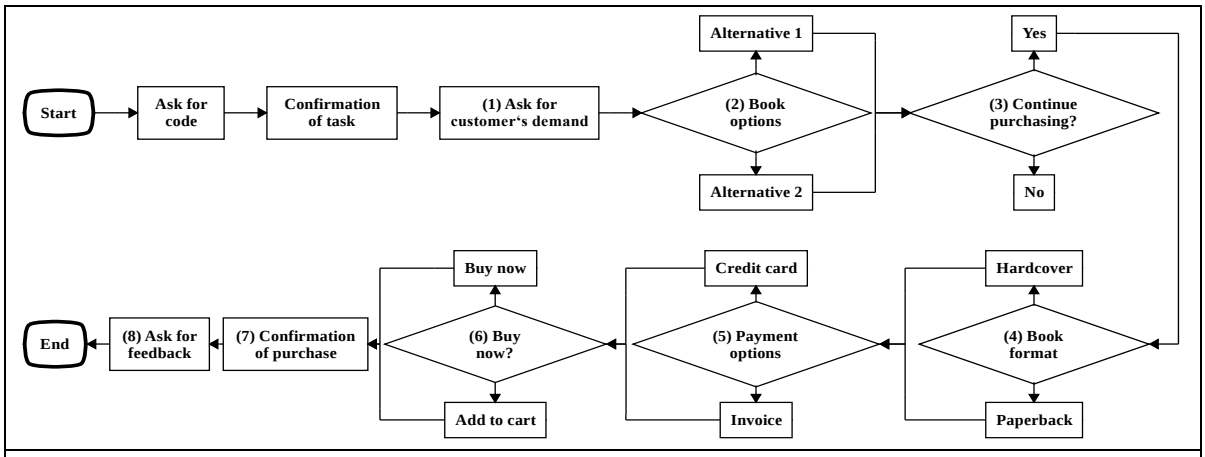

Figure 3. Dialogue Flow of the Configured VAs

Measurement of Constructs, Checks, and Controls

To ensure validity and reliability, we measured the latent constructs with validated self-report scales (7-point Likert scales) from prior research and adapted them to our research environment (see Appendix for an item overview). The questionnaire captured the perceptions of social presence adapted from Gefen and Straub (2003) and parasocial interaction adapted from Lee (2018) and Zhou and Jia (2018). As in similar research, we measured relationship quality as a reflective–reflective higher-order construct (Rajaobelina and Bergeron 2009; Wong et al. 2007) that includes the dimensions of trust (McKnight et al. 2002; Qiu and Benbasat 2009) and satisfaction (Collier and Sherrell 2010; Han and Yang 2018). This approach allowed us to reduce the number of structural model relationships while summarizing more essential aspects in this single multidimensional construct, as we did not seek to explain variance in relationship qualities (Hair et al. 2018). Furthermore, we measured users' intentions to use the VA for shopping with established dimensions of intention to use the VA to purchase products and recommend it to others (Arnett et al. 2003; Venkatesh and Davis 2000). Finally, as control variables to minimize confounding effects in our research model (Nwankpa and Datta 2022), we gathered measures on age, gender, experience with smart speakers, resistance to using new technologies for purchases (Kim and Kankanhalli 2009), and need for interaction (Dabholkar and Bagozzi 2002).

Data Analysis and Results

Manipulation and Randomization Check

To ensure that our manipulation worked as intended, we asked participants to assess the VA's humanness (Cronbach's α = .81) on a 9-point semantic differential scale (Holtgraves and Han 2007). Perceived humanness was significantly higher in the high than in the low humanness condition (M_{high} = 7.003, M_{low} = 6.348; p < .001). This showed that our manipulation was successful. Moreover, the experiment groups presented no significant differences with respect to the control variables (for all controls: $p \geq .816$), suggesting that the randomization was also successful.

Evaluation of the Measurement Model

We tested the research model and hypotheses with the PLS-SEM approach in SmartPLS 3 (Ringle et al. 2015). This approach is also suitable for including our independent variable as a binary experimental variable (0 = low, 1 = high humanness). Because we are more interested in the higher-level estimates of our higher-order construct, we used the two-stage approach, as recommended in the literature (Sarstedt et al. 2019).

We assessed our measurement with satisfying results (see Table 2), lying above the required thresholds: After dropping two items, all factor loadings are higher than .6 (see Appendix) (Gefen and Straub 2005). Cronbach's alpha (α) and the composite reliability (CR) are above .7 (Nunnally and Bernstein 1994). The average variance extracted (AVE) of each construct is above .5 (Bagozzi and Yi 1988), and all square roots

of the AVEs for each construct are greater than the variance shared with other constructs (Fornell and Larcker 1981). As recent research has questioned the Fornell–Larcker test's ability to reliably detect discriminant validity problems (Henseler et al. 2015), we also used the heterotrait–monotrait ratio of correlations (HTMT) criterion to support our findings; as recommended, the value is below the threshold of .9 and thus discriminant validity can be established (Teo et al. 2009). Furthermore, the reliability and validity assessment of the higher-order construct relationship quality (CR = .902; AVE = .821) draws on its relationship with its lower-order components of trust and satisfaction (Sarstedt et al. 2019). Finally, to ensure the correctness of results and the validity of our coming conclusions, we performed multicollinearity diagnostics; all variance inflation factors are lower than the desired threshold of 5 (Hair et al. 2018). With these satisfying results, we can turn to the evaluation of our hypothesis tests.

Construct	**α**	**CR**	**AVE**	**1**	**2**	**3**	**4**	**5**	**6**
1 Humanness	NA	NA	NA	**NA**					
2 Social presence	.898	.925	.712	.505	**.844**				
3 Parasocial interaction	.731	.848	.650	.197	.578	**.806**			
4 Satisfaction	.881	.926	.807	.171	.529	.688	**.899**		
5 Trust	.837	.877	.505	.010	.371	.563	.649	**.711**	
6 Intention to use the VA for shopping	.940	.961	.892	.171	.454	.609	.665	.428	**.945**
Note. Bold numbers on the diagonal = square root of the AVE of the given construct.									

Table 2. Cronbach's α, CR, AVE, and Inter-construct Correlations

Structural Model and Hypothesis Testing

We used bootstrap resampling methods with 5,000 samples to analyze the postulated relationships simultaneously in one structural equation model (SEM) and conducted additional analyses. Figure 4 presents the model along with the adjusted R^2 values, path coefficients, and their significance levels. Our findings show all relationships to be significant but offer support for only five of our six hypotheses (all but H_2): In support of H_1, humanness has a strong positive relationship with social presence (β = .502, p < .001). However, contrary to our expectations in H_2, humanness has not a positive but rather a significant negative effect on parasocial interaction (β = −.124, p = .014). Social presence has a strong positive effect on parasocial interaction (β = .621, p < .001) and a significant positive effect on relationship quality (β = .159, p = .001), supporting H_3 and H_4, respectively. Similarly, we found evidence for H_5 with parasocial interaction having a strong positive effect on relationship quality (β = .586, p < .001). Finally, as hypothesized in H_6, we found that the relationship quality has a strong positive effect on intention to use the VA for shopping (β = .571, p < .001).

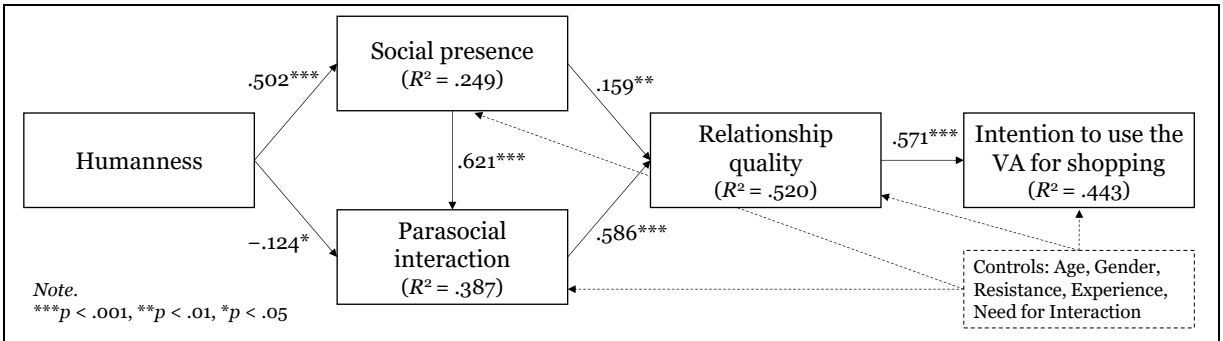

Figure 4. Structural Model Results

To further investigate H_2 in term of the direct and indirect effects of humanness on parasocial interaction, we conducted a post-hoc mediation analysis (Zhao et al. 2010) similar to recent research (e.g., Liu et al. 2022; Nwankpa and Datta 2022; Wolf 2019). We used bootstrap tests with PLS-SEM for a more accurate assessment of direct and indirect mediation effects (Hair et al. 2019). We found a mediation effect in that the interaction of the indirect effects (humanness on social presence as well as social presence on parasocial interaction) is significant (p < .001). We then classified the mediation type following Zhao et al. (2010). As

the indirect effect via social presence is positive (β = .312, p < .001) while the direct effect is negative (β = −.124, p = .014), we find a competitive mediation. Seeing that the total effect is significant and positive (β = .187, p < .001), our post-hoc analysis reveals in terms of H_2 an overall positive effect of humanness on parasocial interaction. However, our analysis points to the existence of another mediator besides social presence that might explain part of the relationships seen here.

We also investigated the effects of the control variables on all latent variables directly in our SEM, in line with previous research (e.g., Liu et al. 2022; Nwankpa and Datta 2022; Wolf 2019). Significant paths include the following: Male users seem to perceive poorer relationship quality with the VA than female users do (β = −.129, p = .001). In addition, users who tend to reject new purchasing technologies perceive interaction with the VA to be significantly less parasocial (β = −.184, p < .001) and have lower intentions to use the VA for shopping (β = −.236, p < .001). Furthermore, users who have a greater need for interaction perceive significantly less parasocial interaction with the VA (β = −.106, p = .015).

Discussion

In this study, we examined the impact of humanizing VAs on users' intentions to use the VAs for voice commerce. In line with our expectations, we found that humanizing VAs increases social presence, which in turn increases parasocial interaction and enhances relationship quality. Moreover, parasocial interaction has a positive effect on relationship quality, while relationship quality boosts users' intentions to use the VAs for shopping. However, we found a competitive mediation effect whereby humanizing VAs has a negative (rather than the expected positive) direct effect on parasocial interaction, but a positive indirect effect via social presence, resulting in a positive total effect. We discuss important implications in the following.

Implications for Theory

With our findings, we contribute to research on the effects of humanness and social aspects in VAs. This stream of research offers inconsistent results and recommendations in various contexts and is lacking in-depth research for VAs in voice commerce, leading scholars to call for research in this domain (e.g., Feine et al. 2019; Puntoni et al. 2021). Our research addresses this gap and suggests that the inconsistencies in the literature could be caused by the complex interplay among humanness, social presence, and parasocial interaction that together shape users' perceptions of VAs and intentions to use them for shopping. On the one hand, our findings demonstrate that humanizing VAs can lead to overall positive outcomes in voice commerce, expanding our knowledge of how people perceive increased humanness in VAs (e.g., Benlian et al. 2019; Cowan et al. 2017). On the other hand, contrary to our theorizing, our results show a negative direct effect of VA humanization on parasocial interaction. However, the total effect is positive, owing to a larger positive indirect effect via social presence. The negative direct effect could be explained in various ways: First, increasing the humanness of VAs could lead users to adjust their expectations of VAs more toward human capabilities, as they now compare them closer to real humans (Blut et al. 2021) and therefore pay greater attention to the nonhuman imperfections of VAs (Diederich et al. 2020; MacDorman et al. 2009). Second, the fact that VAs are still technologies might cause those interacting with them to sense a lack of authenticity (Giles 2002; Hartmann 2008; Wuenderlich and Paluch 2017) and experience uneasiness in accordance with the uncanny valley phenomenon (Diederich et al. 2020; Mori et al. 2012). Finally, a humanlike design may also lead to a reduced perception of familiarity (Diederich et al. 2021) or even cause irritation if a VA aims to closely mimic human conversation but instead appears strange and eerie (Gnewuch et al. 2022). Our mediation analysis reveals that humanness can have both negative and positive effects on users' perceptions of VAs, although the negative effect can be mediated if the VA elicits feelings of social presence. Hence, humanizing a VA will only have positive effects on users' perception if it evokes feelings of warmth, human contact, and sociability in interactions.

Our findings also contribute in various ways to the field of IS, especially the streams of research on the effects of social cues and social aspects in HCI (e.g., Diederich et al. 2022; Pfeuffer et al. 2019b; Schanke et al. 2021; Seeger et al. 2021). First, our results reveal that using a combined set of social cues in a VA's design can make it appear more humanlike and increase user perceptions of social presence; this strengthens social response theory and extends it to the field of voice commerce. Second, our findings show that when VAs are more humanlike and exhibit social presence, they can foster users' perceptions of parasocial interaction. This demonstrates that social response theory is directly connected to parasocial interaction theory in the context of voice commerce. Third, our results indicate that the combined effects of these two theories

(greater social presence and parasocial interaction) enhance user–VA relationships; the principles of both theories have proven to be key drivers of relationship quality and can be extended to voice commerce.

Finally, our study enriches the under-researched field of voice commerce (e.g., Mari and Algesheimer 2021; Rzepka et al. 2020; Son and Oh 2018; Whang and Im 2021) by highlighting that increasing VA humanness can help in transferring paradigms from offline sales into the world of e-commerce. Furthermore, this work expands upon the relationship marketing literature (e.g., Rajaobelina and Bergeron 2009) by showing that social aspects in interactions between buyer and seller are important not only in traditional sales (Crosby et al. 1990; Neslin and Greenhalgh 1983) but also for transactions in voice commerce. Along these lines, our results supplement previous research on the impact of relationship quality on desired business outcomes (e.g., Hernandez-Ortega and Ferreira 2021; Rajaobelina and Bergeron 2009; Wong et al. 2007), particularly in terms of revealing its effect on intentions to use the relevant VAs for voice commerce.

Implications for Voice Commerce Practice

This research also has practical implications for managers and designers in voice commerce. First, our findings suggest that to be successful in this sales channel, companies must take a closer look at the interactions between VAs and customers. Companies designing VAs should capitalize on the plentiful possibilities offered by existing humanlike design elements, such as auditory, verbal, and invisible cues. Such cues can make the voice-shopping experience more social and generate desired behavioral outcomes. For example, VA designers should mimic human speech more closely in VA conversations. This could be achieved through features such as a voice output set to a natural speed (Cowell and Stanney 2005) and varied pitch (Lee and Nass 2003). Furthermore, VAs should use a social communication style with their customers—as salespeople in the offline world ideally do—by including elements of courtesy such as saying hello and goodbye (Bickmore and Picard 2005; Chattaraman et al. 2019). They should also praise customers purposefully; commending a good choice, for example, can give customers the sense that they have performed well and boost their moods (Fogg 2003). Second, our findings highlight that humanizing VAs can have both negative and positive effects on customers' perceptions of VAs. Companies should therefore carefully decide whether, which, and how many social cues to implement in humanizing their VAs. To counteract any unwanted effects between VA humanization and parasocial interaction, companies should ensure that the overarching goal is to enrich the VA's social presence. They should thoroughly test VA designs before going live and avoid adopting a one-size-fits-all strategy. Finally, as we experienced in our second pre-study, companies must train the VA's natural language processing engine with enough conversational expressions to avoid errors such as not providing (adequate) answers to user requests.

Limitations and Opportunities for Future Research

As with any research, our study has some limitations that offer opportunities for further research. First, because social cues tend to not act in isolation (Feine et al. 2019), we employed a combination of cues to create a more humanlike perception of the VA. However, we are aware that our study does not address whether one cue has a more significant effect than another. Future research could therefore investigate particular social cues (e.g., tone of voice) in isolation and in different combinations. In addition, we analyzed the VA's humanness as a binary variable, but in the future this could also be measured at multiple levels of (perceived) humanness. Second, although ordering books via VA reflects a realistic scenario, future research could include other products and shopping goals to increase the generalizability of the results. Third, our mediation analysis revealed that competitive mediation is at play in our research model, with a direct effect of humanness on parasocial interaction and a mediated effect via social presence both existing and pointing in opposite directions (Zhao et al. 2010). This raises the question of whether there are further mediators on the direct path between humanness and parasocial interaction that future research could explore, such as VA's perceived authenticity (Giles 2002; Hartmann 2008; Wuenderlich and Paluch 2017) and perceived uncanniness (MacDorman et al. 2009; Mori et al. 2012). Fourth, in practice, it is still important to improve VA technologies in terms of accurately understanding customers (Rzepka et al. 2020), as research in the related case of social chatbots has shown that a lack of understanding is problematic for relationship development (Skjuve et al. 2021). Although sufficient training and constant improvement by providers such as Amazon itself will eventually render VAs quite proficient in this regard, until then, future research could explore whether humanizing VAs can have negative effects in the case of failure to provide an adequate response. Fifth, although female VAs are the current default in practice and research has found positive effects of female versus

male VAs (Reinkemeier and Gnewuch 2022), future research should also consider gender-neutral and male voices to avoid reinforcing potentially harmful stereotypes in the design of CAs (e.g., Feine et al. 2020). Finally, our study addresses users' intentions to use the VAs for shopping activities in one-off scenarios. This means that the experiment reflects the starting point of using VAs and initial relationship quality, which is legitimate but different from insights into real usage behavior and long-term orientations (Skjuve et al. 2021; Whang and Im 2021). As VAs are often embedded in users' daily lives, future research should extend our research into the field, investigating elements such as long-term perceptions of humanized VAs and how users might change their preferences for VA design over the course of a continuous relationship and establishing loyalty.

Conclusion

Voice commerce offers companies the unique opportunity to conduct speech-based sales conversations while also granting customers numerous advantages. With our research, we aim to help unleash its potential by offering guidance on how to overcome existing challenges surrounding the humanness of VAs in voice commerce. In summary, our study offers three main contributions to this timely topic: First, its findings suggest that customers who interact with more humanlike and social VAs establish higher-quality relationships, leading to increased intentions to use them for voice commerce. However, our study also reveals that although the total effect is positive, deploying more humanlike VAs can have certain negative effects as well. Second, our findings add to the controversial discussion in the literature about humanizing technology and contribute further insights to the growing knowledge base of voice commerce. Third, as a practical contribution, our study reveals that instead of presenting machinelike VAs, companies should bestow them with humanlike design elements, offering customers a more intuitive way to interact. Making the user–VA interaction more humanlike while ensuring that the VA is socially present could be the key to greater VA acceptance and boosting sales in voice commerce.

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Appendix

Construct	Item	Loading	Source(s)
Perceived humanness	How humanlike did you perceive the voice assistant to be during the interaction?	.719	Diederich et al. (2019); Holtgraves and Han (2007)
	How skilled do you perceive the voice assistant to be?	.789	
	How thoughtful do you perceive the voice assistant to be?	.774	
	How polite do you perceive the voice assistant to be?	.634	
	How responsive do you perceive the voice assistant to be?	.752	
	How engaging do you perceive the voice assistant to be?	.681	
Social presence	While interacting with the voice assistant, I felt a sense of …		Gefen and Straub (2003)
	… human contact.	.824	
	… personalness.	.846	
	… human warmth.	.863	
	… sociability.	.803	
	… human sensitivity.	.880	
Parasocial interaction	Interacting with the voice assistant made me comfortable, as if I were with a friend.	.794	Lee (2018); Zhou and Jia (2018)
	When I interact with the voice assistant, I feel included.	.812	
	Interacting with the voice assistant made me relax.	.813	
Relationship quality	Satisfaction:		Collier and Sherrell (2010); Han and Yang (2018)
	Overall, I am very satisfied with the voice assistant.	.907	
	I am very pleased with the voice assistant.	.928	
	I am pleased with the quality of this voice assistant's purchasing support.	.860	
	Trust:		McKnight et al. (2002); Qiu and Benbasat (2009)
	In the purchase process, the voice assistant appeared …		
	… honest with me.	.646	
	… sincere and genuine.	.672	
	… objective in its product recommendations. (dropped)	*.492*	
	In the purchase process, the voice assistant was …		
	… competent.	.763	
	… very knowledgeable about the products.	.723	
	… good at satisfying my needs.	.755	
	The voice assistant gave the impression of …		
	… being interested in making sure I'm okay. (dropped)	*.579*	
	… doing its best to help me with the purchase.	.719	
	… acting in my best interest.	.689	
Intention to use the voice assistant for shopping	Assuming I had access to the voice assistant in the future, I would …		Arnett et al. (2003); Venkatesh and Davis (2000)
	… use it to buy products.	.949	
	… frequently use it to buy products.	.949	
	… recommend friends to buy products through a similar voice assistant.	.936	

Table 3. Constructs, Items, and Factor Loadings