The service robots have already arrived: Virtual agent features and behaviors that boost customer satisfaction in the service encounter

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Abstract:

Virtual agents (VAs) are already used as representatives of the firm in service encounters, and this study of customers' interactions with existing VAs explores a set of VA features and behaviors with respect to their potential to influence customer satisfaction. The study also examines perceived VA humanness as a mechanism (i.e., a mediating variable) for this influence. The results show that a set of VA features and behaviors that are typical for human employees contributed to ascribing humanness to VAs, and perceived VA humanness mediated the impact of both features and behaviors of VA on customer satisfaction. Thus, what has been learned during several decades of research on the satisfaction-boosting potential of the *human* frontline employee appears to be useful points of reference for those who are concerned with understanding and designing VAs appearing in service encounters.

1. Introduction

Several authors concerned with the role of technology in services argue that service encounters in the near future will comprise AI-powered entities as representatives of firms (e.g., Huang & Rust, 2017). However, this part of the future has already happened, in the sense that many firms have replaced human employees in the service encounter with various forms of virtual agents (VAs). Such VAs are software systems, not embodied robots (Kielser et al., 2008). They typically appear in screen-mediated forms (e.g., as chatbots on firms' webpages and as self-service kiosks in store environments), and they can offer service in several ways—such as providing information to customers before and after a purchase.

Firms seem to have assumed that VAs should resemble human employees because the typical contemporary VA has human features; it may have a name, a human-like face, and a gender. So far, however, few studies have examined if the existence of such features (i.e., their presence or absence) influence customer satisfaction in service encounters. Moreover, many existing VAs resemble human employees also when it comes to how they behave in service encounters. A typical VA, for example, may greet the customers and ask questions. This behavioral aspect of VAs has been understudied, too. Decades of service research have indeed generated a rich catalog of customer satisfaction-generating behaviors with respect to *human* employees in service encounters (e.g., Bitner, Booms, & Tetreault, 1990; Söderlund, 2016; Winsted, 2000), but little is known if such behaviors would boost satisfaction if a VA performs them.

The purpose of the present study, then, is to examine the impact of a set of VA features and behaviors on customer satisfaction in a service encounter context. In addition, the purpose is to investigate *why* such features and behaviors may influence customer satisfaction when a VA performs them. We examine this in terms of one particular variable—the perceived humanness of the VA. More specifically, we examine the following: (a) if VA features and behaviors can boost perceptions of VA humanness, (b) if perceived VA humanness enhances customer satisfaction, and (c) if the influence of VA features and behaviors on customer satisfaction is mediated by perceived humanness of the VA. In this regard, the current study serves to answer whether the features and behaviors of VAs influence customer satisfaction directly or indirectly via the perceptions of VAs as human-like entities. A distinction between these two routes of influence, we argue, serves to explicate the extent to which human features and behaviors are useful as reference points for the design and "training" of VAs in service encounters. In other words, the distinction addresses if characteristics of human

employees should be a kind of "gold standard" in customer-machine interactions. For our empirical assessment, we invited customers ($n = 110$) who had been interacting with a VA in a service encounter, and we used a questionnaire to collect data regarding these customers' views of VA features and behaviors, perceptions of VA humanness, and customer satisfaction. The empirical part of the study, then, is an attempt to capitalize on customers' personal experience of existing VAs rather than examining responses to VAs created in the lab to serve as stimuli in a study (e.g., Go & Sundar, 2019).

2. Theoretical framework and hypotheses

The central conceptual tenets in our theoretical framework are that (a) VA resemblance to humans in terms of features and behaviors can influence the perceived humanness of a VA and that (b) the attribution of humanness to a VA can have a positive impact on customer satisfaction in a service encounter context.

2.1 Perceived humanness of VAs

Perceived humanness, a dimension of social perception (Haslam & Bain, 2007), is about the extent to which an individual (human or non-human) is perceived as having characteristics that are typical for humans (Haslam, 2006; Haslam, Loughnan, Kashima, & Bain, 2008). With this view of humanness (as a variable, not a dichotomy), one specific human individual may be seen as having "more" of humanness than another human individual (Epley, Schroeder, & Waytz, 2013). Moreover, given a strong human tendency to anthropomorphize non-humans (Epley, Waytz, & Cacioppo, 2007), we humans can ascribe various levels of humanness also to non-humans (Kim & Sundar, 2012; Waytz, Gray, Epley, & Wegner, 2010). One main reason is that we are equipped with evolution-based social responses to other humans – responses that we apply more or less automatically in interaction situations resembling the situations in which they were originally developed (Epley, 2018). What, then, contributes to perceptions of an object's humanness? In the case of a VA, and inspired by Martini, Gonzalez, and Wiese (2016) and Epley (2018), we expect that VA similarity to humans, with respect to both features and behavior, would have the potential to contribute positively to perceptions of VA humanness.

2.2 VA features and perceived humanness

Several authors have suggested that similarity in physical appearance between a virtual agent/robot and humans is likely to influence perceptions of humanness (e.g., Martini et al., 2016). For example, if an agent has a body, this feature is likely to increase the perceived humanness of the agent (Kielser et al., 2008). The association may be strengthened if the body is shaped like the typical human body (Aggarwal & McGill, 2007). Moreover, the presence of a human-like face—with eyes, a nose, and a mouth—seems to have a positive impact on perceiving an agent as being alive and having a mind (Martini et al., 2016). These two aspects can be assumed to increase humanness perceptions. In the present study, our focus is on three features that characterize a typical human, namely having a name, face, and gender, and we hypothesize that the presence of these features in a VA would boost the perceived humanness of the VA:

H1: VAs with a name, face, and gender are perceived as having more humanness than VAs without these features

2.3. VA behaviors and perceived humanness

The second main factor that we assume would contribute to ascribing humanness to an agent is that the agent's behavior is seen as similar to human behavior (Martini et al., 2016). In the present study we focus on a set of behaviors that existing research has found to be positively associated with customer satisfaction when they are performed by human employees in the service encounter: display of happiness (Söderlund & Berg, 2019), demonstrating empathy (Aggarwal, Castleberry, Ridnour, & Shepherd, 2005), expressing warmth (Winsted, 2000), and showing interest in the customer (Aggarwal et al., 2005; Winsted, 2000).

Several specific facets of humanness have been suggested in the literature, and the employee behaviors selected for this study are related to such facets. First, emotionality, the capability to experience emotions, is assumed to be a fundamental humanness facet (Epley et al., 2013; Epley, 2018; Haslam & Bain, 2007; Haslam et al., 2008). Here, we assume that VA display of happiness and empathy signal VA emotionality, and therefore we expect that VA happiness and empathy are positively associated with perceived VA humanness. Second, warmth is another facet of humanness (Haslam, 2006; Haslam & Bain, 2007), so we assume

that a VA's expression of warmth is positively associated with perceived VA humanness. Third, it has often been claimed that having agency (i.e., the capability to have intentions, wants and goals) is a central aspect of humanness. However, it can be argued that an even more advanced facet of humanness is to recognize that an interaction party has agency, too (Dennett, 1983; Gallagher & Frith, 2003). Therefore, we assume that a VA that shows interest in a customer signals that it recognizes that the customer has intentions, wants, and goals— and thus that it acknowledges the customer as having agency. We assume, then, that VAs that show interest in the customer are perceived as higher in humanness than VAs that do not show interest. In sum, then, we hypothesize that when a VA performs the selected behaviors in a service encounter with a customer, each such behavior will boost the customer's perceptions of VA humanness:

H2: VA (a) display of happiness, (b) empathy, (c) warmth and (d) interest are positively associated with perceived VA humanness

2.4 Perceived VA humanness and customer satisfaction

Human information processing is typically biased in such a way that other humans have a positive rather than a negative charge (Sears, 1983). This bias can be seen in the light of the social nature of humans; other humans offer promises of social connection, belongingness, and intimacy, which in turn are highly valued outcomes for most humans. In addition, social connections make us both more happy and healthier (Epley, 2018), and the accumulated experience of such outcomes is likely to contribute to a general preference for humans. It has also been argued that we humans indeed *need* other humans for both practical and existential issues (Epley et al., 2008). This means that it makes sense, from an evolutionary point of view, to equip humans with an innate liking for other humans. Given this, we expect that there is a positive association between the perceived humanness of an individual and the evaluation of this individual. Empirical findings supporting this, in the case of human individuals, have been provided by Kozak, Marsh, and Wegner (2006). Moreover, given the easiness with which we humans anthropomorphize non-humans, we assume that a positive association between perceived humanness and evaluations also exists for a non-human object (such as a VA). This assumption has been confirmed in several empirical studies of non-human objects in commercial settings (e.g., Aggarwal & McGill, 2007). Therefore, we expect the following for customers who interact with VAs in service encounters:

H3: Perceived VA humanness is positively associated with customer satisfaction

Taken together, H1-H3 imply that perceived humanness mediates the effect of the VA features and behaviors on customer satisfaction. To assess this explicitly, we hypothesize the following:

H4: The influence of VA (a) name, (b) face, and (c) gender on customer satisfaction is mediated by perceived VA humanness

H5: The influence of VA (a) display of happiness, (b) empathy, (c) warmth, and (d) interest on customer satisfaction is mediated by perceived VA humanness

3. Research method

We invited participants who had interacted with a VA, which we defined as "a computer-generated character, sometimes powered by artificial intelligence, which provides customer service". Moreover, we asked the participants to think about one specific service encounter in the past when they—as consumers—had been interacting with a VA that was representing a firm. Then, with open-ended question, the participants were asked to specify which type of firm the VA represented and for what task they interacted with it. We instructed the participants to have this particular interaction in mind when we asked them about the variables in the hypotheses with a set of subsequent questionnaire items. The participants ($n = 110$; $M_{age} = 23.05$, 34 percent were males) were recruited from bachelor and master courses in business administration.

To measure the VA feature variables, we asked the participants if the VA they had interacted with had a *name*, *face,* and *gender* (each of these variables was scored as 1 = absence of the feature and 2 = presence of the feature). The VA behavior variables were measured with scales ranging from 1 (do not agree at all) to 10 (agree completely). The items for *display of happiness* were "The virtual agent expressed happiness in the encounter," "The virtual agent appeared to have felt joy in the interaction with me," and "I got the impression that the virtual agent enjoyed the encounter" ($\alpha = .91$). *Empathy* was measured with the items "The virtual agent understood my emotions," "It felt as if the virtual agent could feel what I felt," and "The virtual agent clearly tried to put itself in my shoes" ($\alpha = .95$). The *warmth*

items were "The virtual agent was friendly in the encounter," "The virtual agent was polite," "The virtual agent was nice in the interaction," and "The virtual agent was behaving in a warm way" ($\alpha = .90$). The items for *showing interest* were "The virtual agent listened to what I had to say," "The virtual agent was interested in what I was saying," and "The virtual agent really tried to understand what I said" ($\alpha = .88$). Moreover, we measured *perceived humanness* with the items "The virtual agent behaved very much like a human," "The virtual agent was humanlike," and "The virtual agent acted like humans typically do" ($1 =$ do not agree at all, $10 =$ agree completely; $\alpha = .91$). It has been suggested that contemporary VAs are "short on humanness" (Go & Sundar, 2019), yet the level of perceived humanness of the VAs in the present study ($M = 5.15$) was not significantly different ($t = 1.57, p = .12$) from the humanness scale's midpoint (i.e., 5.5). *Customer satisfaction* was measured with Fornell's (1992) satisfaction items. Adapted to our VA interaction context, the items were worded as follows: "How dissatisfied or satisfied are you with the virtual agent?" ($1 =$ very dissatisfied, $10 =$ very satisfied), "To what extent did the virtual agent meet your expectations?" ($1 =$ not at all, $10 =$ totally), and "Imagine a virtual agent that is perfect in every respect. How near or far from this ideal did you find the virtual agent?" ($1 =$ very far from, $10 =$ cannot get any closer; $\alpha = .89$).

4. Analysis and results

H1 was tested by computing the zero-order correlations between the feature variables (i.e., name, face and gender; scored as $1 =$ absent feature and $2 =$ present feature) and perceived humanness. Similarly, to test H2, we computed the zero-order correlation between each behavioral variable (display of happiness, empathy, warmth, and showing interest) and perceived humanness. The outcomes are reported in Table 1, which shows that each feature variable was positively and significantly associated with perceived humanness. Thus, H1 was supported. Moreover, the behavior variables were positively and significantly associated with perceived humanness. This provides support for H2. It should be noted that that the zero-order correlations between the feature variables and customer satisfaction were non-significant, while the zero-order correlations between the behavioral variables and satisfaction were significant (see Table 1). Moreover, H3 was assessed by computing the zero-order correlation between perceived humanness and customer satisfaction. This resulted in a positive and significant correlation ($r = .30, p < .01$), which provides support for H3.

For H4, the first mediation hypotheses, we used model 4 of the PROCESS macro with 5,000 bootstrapped samples (Hayes, 2012) separately for each of the three features variable. That is to say, in each analysis, the feature variable was the independent variable (thus scored as 1 = the feature was absent, 2 = the feature was present). Perceived humanness was the mediator and customer satisfaction was the dependent variable. These analyses resulted in a significant indirect effect (*b*) for each feature variable (see Table 1). There were no significant direct effects in these analyses. This means that H4 was supported. Similarly, for H5, we used Hayes (2012) Model 4 (again with 5,000 bootstrapped samples) separately for each of the four behavioral variables (in each analysis, the behavioral variable was the independent variable, perceived humanness was the mediator, and customer satisfaction was the dependent variable). These analyses indicated a significant indirect effect (*b*) on customer satisfaction for each behavioral variable (see Table 1). No direct effects were significant in these mediation analyses. Thus, H5 was supported.

Table 1:
VA features and behaviors and associations with humanness and customer satisfaction

VA variable	Frequencies (features) and means (behaviors)	Association with perceived humanness (*r*)	Association with satisfaction (*r*)	Indirect effect on satisfaction (*b*)
VA features				
Name	Yes: 48 %	.25 ***	.04	.34 **
Face	Yes: 24 %	.30 ***	-.06	.53 **
Gender	Yes: 44 %	.25 ***	-.09	.37 **
VA behaviors				
Happiness	4.38	.29 ***	.17 *	.07 **
Empathy	2.68	.41 ***	.28 ***	.11 **
Warmth	6.61	.18 *	.20 **	.05 **
Interest	5.88	.39 ***	.24 ***	.09 **

*$p < .10$, **$p < .05$, *** $p < .01$

5. Discussion

With respect to the VA feature variables, the results of the present study indicate that the presence of a name, face, and gender contributed positively to the perceived humanness of

the VA, and that there was a mediated, positive influence of the feature variables on customer satisfaction. These findings should be seen in the light of several previous studies examining the impact of various facial components, specific names, and male versus female identity of robots or VAs. In relation to such studies, then, the current research has been occupied with the more fundamental issue of the presence versus absence of human-like features.

As for the VA behavioral variables included in the present study, all of them boosted satisfaction (via perceived humanness). Given that these behaviors have been shown (in previous research) to have a positive influence on customer satisfaction when a *human* employee performs them, the results of the present study indicate that what has been learned from many years in service research on satisfaction-boosting behavior of human employees can be valid also for a setting in which the customer interacts with a non-human representative of the firm.

Taken together, the results indicate that features and behaviors of human employees do provide useful points of reference for understanding the antecedents to customer satisfaction in service encounters in which customers interact with VAs. Presumably, the main underlying reasons for the causal potency of the independent variables are (1) the easiness by which we humans attribute human characteristics to non-humans in social settings and (2) we humans are susceptible to influence by features and behaviors of real humans. In any event, these reasons stress that we humans have a highly anthropocentric information processing apparatus. This is indeed the case also for the authors of the present study (i.e., our anthropocentrism is reflected in what we included as independent variables and as a mediator) and for many others who have examined the characteristics of robots and VAs in previous studies. However, further research on the satisfaction-boosting capacity of VAs in the service encounter may benefit from a perspective open to factors that do not stem directly from what is human-like. Moreover, eventually, the day would come when the customer is a VA, too— and this type of customer may not become satisfied by what is human-like.

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