Service encounters with virtual agents: an examination of perceived humanness as a source of customer satisfaction

Magnus Söderlund
Centre for Consumer Marketing, Stockholm School of Economics, Stockholm, Sweden, and

Eeva-Liisa Oikarinen
University of Oulu, Oulu, Finland

Abstract

Purpose – Firms have begun to introduce virtual agents (VAs) in service encounters, both in online and offline environments. Such VAs typically resemble human frontline employees in several ways (e.g. the VAs may have a gender and a name), which indicates the presence of an assumption by VA designers – and by firms that employ them – that VA humanness is a positively charged characteristic. This study aims to address this assumption by examining antecedents to perceived humanness in terms of attribution of agency, emotionality and morality, and the impact of perceived humanness on customer satisfaction.

Design/methodology/approach – A questionnaire was distributed online to participants who had been interacting with existing VAs, and they were asked to focus on one of them for this study. The questionnaire comprised measures of antecedents to perceived humanness of VAs, perceived humanness *per se* and customer satisfaction. A structural equation modeling approach was used to assess associations between the variables.

Findings – Attributions of agency, emotionality and morality to VAs contributed positively to the perceived humanness of the VAs, and perceived humanness was positively associated with customer satisfaction.

Research limitations/implications – Additional humanness capabilities should be explored in further research.

Practical implications – Firms using VAs in service encounters should make attempts to maximize perceived VA humanness, and this study shows that it may be beneficial if such attempts comprise signals that VAs have agency, emotionality and morality.

Originality/value – By examining VAs in terms of a set of fundamental human capabilities, the present study contributes to existing research on human–VA service encounters, which to date has focused on more superficial VA characteristics (such as if the VA has a face and gender).

Keywords Service marketing, Customer satisfaction, Virtual agents, Service encounters, Humanness

Paper type Research paper

1. Introduction

This purpose of this study is to examine antecedents to perceived humanness of virtual agents (VAs) that customers interact with in service encounters as well as the consequence of such perceptions for customer satisfaction. Firms are already offering customers the opportunity to interact with a VA instead of a human frontline employee in service encounters (Gnewuch et al., 2017; Hadi, 2019; Köhler et al., 2011; Suich Bass, 2018), and such VAs resemble humans in several ways: they may have a name, gender and voice; they may be represented with a humanlike face; and they often interact with customers in terms of a dialogue comprising the exchange of questions and answers. Several authors also explicitly recommend that firms should use VAs that are humanlike (Mull et al., 2015). However, why are VAs appearing in a service encounter setting often designed so that they resemble human frontline employees? And why are firms recommended to do so? After all, in a screen-mediated context, it is possible to provide acquisition and consumption opportunities with an interface without any particular human characteristics – such as when the customer is using Excel or SPSS, searches for YouTube video and pays with a credit card on an e-retailer's website.

In the present study, the human resemblance issue is explored with the notion of perceived humanness, which has to do with the extent to which an individual is seen as typically human (Haslam et al., 2008a). Perceived humanness is a general dimension of social perception (Haslam and Bain, 2007; Morera et al., 2018), and it is assumed here that perceptions of humanness can take place despite the fact that an observer knows that a stimulus individual (such as a VA) is not a human. The main reason is that we humans have a tendency to perceive humanlike characteristics in non-humans. This is often referred to as anthropomorphism, which has been demonstrated for non-human objects such as geometric shapes, plants, (Epley et al., 2007; Epley et al., 2008), volcanoes (Norenzayan et al., 2008), cars (Aggarwal and McGill, 2007) and slot machines (Riva et al., 2015). Similarly, when the non-human object is a computer, a computer program, an algorithm or a smartphone, several studies show that we humans are likely to respond to such objects in ways that are similar to how we respond to other humans (Lee, 2018; Shank, 2012; Sundar and Nass, 2000; Wang, 2017).

The present study is an attempt to contribute to the discourse on the role of new digital technologies in services, which may fundamentally change the interplay between customers and service firms (Larivière et al., 2017) and dramatically change service industries (Wirtz et al., 2018); thus they call for new service strategies (Huang and Rust, 2017). A crucial aspect for those involved in the transformation – and for those whose task it is to understand it – has to do with what characteristics VAs should have to make them acceptable to the customer. As already indicated, many assume that VAs should resemble humans, and the present study contributes by examining a set of antecedents to perceived humanness in terms of fundamental human capabilities (agency, emotionality and morality). This extends the knowledge of VA–customer interactions, because existing research has mainly focused on VA characteristics in terms of humanlike features such as having a face (Koda and Maes, 1996; Sproull et al., 1996), facial features (Luo et al., 2006), a smiling facial expression (Sproull et al., 1996; Verhagen et al., 2014), voice (Sproull et al., 1996), gender (Luo et al., 2006), physical attractiveness (Holzwarth et al., 2006), looking like a human (Etemad-Sajadi, 2016), as well as humanlike behaviors such as proactivity (Köhler et al., 2011) and dominance (Rosenthal-von der Pütten et al., 2019). In contrast, the present study comprises more fundamental aspects of the human nature – and aspects that must be inferred by an observer rather than being perceived directly. In empirical terms, this study examined such

aspects with respect to customers' experience with real VAs already in use in commercial contexts.

The present study also contributes to the discourse on the role of new digital technologies in services by assessing consequences of perceived VA humanness. The authors of the present study expected (and found) that the perceived humanness of a VA in a service encounter boosts the overall evaluation of the VA, which was captured with customer satisfaction as a main dependent variable. This particular dependent variable was selected because it has a dominant role in research on service encounters and has a potential to influence several customer behavioral variables as well as firm value (Lee *et al.*, 2018; O'Sullivan and McCallig, 2012). So, far, however, few existing studies of service encounters have examined the influence of perceived humanness on customer satisfaction. Moreover, many studies of the anthropomorphization of VAs and robots have not comprised overall evaluations of the non-human with which the human interacts (Johnson *et al.*, 2006; Komiak *et al.*, 2004; Köhler *et al.*, 2011; Luo *et al.*, 2006; Martini *et al.*, 2016; Mull *et al.*, 2015; Rosenthal-von der Pütten *et al.*, 2019; Wang, 2017), so by including VA-generated customer satisfaction, the authors of the present study make an attempt to contribute both to the service encounter literature and to the literature dealing with interactions between humans and (humanlike) non-humans in general. More specifically, the finding that perceived VA humanness boosts customer satisfaction contributes to existing literatures with an indication that a heuristic of the "what-is-humanness-is-good" type is involved in inferences about VAs.

2. Theoretical framework and hypotheses
2.1 Perceived humanness
The point of departure here is the notion of humanness – the extent to which an individual has characteristics that are typical for humans. This has been referred to as the "human nature" aspect of humanness (Haslam, 2006; Haslam *et al.*, 2008a), and it reflects a view of humanness as a variable rather than a dichotomy. With this view, then, one specific human individual may be seen as having "more" of humanness than another human individual. Previous research with perceived humanness as a social perception dimension has shown, for example, that we humans have a tendency to attribute more humanness to the self than to others (Haslam and Bain, 2007) and less humanness to out-group members than to in-group members (Epley *et al.*, 2013; Leyens *et al.*, 2000). Perceptions of others as having less humanness (i.e. dehumanization) is indeed likely to be a main rationale behind a long list of horrible acts in the history of mankind (cf. Bastian *et al.*, 2012; Epley, 2018).

The variable nature of humanness also implies that non-humans can be seen as having various degrees of humanness. For example, we humans do anthropomorphize animals, but we do not do this to the same extent for all animals; monkeys and dogs are seen as having more mind than chickens and fish (Bastian *et al.*, 2012). In any event, humanness as a dimension of social perception allows for the possibility that it may not distinguish humans from non-humans in a discrete way (Haslam *et al.*, 2005). Or, as noted by Epley and Waytz (2010), ordinary perceivers are capable of treating their pets as people and their enemies as animals. Empirical results stressing the lack of a clear human vs non-human dichotomy appear in Longoni *et al.* (2019), a study of medical services showing that human service providers were not ascribed different levels of humanness than computerized service providers.

In the present study, the authors use perceived humanness as an overall judgment made by a perceiver in relation to a specific stimulus individual that is not human (i.e. a VA). Previous research, such as Kim and Sundar (2012) and Powers and Kiesler (2006), shows

that humans can indeed attribute humanness at an overall level to non-humans. One main reason is that we humans are equipped with evolution-based social responses in relation to other humans – responses that we apply more or less automatically in interaction situations resembling the situations in which they were originally developed (Nowak and Biocca, 2003; Shank, 2013). In other words, we humans are preconditioned, primed and neurologically prepared to interact with humans, and reaction patterns from human–human interactions easily translate into similar reactions to non-human objects (Karr-Wisniewski and Prietula, 2010).

Epley (2018) argues that similarity between the non-human object and a human is a particularly important factor that can trigger this translation; because of the associative nature of human brains, exposure to a non-human object that is similar in some ways to a real human can make accessible and activate mental content (and its affective charge) related to real humans – and in the next step, this content is applied, more or less automatically, to the non-human object [a similar priming-based argument appears in Aggarwal and McGill (2007)]. This provides us humans with efficient information processing possibilities; we can capitalize on our knowledge about what it means to be human. And such knowledge is much more extensive – and easier to access – than our knowledge about what it is like to be non-human (Wiese *et al.*, 2017).

Moreover, it has been argued that needs for social relations, understanding and control are additional explanations behind the tendency to perceive humanlike characteristics in non-humans. That is to say, we humans have such a strong need for social relations that we may make attempts to gain a sense of social connection by humanizing non-human objects (Aggarwal and McGill, 2007; Epley *et al.*, 2008; Epley, 2018). We humans also have a strong need for understanding and control. As we are the most social of all primates (Epley, 2018), personal experience has equipped most of us with well-rehearsed schemes related to ourselves and other humans, and accessing them increases our ability to make sense of, and control, non-human objects (Aggarwal and McGill, 2007; Epley *et al.*, 2007; Epley *et al.*, 2013).

2.2 Impact of perceived humanness on customer satisfaction

A basic tenet in the present study is that the perceived humanness of an individual can have a positive impact on the overall evaluation of this individual. One first reason is person positivity bias. That is to say, for us humans, other humans typically have a positive rather than a negative charge (Sears, 1983). This bias is most likely a function of the inherently social nature of humans, meaning that other humans offer promises of social connection, belongingness and intimacy, which in turn are highly valued outcomes for most humans (Söderlund, 2016). In addition, social connections make us both more happy and healthier (Epley, 2018), and accumulated experience (personal and mass-mediated) of such outcomes may contribute to "what is humanness is good" inferencing. 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. In any event, a positivity bias of this type has materialized in consumer settings in such a way that the mere presence of a human employee in a store environment can boost customers' positive emotions (Söderlund, 2016).

Second, as already indicated, humans have well-rehearsed schemes, based on a lifetime of experience, to make sense of humans. The efficiency with which such schemes are used is sometimes astonishing; for example, humans need only few visual clues to conclude that an object is a human (Johansson, 1973). And only thin slice of a person's behavior is enough to produce remarkably accurate judgments about the person (Ambady and Rosenthal, 1992).

Thus information about other humans is often subject to highly fluent information processing, which means that anthropomorphizing a non-human object can result in effortless sense-making (Rauschnabel and Ahuvia, 2014). This, in turn, is likely to influence evaluations; a high level of processing fluency in relation to an object can boost evaluations of the object (Reber *et al.*, 1998). Similarly, it has been suggested that a non-human object's perceived congruity with the schema for what is human provides a sense of satisfaction that may carry over, in a valence-congruent way, to evaluations of the object (Aggarwal and McGill, 2007; Chandler and Schwarz, 2010).

Third, given that a human is likely to perceive himself or herself as more similar to another human than to a non-human, and given that perceived similarity typically has a positive influence on evaluations (Cialdini, 2007), perceived similarity in relation to a non-human agent can enhance the evaluation of this agent. In addition, perceptions of an agent's humanness may boost trust in the agent (Castelo *et al.*, 2019; Hadi, 2019), and trust is typically influencing overall evaluations such as customer satisfaction (Anderson and Narus, 1990).

Thus, several mechanisms can contribute to boosting evaluations of an anthropomorphized non-human. It must be underscored, however, that it is humanness in general that is assumed to have a positive charge. Specific human individuals, or specific groups of humans (e.g. criminals, drug addicts and the homeless) do not necessarily have a positive charge, so ascribing a non-human characteristics of a specific (and negatively charged) human is not likely to boost evaluations of the non-human (cf. Aggarwal and McGill, 2007). In any event, and in terms of findings in previous studies, a positive association between the extent to which a human person is imbued with humanness and evaluations of the person has been found by Kozak *et al.* (2006) and Söderlund (2020). Moreover, in consumer contexts, several studies have identified a positive influence of anthropomorphizing an offer on evaluations of the offer (Aggarwal and McGill, 2007; Delbaere *et al.*, 2011; Rauschnabel and Ahuvia, 2014; Van den Hende and Mugge, 2014). It has also been shown that the presence of a (humanlike) avatar on a website boosts customer satisfaction compared to no such avatar (Holzwarth *et al.*, 2006). In the light of the arguments above and existing empirical findings, then, and in a service encounter, one would expect a positive (and linear) association between the perceived humanness of a VA and the evaluation of the VA (in terms of customer satisfaction).

Some authors, however, have expressed concerns regarding the possibility of a non-linear association between a non-human's humanlike appearance and the evaluation of this non-human. This possibility has been referred to as the uncanny valley hypothesis, which in the typical case is applied to the human observer's reactions to non-human objects such as robots. More specifically, according to this hypothesis, increases in humanlike appearance leads to increased liking up to a point after which a too humanlike appearance becomes unnerving and results in reduced liking. It is this dip that is referred to as the uncanny valley. When the humanlike appearance increases further, however, liking is expected to increase again (Cheetham *et al.*, 2011; Gray and Wegner, 2012; Ho and MacDorman, 2010; Kätsyri *et al.*, 2015). Several reasons why there would be an uncanny valley effect have been suggested. For example, humanlike robots may remind us of death and prompt us to see a mind in robots – and both these aspects can be eerie (Gray and Wegner, 2012). It is also possible that ambiguity during categorization of the non-human may result in eeriness (Wiese *et al.*, 2017). In any event, the uncanny valley hypothesis entails the possibility that the association between perceived humanness of a VA and customer satisfaction produced by the VA may be nonlinear. However, empirical findings regarding this hypothesis have been inconsistent (Cheetham *et al.*, 2011; Gray and Wegner, 2012; Kätsyri *et al.*, 2015), or

have comprised other dependent variables such as customer satisfaction (Castelo, 2019), so in the present study, the hypothesis regarding perceived humanness of a VA and customer satisfaction is formulated in linear terms (but in the subsequent analysis, the possibility of a non-linear association is examined). In a service encounter setting in which the customer interacts with a VA, then, and when customer satisfaction is conceptualized as an overall evaluation of the VA, the following is hypothesized:

H1. Perceived humanness of the VA is positively associated with customer satisfaction.

2.3 Human capabilities as antecedents to perceived humanness

Studies and theories comprising humanness have distinguished several specific facets of humanness, and a set of them – specific capabilities of humans – are discussed in this section (agency, emotionality and morality). They were selected because they appear frequently in theories and studies of humanness and anthropomorphizing of non-humans, and it can be assumed that a perceiver can attribute each of them to a non-human agent (such as a VA). In any event, for each of them, it is hypothesized that there is a positive association between the extent to which a VA is perceived to have the specific capability and the perceived humanness of the VA. It is also hypothesized that perceived agency and emotionality of a VA are likely to boost perceptions of the VA's morality.

First, *agency* is often mentioned as a humanness aspect (Castelo, 2019; Haslam *et al.*, 2008a; Morera *et al.*, 2018). To be an agent is to be capable of influencing intentionally one's functioning and life circumstances; it is agency that enables us humans to transcend the dictates of our immediate environment and it allows us to shape the course of our lives (Bandura, 2006). Agency also has social utility (Wojciszke *et al.*, 2009), which makes it valuable for highly social organisms. For example, agentic qualities are instrumental for gaining status and success (ibid.). The main properties of agency are forming intentions that include action plans and strategies for realizing them; setting goals and anticipating the likely outcomes of actions to guide and motivate goal attainment; constructing appropriate courses of action and to motivate and regulate their executions; and the ability to reflect on personal efficacy (Bandura, 2006).

It is assumed here that humans are hardwired to make sense of others in agency terms, because this capability has been identified among 12- to 15-month-old infants (Johnson, 2003). And already at the age of 2.5 years, human children perform better than chimpanzees and orangutans in understanding an actor's intentions (Herrmann *et al.*, 2007). The capability of attributing agency to others, sometimes referred to as mentalizing and theory of mind (Martini *et al.*, 2016), provides several advantages: it can be used to predict and explain others' behavior (Johnson, 2003; Kozak *et al.*, 2006; Wiese *et al.*, 2012) and to manipulate (and deceive) others (Johnson, 2003). The exact mechanism for *how* we humans make sense of others' agency, however, is an open issue; this capability appears to stem from a combination of using the self as a source of analogy and theory-driven inferences (Epley and Waytz, 2010).

Given the general tendency to attribute humanness to non-human objects, it is not surprising that several studies indicate that we humans can attribute agency also to non-humans (Bastian *et al.*, 2012; Gray and Wegner, 2012; Martini *et al.*, 2016). A classical study is Heider and Simmel (1944), who found that humans can attribute intentions even to geometrical shapes. Moreover, as the attribution of agency to a non-human object is likely to foster anthropomorphizing in relation to that object (Chandler and Schwarz, 2010), the following is hypothesized in a setting comprising customers' service encounters with VAs:

H2. The attribution of agency to a VA is positively associated with the perceived humanness of the VA.

Emotionality, the capability to experience emotions, is another fundamental aspect of humanness (Castelo, 2019; Epley *et al.*, 2013; Epley, 2018; Haslam and Bain, 2007; Haslam *et al.*, 2008a, Morera *et al.*, 2018). Conversely, when others (such as outgroup members) are perceived to lack emotionality, they are typically denied humanness (Leyens *et al.*, 2000). One main reason why emotionality is crucial for us humans is that it facilitates choosing between alternatives; emotion is the currency that underlies all of our decisions (Johnston, 1999). That is to say, to be able to feel negative or positive emotions has strong implications for action, given the important role of emotions for evaluations of actions (Bagozzi *et al.*, 1999).

The capability to recognize the emotionality of a target person is another aspect of having theory of mind (Epley, 2018; Gray *et al.*, 2012; Leslie *et al.*, 2004) and a first step toward empathy or empathizing (Wiese *et al.*, 2017). One main source for recognizing others' emotionality is that others frequently display various levels of specific emotions, particularly with facial expressions. Humans' high levels of emotion detecting skills in identifying others' displayed emotions (Batty and Taylor, 2003) indicate that we humans are indeed able to attribute emotionality *per se* to others. In any event, given the general tendency to anthropomorphize non-humans, humans have been shown to be able to attribute emotionality to non-humans (Gray and Wegner, 2012; Haslam *et al.*, 2008b; Martini *et al.*, 2016), including computers (Johnson *et al.*, 2006), smartphones (Wang, 2017) and robots (Wang and Krumhuber, 2018). Therefore, given that emotionality is a central aspect of humanness, the following is expected in a service encounter setting in which customers interact with VAs:

H3. The attribution of emotionality to a VA is positively associated with the perceived humanness of the VA.

Morality is the third humanness facet to be included in the present study. It is, at a general level, the capability to distinguish what is right from what is wrong and trying to do what is right (Gray *et al.*, 2007; Gray *et al.*, 2012; Waytz *et al.*, 2010). And what is right, in the light of research on moral judgments and human morality, as well as in the folk notion of morality, is typically about what does not harm others and what is just in relation to others (Graham *et al.*, 2011). Some researchers, such as Mikhail (2007), view morality as an innate human faculty (i.e. largely pre-determined by the inherent structure of the mind), and it has been argued that its basic function is to regulate selfishness and to make social life possible (Haidt, 2008). It has also been argued that the justice aspect of morality, visible already among hunter-gatherers, is a particularly decisive aspect to foster a cooperative mode and to form long-term groups (Flannery and Marcus, 2012). Morality, then, seems highly qualified as a central facet of humanness. Empirical results pointing in this direction are provided by Goodwin *et al.*, 2014). Its centrality is reflected in a social perception context, because it has been shown that perceptions of another person's morality occupy a particularly privileged position for us humans when it comes to forming global evaluative impressions of this person (Brambilla and Leach, 2014; Goodwin *et al.*, 2014).

Given again the tendency to anthropomorphize non-humans, it is expected that non-humans can be subject to morality attributions. Prior research offers support for this in terms that are relevant for VAs; humans can attribute fairness to both computers (Shank, 2012) and algorithms (Lee, 2018), and a disembodied artificial intelligence (AI) can be

blamed for its actions (Malle *et al.*, 2019). Therefore, the following is hypothesized regarding VA morality and perceived humanness in a service encounter context:

H4.   The attribution of morality to a VA is positively associated with the perceived humanness of the VA.

2.4 Inter-capability associations

So far, it has been hypothesized that attributions of agency, emotionality and morality to a VA are likely to boost perceptions of VA humanness. However, from a perceiver's point of view, the three capabilities are likely to be interrelated. In the present study, given that agency and emotionality are two central aspects of having a mind, and given that attributions of mind to a target person can turn this person into a moral agent (Epley *et al.*, 2008), it is assumed that attributions of agency and emotionality would serve as clues that contribute to attributions of morality.

In human life, agency–morality associations manifest themselves by a frequent use of agency signals to determine the morality of target persons. In the folk notion of morality, for example, agency is typically one determinant of what is morally wrong (Gray *et al.*, 2012). Indeed, people consistently blame intentional norm violators more severely than unintentional ones (Malle *et al.*, 2014). An agency–morality association can also be seen when people are asked to think about acts that are morally wrong: frequent answers are murder, stealing and adultery (Schein and Gray, 2015), and such acts require a perpetrator with agency. Indeed, many justice systems reflect beliefs that punishments of moral violations should be a function of the (perceived) intent of the transgressor. However, agency can also signal high morality, in the sense that many markers of high morality persons require agency; being fair, brave, self-controlled, principled, responsible, just, honest, sincere, determined, committed, disciplined and loyal are examples (Brambilla and Leach, 2014; Goodwin, 2015; Goodwin *et al.*, 2014; Walker and Hennig, 2004).

In the light of this, and given the tendency to anthropomorphize non-humans, it is assumed in the present study that agency-morality associations in human life can transfer to a situation in which customers are exposed to a VA so that attribution of agency to a VA boosts attributions of VA morality. Hence the following is hypothesized:

H5.   The attribution of agency to a VA is positively associated with the attribution of VA morality.

Moreover, again in human life, affect is assumed to profoundly shape morality (Harenski and Kiehl, 2011; Sherman and Haidt, 2011). Indeed, emotionality can provide clues about morality in several ways. First, emotionality is a useful facilitator for making right vs wrong distinctions, because emotions provide the decision-maker with a valenced charge for various options. In other words, emotions are can inform morality assessments (Haidt, 2008; Horberg *et al.*, 2011). Assuming that most people have experienced that emotions are associated with morality aspects when they make decisions and judgments, and assuming that the self is an important point of reference when inferences are made about others' minds, particularly when these others are similar to us (Waytz *et al.*, 2010), one's own experience of the influence of emotions on morality decisions and judgments can suggest that emotionality influences morality also for others. Second, particularly when transgressions occur, the emotional response by the transgressor is likely to be informative for a perceiver who is making judgments about the transgressor's morality – and so-called moral emotions (Moll *et al.*, 2007) are particularly informative. A transgressor who does not

appear to feel, for example, shame and guilt is likely to be subject to attenuated morality judgments. More generally, lack of emotionality, or distorted emotionality, which has been ascribed to psychopaths and sex-offenders, may explain why they can be perceived as highly immoral (Harenski and Kiehl, 2011). Third, emotionality may be a prerequisite for understanding that others have emotionality, too. And a target person who signals that he or she understands that others can experience emotions provides material for perceivers' assessment of the person's morality. For example, a harmful activity carried out by a target person who not only had the intent to carry out the activity, but also understood that others would suffer from it, is typically considered immoral (Gray *et al.*, 2012). A target person's emotionality, however, can also signal high morality. Markers of a person's high moral standing derived from naturalistic conceptions comprise several characteristics that seem to require that the person has emotionality; examples are being compassionate, caring and kind (Goodwin, 2015; Walker and Hennig, 2004). In addition, altruism and generosity are other markers of a person's elevated moral status (Bai, 2017) and they seem to require emotionality, too.

Given this, authors who are convinced that artificial and mechanical agents (such as robots) do not have emotionality typically conclude that they are non-moral agents (Coeckelbergh, 2010). In the present study, however, which is concerned with social perception, and given again humans' tendency to anthropomorphize non-humans, it is expected that emotionality–morality associations in human life can transfer to a situation in which customers are exposed to a VA. The following, then, is hypothesized:

H6. The attribution of emotionality to a VA is positively associated with the attribution of VA morality.

2.5 Mediation issues
The reasoning above involves several assumptions of mediation. First, given that agency, emotionality and morality are assumed to influence perceived humanness (i.e. *H2–H4*), which in turn is assumed to influence customer satisfaction (*H1*), perceived humanness is seen as mediating the influence of the three capabilities on customer satisfaction. To assess this explicitly, the following is hypothesized:

H7. Perceived humanness mediates the influence of agency, emotionality and morality on customer satisfaction.

Second, the assumption that agency and emotionality can be seen as antecedents to morality (i.e. *H5* and *H6*), which in turn is assumed to influence perceived humanness (*H4*), implies that morality mediates the influence of agency and emotionality on perceived humanness. To explicitly assess this, the following is hypothesized:

H8. Morality mediates the influence of agency and emotionality on perceived humanness.

2.6 Moderation issues
With respect to moderator variables, it has been argued that extant research on the effects of anthropomorphism in consumer settings often overlooks the role of consumption context (Wan, 2018). Nevertheless, previous research indicates that humans prefer a human service provider rather than a computerized service provider in situations when the motives for seeking service are highly involving (Longoni *et al.*, 2019). Given a view of humanness as a

variable, and given that a human is capable of having more humanness than a non-human, Longoni *et al.*'s (2019) results suggest that task involvement may moderate also associations in which the perceived humanness of a service provider is the independent variable. Results that seem to point in this direction have been provided by Holzwarth *et al.* (2006); the presence of an (humanlike) avatar produced a higher level of satisfaction for high involvement visitors to a website than for low involvement visitors.

More specifically, in the present study, it is expected that the strength of the hypothesized association between the perceived humanness of a service provider and customer satisfaction (i.e. *H1*) can be moderated by task importance in such a way that high task importance results in that customers give more weight to the perceived humanness of a service provider when they form overall evaluations. The main reason is that high task importance is a situation in which the customer needs more advanced information, and needs to process it more carefully (Zaichkowsky, 1985), to arrive at a satisfying decision. The authors of the present study assume that the extent to which such needs can be satisfied is a function of the perceived humanness of a service provider. That is to say, given that effective transferring of information requires at least some theory of mind (Epley and Waytz, 2010), it is assumed that satisfying a receiver's need for more detailed and personalized information would demand more theory of mind (and thus more humanness) from the sender. Conversely, when task importance is low, and thus the customer's need for information is not high, the level of the humanness of the service provider is likely to be relatively less relevant from an information exchange point of view – and therefore less influential in the process in which overall customer satisfaction is formed. It should also be noted that assessing other people's minds is cognitively taxing (Epley and Waytz, 2010), and low task involvement is likely to be less motivating to do so than high task involvement. The following, then, is hypothesized for customers who are interacting with VAs in service encounters:

H9. Perceived VA humanness has a stronger impact on customer satisfaction when task importance is high as opposed to low.

Taken together, then, there are nine hypotheses to be tested in the present study and an overview of them is provided in Figure 1.

3. Research method
3.1 Data collection and participants
As already indicated, one main idea in the present study was that it should comprise customers' experience of interacting with existing VAs and thus that the study should capture natural VA variation that exists in the field. Therefore, the authors invited participants who had interacted with a VA, defined as "a computer-generated character, sometimes powered by artificial intelligence, which provides customer service."

The participants were asked to think about one specific and memorable service encounter in the past when they – as consumers – had been interacting with a VA that was representing a firm. This part, then, is somewhat similar to studies based on critical incidents (cf. Bitner *et al.*, 1990) in the sense that it generates one particular incident (here: an encounter with a VA) for each participant. In the present study, however, the participants were not asked to think about a *critical* incident (e.g. an encounter that generated a very low or a very high level of satisfaction), because the idea was to allow for full variation in satisfaction. Then, in the second part, and with open-ended question, the participants were asked to specify which type of VA they had interacted with, which type of firm it represented and for what task they interacted with the VA. They were also asked to describe
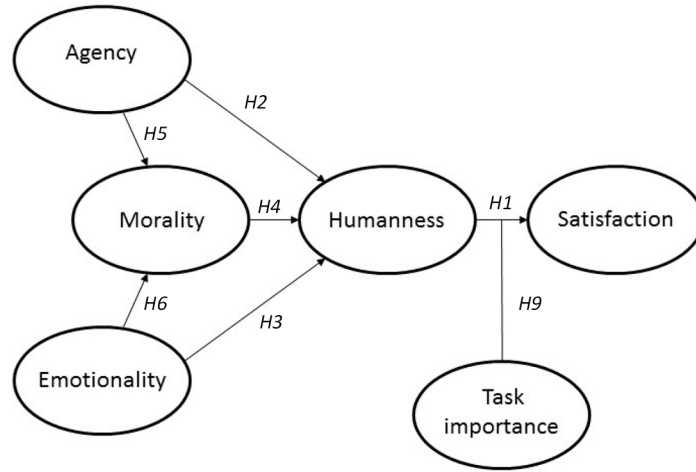
H7: Perceived humanness mediates the influence of agency, emotionality, and morality on customer satisfaction

H8: Morality mediates the influence of agency and emotionality on perceived humanness

Figure 1.
Overview of the hypotheses

what happened in the interaction. This part mainly served the purpose of making the selected encounter come alive again in the participants' minds and to allow for descriptive data regarding the VAs. The third part, for which the participants were asked to have the selected interaction in mind, comprised standardized questionnaire items to measure the variables in the hypothesis. That is to say, each participant selected one VA encounter from his or her life as a customer, all participants responded to (the same) standardized questions (presented below) about a selected encounter, and the responses to the standardized questions were used for testing the hypotheses.

The data were collected online from members of the Prolific panel, a platform explicitly tailored for researchers who collect data online (cf. Palan and Schitter, 2018). From this panel, 225 members who were UK residents and who had experience in online shopping were invited, and those who passed two attention checks were used in the analysis. The first attention check was the item "Please select the number 8 below" (with 5, 8, 13 and 15 as response alternatives); the second check was the item "Please select the number 14 below" (with 5, 8, 12 and 14 as the response alternatives). This approach was inspired by Jones *et al.* (2015), who refer to such items as "trap questions." After removing those who failed the attention checks, the result was 209 participants (M_{age} = 37.53; 149 women and 60 men) to be used for testing the hypotheses.

3.2 Virtual agents in the sample

As for the VAs selected by the participants, the majority were chatbots encountered online on firms' websites. In addition, some VAs were encountered in telephone calls to firms and some appeared in physical environments such as airports, train stations and clothes stores. The firms that these VAs represented comprised banks, health-care providers, automobile companies, supermarkets, energy providers, clothing retailers, airlines, insurance firms,

restaurants, travel agents and telecom firms. And the tasks that were covered in the VA interactions had to do with, for example, seeking information, booking tickets, cancelling orders, checking accounts and order tracking. With respect to physical characteristics of the 209 VAs in the sample (and as reported by the participants when asked about them), 53% had a name (e.g. Alice, Andy, John, Sara and Sally), 55% had a gender and 24% were represented with a face.

3.3 Assessment of the measures
In a first step, the properties of the measures were assessed with a structural equation modeling approach (SmartPLS 3.0 was used). The items used for the multi-item measures are presented in Table 1, in which also the reliability and validity of the measures are reported in terms of Cronbach's alpha (CA), composite reliability (CR) and average variance extracted (AVE). For a discriminant validity assessment, the heterotrait–monotrait ratio of correlation was used with 0.85 as a threshold, and all ratios in this assessment were <0.85. All items were scored on a scale ranging from 1 to 10. For all items except the satisfaction items, the endpoints were labeled as 1 = do not agree at all and 10 = agree completely. The endpoint labels for the satisfaction items are reported below.

As for the participants' perceptions of VA capabilities (i.e. the antecedents to perceived humanness; *H2–H4*), it should be noted that the focus in the present study is on a first step in human social sense-making of others, namely, the extent to which another individual (here: a VA) is perceived to have the capability *per se* (cf. Martini *et al.*, 2016; Wiese *et al.*, 2012; Wiese *et al.*, 2017), not on perceptions of levels of particular expressions of the capability.

Agency was measured with items similar to what was used in Gray and Wegner (2012), Kozak *et al.* (2006), Morera *et al.* (2018) and Waytz *et al.* (2010). For *emotionality*, similar items have been used by Kozak *et al.* (2006) in a mind attribution scale, by Wang (2017) in an anthropomorphism scale and by Wang and Krumhuber (2018) in a study of the extent to which emotionality was attributed to robots. It may be noted that Klein and Hodges (2001) argue that women are more motivated than men to perform better at tasks involving empathic accuracy (i.e. inferring the feelings of another person). This suggests that they may be more motivated to infer emotionality, too. The data in the present study do indicate this; female participants attributed a higher level of emotionality ($M = 3.93$) to the VAs than did male participants ($M = 2.89$). This difference was significant ($t = 2.49$, $p < 0.05$). This, then, serves as a validity indicator for the emotionality measure. As for *morality,* Gray *et al.* (2007), Gray *et al.* (2012) and Morera *et al.* (2018) have used similar items. *Perceived humanness* items of the type used in the present study have been used previously by, for example, Aggarwal and McGill (2007), Söderlund (2020) and Thompson *et al.* (2011).

For *customer satisfaction*, the three Fornell (1992) items were used: "How dissatisfied or satisfied are you with the virtual agent?" (1 = very dissatisfied and 10 = very satisfied), "To what extent did the virtual agent meet your expectations?" (1 = not at all and 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 and 10 = cannot get any closer). To assess the validity of the customer satisfaction measure, the responses to the open-ended item used for asking the participants to describe what happened in the interaction were used. More specifically, the Linguistic Inquiry and Word Count (LIWC) software was used to compute the emotional tone of the texts provided by the participants [for a similar approach, see Cavanaugh *et al.* (2015)]. LIWC produces an emotional tone score that takes on values in the range from 0 (very negative) to 100 (very positive). Given that customer satisfaction is expected to be positively associated with positive affect (Mano and Oliver, 1993), it was

Variable	Items	Factor loadings	CA	CR	AVE	M	SD
Agency	The virtual agent behaved as if it had clear goals	0.85	0.84	0.89	0.67	4.95	2.92
	It felt as if the virtual agent had a mind of its own	0.71					
	The virtual agent had the capacity to plan its actions	0.86					
	The virtual agent appeared to have a motivation of its own	0.86					
Emotionality	It felt as if the virtual agent had the capacity to experience emotions	0.98	0.97	0.98	0.95	3.58	2.79
	The virtual agent appeared to be able to react emotionally	0.97					
	I got the impression that the virtual agent was able to have emotions	0.98					
Morality	The virtual agent was capable of telling right from wrong	0.86	0.92	0.94	0.77	4.69	2.43
	The virtual agent was trying to do what is right	0.74					
	The virtual agent could understand negative and positive consequences of its behavior	0.91					
	The virtual agent appeared to have had a sense of what is fair	0.92					
	The virtual agent could distinguish between what is good and what is bad	0.93					
Humanness	The virtual agent behaved very much as a human	0.98	0.97	0.98	0.95	4.79	2.92
	The virtual agent was humanlike	0.97					
	The virtual agent acted like humans typically do	0.98					
Satisfaction	How dissatisfied or satisfied are you with the virtual agent?	0.96	0.96	0.98	0.93	5.80	3.06
	To what extent did the virtual agent meet your expectations?	0.96					
	Imagine a virtual agent that is perfect in every respect. How near or far from this ideal did you find the virtual agent?	0.98					

Table 1.
Properties of the
multi-item measures

assumed that a positive association between the two variables would indicate validity in the satisfaction measure. The two variables were indeed positively and significantly associated ($r = 0.48$, $p < 0.01$). Moreover, customer satisfaction is typically assumed to have a positive impact on repatronize intentions. As an additional validity check, then, the question "How likely is it that you would interact with the same virtual agent again?" (1 = very unlikely and 10 = very unlikely) was included. The correlation between the satisfaction variable and this intention variable was positive and significant ($r = 0.72$, $p < 0.01$), which provides further evidence of the satisfaction measure's validity.

For *task importance* (i.e. the potential moderator involved in *H7*), the participants were asked to describe, in their own words, for what task they interacted with the selected VA. After this, the following question appeared: "How important was it for you to complete this task?" (1 = not important at all and 10 = very important). The responses to the itemized rating scale was used as a measure of task importance ($M = 8.25$, $SD = 1.77$).

To be able to test the uncanny valley hypothesis, as an extension of *H1*, the authors of the present study used a measure of VA *uncanniness* comprising the participants' feelings about the selected VA interaction in terms of a ten-point scale and the adjectives "uncomfortable," "uneasy" and "eerie" (CA = 0.93; $M = 3.10$, $SD = 2.31$). Similar adjectives to capture the uncanniness of a robot were used by Gray and Wegner (2012) and Thompson *et al.* (2011).

Finally, as already indicated, the VA descriptive data comprised (dichotomous) data about VA features (i.e. if they had a name, gender and face). These features are indeed possible antecedents to perceived humanness, given that non-human similarity with humans is assumed to contribute to anthropomorphization (Epley, 2018). In the present study, however, the three feature variables were only weakly and non-significantly associated with perceived humanness, so the subsequent analysis comprises only agency, emotionality and morality as antecedents to perceived humanness.

Taken together, the measures of the variables in the hypotheses had acceptable levels of reliability and validity, so the next step was to assess the relationships between them. A structural equation modeling approach (with SmartPLS 3.0) was the main tool for this assessment.

4. Analysis and results

4.1 Perceived humanness as a higher-order construct?
It should be underscored that the present study has conceptualized (and measured) perceived humanness as a unidimensional variable, in which the measure is free of content related to specific humanlike capabilities. This was assumed to facilitate contact between literatures in which the perceived humanness of agents with different features and capabilities are studied – such as brands, physical products, VAs, robots and even real humans. However, this is not the only option; several studies have conceptualized (and/or measured) perceived humanness as a higher-order construct comprising several capabilities.

The latter has several advantages; for example, it reduces the number of relationships in a model and it can be a useful option in cases with high collinearity between independent variables (Sarstedt *et al.*, 2019). One disadvantage, however, is that it can provide less precision for interventions. As an example, a practitioner who wants to know if VA agency or emotionality should be emphasized to boost satisfaction would find it less helpful if these two aspects are not separate variables. In any event, before turning to the tests of the hypotheses from the theory section, an examination of what happens if perceived humanness is conceptualized and measured as a higher-order construct in the present study is warranted.

This can be done in many ways, but one particularly common way is to think of a higher-order construct as of the reflective-reflective type (Sarstedt *et al.*, 2019). In the present case, this means that perceived humanness was modeled as reflective of agency (measured with four items), emotionality (measured with three items) and morality (measured with five items), and an antecedent to customer satisfaction (measured with three items). SmartPLS 3.0 was used for the analysis. In terms of overall fit, however, this alternative model (standardized root mean residual [SRMR] = 0.10) was inferior to a model with the hypothesized associations between variables (i.e. *H1–H6* and *H9*) as depicted in Figure 1 (SRMR = 0.05). The alternative model also reduced the explained variance in customer satisfaction (R^2 = 0.408) in relation to the proposed model (R^2 = 0.43). Given model fit and criterion-related validity as two ways to substantiate the usefulness of higher-order multidimensional constructs (Johnson *et al.*, 2012), it can be contended that it was less useful to conceptualize perceived humanness as a higher-order construct in the present case. The content of higher-order constructs, however, should be determined by theory (Johnson *et al.*, 2012). Several theories do suggest that agency, emotionality and morality are central human capabilities, but few authors would argue that these are the only capabilities that determine perceived humanness – and to date there is no consensus regarding a complete list of such capabilities. Thus additional capabilities need to be assessed before the final word is said about perceived humanness as a higher-order construct.

4.2 Testing the hypotheses

The hypothesized associations (see Figure 1) were tested with a structural equation modeling approach (SmartPLS 3.0 was used). That is to say, the associations covered by *H1–H6* and *H9* represented the proposed model, and its overall fit with the data was good (SMRM = 0.05, NFI = 0.902). As for *H1–H6*, the path coefficients are reported in Table 2.

For *H1*, the results indicate a positive and significant association between perceived humanness and satisfaction (b = 0.45, $p < 0.01$). This means that *H1* was supported. It should be recalled, however, that several authors have discussed the possibility of an uncanny valley aspect of perceived humanness (i.e. the possibility of a non-linear association between perceived humanness and overall evaluation variables). Therefore, the authors of the present study modeled the association as a third degree polynomial function ($Y = a + b_1x + b_2x^2 + b_3x^3$), which is capable of capturing the two extreme points to be expected if an uncanny valley relationship is at hand, as depicted by, for example, Ho and MacDorman (2010) and Kätsyri *et al.* (2015), and compared it with a linear model ($Y = a + b_1x$). This comparison, made with SPSS 26, however, yielded a well-neigh linear pattern also for the third degree polynomial and a virtually identical level of explained variance (R^2 = 0.434) in relation to the linear model (R^2 = 0.428). It should also be noted that the association between perceived humanness and the explicit measure of uncanniness was weak (r = −0.12,

Hypothesized association	Path coefficient	t	p
H1: Humanness – satisfaction	0.45	5.71	<0.01
H2: Agency – humanness	0.15	2.02	<0.05
H3: Emotionality – humanness	0.39	5.95	<0.01
H4: Morality – humanness	0.33	4.75	<0.01
H5: Agency – morality	0.51	6.83	<0.01
H6: Emotionality – morality	0.39	4.39	<0.01

Table 2.
Path coefficients for
H1–H6

$p < 0.10$). Taken together, then, it must be contended that the perceived humanness of the VAs in the present study did not elicit an uncanny valley effect.

Turning to the hypotheses about the three capabilities and their influence on perceived humanness (i.e. *H2–H4*), there were significant and positive associations for agency ($b = 0.15$, $p < 0.05$), emotionality ($b = 0.39$, $p < 0.01$), and for morality ($b = 0.33$, $p < 0.01$). This means that *H2–H4* were supported. In a human-to-human context, this is perhaps not surprising, because each capability has been discussed in the literature as a fundamental aspect of what it means to be a human. The results of the present study, however, show support for the hypotheses in a human–VA context and the results thereby indicate that not only easily observed features of a VA (such as a face or voice), which have been examined in previous studies, can contribute to the perceived humanness of a VA. It may be noted that agency was subject to a weaker association with perceived humanness than emotionality and morality. Thus, in the present study, agency appeared to be less diagnostic of perceived humanness than the other capabilities. One reason may be that attributions of agency to non-human entities are likely to occur more frequently in everyday life than attributions of emotionality and morality (e.g. in relation to objects such as cars and computers), which can make agency a less distinct characteristic of humanness than the other two capabilities.

H5 and *H6* have to do with relations between the three capabilities, and the results indicate that there was a positive and significant association between agency and morality ($b = 0.51$, $p < 0.01$) and a positive and significant association between emotionality and morality ($b = 0.39$, $p < 0.01$. This means that both *H5* and *H6* were supported. These results are consonant with the argument that that both agency and emotionality are needed for morality (Gray *et al.*, 2012). This part of the results also indicates that agency was more diagnostic than emotionality for the attributions of morality. One possible reason is that the agency–morality link may be activated more frequently than the emotionality–morality link in everyday life, and this could have made it more accessible in a VA encounter. If so, this seems to reflect that agency has a particularly strong link to moral reasoning, in the sense that, for example, intentional norm-violators are blamed more than those that are unintentional (Malle *et al.*, 2014) and that children, who may appear less autonomous than adults, are held less responsible for transgressions (Bigman *et al.*, 2019).

For the first mediation hypothesis (*H7*), stating that perceived humanness mediates the influence of agency, emotionality and morality on customer satisfaction, the procedure suggested by Nitzl *et al.* (2016) and Sarstedt *et al.* (2020) was followed. That is to say, and again with SmartPLS 3.0, three links were added to the proposed model (i.e. direct links between agency and satisfaction; emotionality and satisfaction; and morality and satisfaction). This was done to be able to control for direct effects and, if the indirect links are significant, to assess the type of mediation. With this approach, as in the perhaps more familiar Hayes PROCESS approach, mediation is at hand if there is a significant indirect effect between an independent variable and a dependent variable. This, in turn, is indicated by the confidence interval for the coefficient for the indirect effect (it should not comprise a zero). Nitzl *et al.* (2016) recommends a biased-corrected confidence interval for the assessment, and this was used in the present mediation analysis. This analysis showed that there was a significant indirect effect in the following chains of influence: agency–humanness–satisfaction ($b = 0.06$, $p < 0.05$), emotionality–humanness–satisfaction ($b = 0.15$, $p < 0.01$) and morality–humanness–satisfaction ($b = 0.13$, $p < 0.01$). Here, the relatively less diagnostic role of agency for perceived humanness made itself visible again, and this time in terms of a relatively weaker indirect effect of agency compared to the other capabilities. Moreover, the direct impact of agency on satisfaction was not significant ($p = 0.19$), the direct impact of emotionality on satisfaction was significant ($p < 0.01$) and the direct impact

of morality on satisfaction was not significant ($p = 0.85$). This, then, indicates that perceived humanness fully mediated the agency–satisfaction association and the morality–satisfaction association, while mediation was complementary in the emotionality–satisfaction association (cf. Zhao *et al.*, 2010). *H7* was thus supported.

The second mediation hypothesis (*H8*) was based on the assumption that agency and emotionality are likely to provide clues about morality and thus they can be seen as antecedents to morality (cf. Section 2.4). To test this, the same extended model as above was used (i.e. a model with direct links between agency and satisfaction; emotionality and satisfaction; and morality and satisfaction) in a mediation analysis with SmartPLS 3.0. In this analysis, there was a significant indirect effect ($b = 0.06$, $p < 0.05$) of agency on satisfaction in the chain in which also morality is present as a mediator (i.e. agency–morality–humanness–satisfaction). Similarly, emotionality had a significant indirect effect ($b = 0.04$, $p < 0.05$) on satisfaction when also morality served as a mediator (i.e. emotionality–morality–humanness–satisfaction). This, then, provides support for *H8* and adds further evidence in support of the argument that morality seems to require both agency and emotionality (Gray *et al.*, 2012).

Finally, and for the moderator hypothesis (*H9*), an initial inspection of the data revealed that the association between perceived humanness and satisfaction was weaker when task importance was low ($r = 0.52$) compared to when task importance was high ($r = 0.66$). This is thus the type of moderation pattern that was hypothesized. To test this explicitly, *H7* was first assessed with the moderator analysis module in SmartPLS 3.0, which produced a non-significant result at the 5% level ($p = 0.09$). Second, the potential for moderation was re-examined with the PROCESS procedure for SPSS version 3.3 and SPSS 26. Hayes (2012) Model 1 with 5,000 bootstrap samples was used (perceived humanness was the independent variable, task importance was the moderator and customer satisfaction was the dependent variable). The interaction term from this analysis ($b = 0.013$), which was used as an indicator of moderation, was not significant ($p = 0.70$). Thus both tests point in the same direction, so *H9* must be rejected.

5. Discussion

5.1 Summary of main results
The results indicate that the more the VAs in service encounters were attributed agency, emotionality and morality, the more they were attributed humanness. Perceived humanness, in turn, was positively associated with VA-generated customer satisfaction (and there were no indications of an uncanny valley effect when perceived humanness increased from low to high).

5.2 Contributions
The present study contributes to the literatures on anthropomorphization and service encounters by showing that VAs in service encounters can be anthropomorphized in terms of fundamental human capabilities (agency, emotionality and morality) that must be inferred, because they cannot be directly observed. It should be noted that the levels (on a ten-point scale) reached by the three capability variables were relatively low (i.e. $M_{agency} = 4.95$, $M_{emotionality} = 3.58$ and $M_{morality} = 4.69$), which indicates that many of the VAs in the present study have not reached an advanced stage. Nevertheless, the capability variables were still able to boost the perceived humanness of the VAs. It should also be noted that the perceived humanness variable reached a relatively low level ($M_{humanness} = 4.79$). This may suggest that the VAs in the study were not perceived as very humanlike. It should be recalled, however, that previous research has examined the perceived humanness of real

humans, and results from such studies show that real humans, particularly out-group members, but also store employees, rarely receive "full" perceived humanness scores (cf. Söderlund, 2020). One main reason is likely to be that the minds of others are never fully accessible. In any event, in previous research, some groups of real humans appear to have received basically the same level of perceived humanness as the VAs in present study (cf. Table 1 in Kteily and Bruneau, 2017).

The present study also contributes by identifying a positive association between the perceived humanness of a VA and the evaluation of the VA (in terms of customer satisfaction). This indicates that we humans are not only influenced by heuristics of the type "what is beautiful is good" (Dion *et al.*, 1972) and "what is healthy is good" (Pazda *et al.*, 2016) in a social perception setting; we are also influenced by a more fundamental and holistic heuristic of the type "what is humanness is good." It should be underlined that there was no evidence of a so-called uncanny valley effect in the association between perceived humanness and customer satisfaction. Presumably, there is less potential for eeriness as consumers' experience in interacting with VAs is increasing – and such experience appears to already have reached a level at which many consumers are familiar with VA interactions (Reeves, 2016). After all, virtual assistants such as Apple's Siri and Amazon's Alexa have been around for some years, and an increasing number of consumers are encountering virtual humans in entertainment areas – such as virtual influencers (e.g. Lil Miquela), pop stars (e.g. Hatsune Miju) and supermodels (e.g. Noonouri).

Moreover, as VAs powered by AI are developing fast, and are expected to replace or complement human employees in many roles (Fen, 2019), there is an ongoing discussion of what AI is and is not capable of in relation to humans' capabilities. Several observers, for example, Fen (2019) and du Sautoy (2019), appear to be convinced that AI-powered entities are not – and will not be – capable of agency and other fundamental human capabilities of the type explored in the present study. Be that as it may, the present study contributes to the general discourse on AI and the human–machine distinction by showing that humans can *perceive* VAs as having relatively advanced capabilities and that such perceptions add to the overall perceived humanness of a non-human – and to the overall evaluation of VAs. More specifically, given that we humans are expected to spend more time interacting with VAs in the near future, the present study contributes to the AI discourse by highlighting factors that can facilitate human–machine interactions in commercial settings and, presumably, also blur the boundary between humans and machines.

5.3 Managerial implications
In marketing, particularly in offline settings, there are many examples of firms that make attempts to "humanize" their products and brands in the hope of more positive evaluations. For example, brands are imbued with personalities, they are referred to as "she" or "he" instead of "it," and they are presented as talking directly, in the first person, to the receiver of an ad (Aggarwal and McGill, 2007; Van den Hende and Mugge, 2014). Previous research indicates that customers' anthropomorphizing in such cases can pay off in terms of positive product attitudes (van den Hende and Mugge, 2014).

As service encounters are becoming increasingly online based, and comprise interactions with various forms of VAs, firms are striving for anthropomorphization also in this setting (Steinhoff *et al.*, 2019). With respect to such online practices, and in the light of the results in the present study, it does appear as if anthropomorphizing VAs in service encounters has a similar positive effect on evaluations as in the case of physical products. Given the VA's role in a service encounter as a representative of a firm, and given that service encounters typically mean that the representative is the firm from the customer's point of view

(Bitner *et al.*, 1990), the results of the present study imply that customer satisfaction-seeking firms that are using VAs would benefit if the VAs are designed so that they receive high scores in perceived humanness.

More specifically, and in addition to previous research indicating that various VA features (e.g. a name and a humanlike face) can enhance perceived humanness, the present study shows that perceived VA agency, emotionality and morality have a positive influence on perceived VA humanness. To produce VAs with such capabilities would of course be a Herculean task, both for a typical service firms that encounters customers online and for full-time VA designers, yet it should be underscored that the present study has dealt with *perceptions* of such capabilities. It should also be noticed that many contemporary VAs are visible to the customer only in terms of the text that they produce in a chat window on a screen; a typical encounter with a VA, then, resembles an exchange of SMS messages. These two aspects make life easier for managers who want to boost perceptions of humanlike capabilities of VA, because text can signal important aspects of a sender's psychological world (Pennebaker *et al.*, 2003). For example, recent research shows that simple linguistic elements in texts sent by VAs can boost their perceived happiness (Söderlund *et al.*, 2021), which would signal that they have emotionality. Similarly, if the mere movement of a geometrical shape signals that it has agency (Heider and Simmel, 1944), one would assume that a VA in a service encounter that uses phrases such as "My goal is [. . .]" and "What we need to do, to find a suitable XYZ for you, is to [. . .]" can signal agency, and that phrases such as "I believe it is right to [. . .]" and "It would not be fair to [. . .]" can signal morality. Not much existing research is available to give specific guidance about what exactly a VA should say to boost perceptions of agency, emotionality and morality, but firms with online service encounters can relatively easily create their own VA guidelines by experiments online with their visitors (cf. Thomke, 2020).

5.4 Limitations and suggestion for further research
Several limitations characterize the present study – and several possible alternative options for the study were not chosen. An overview of options for further research is provided in below:

- Examine different types of VAs with respect to their level of perceived humanness.
- Examine different ways of measuring perceived humanness.
- Examine perceived humanness *and* technological aspects of VAs with respect to the impact on overall evaluations.
- Examine additional capabilities that may influence perceived humanness.
- Examine additional moderator variables.
- Examine other downstream variables than customer satisfaction, such as trust, perceived hedonic value, money spent, prosocial behaviors and performance in joint action tasks.

With respect to the VAs in the sample, the authors of the present study did not make systematic attempts to compare different types (e.g. VAs that appear on firms' websites and VAs that exist in commercial environments such as hotel lobbies and airports). There are indications, however, that different types of VAs may be subject to different levels of anthropomorphism. For example, embodied synthetic agents (such as three-dimensional robots) prompt more anthropomorphism than agents represented in two dimensions

(Kiesler *et al.*, 2008). Further research should examine this by explicitly comparing different types of VAs.

Moreover, previous studies indicate that it is easy to prime humans who are exposed to a non-human object so that they indeed attribute human characteristics to the object. This calls for caution when researchers examine humanness perceptions. It is not unlikely that merely asking participants to assess the extent to which a non-human object is perceived to be human (e.g. with questionnaire items of the type used in the present study) can set in motion thoughts for which the downstream result is that anthropomorphization indeed occurs. If this happens, it is an example of self-generated validity (Feldman and Lynch, 1988). To avoid this, other (and less obtrusive) measurement approaches may be beneficial. One option may be the "ascent of humans" measure used by Kteily and Bruneau (2017). Another option is to do as Chandler and Schwarz (2010) did; they asked participants to describe their cars with their own words, and the resulting texts were content analyzed (e.g. by noting if a car was described by personal pronouns and with personality traits) to generate a measure of anthropomorphization. Further research is needed to establish the relationship between itemized rating scales for the measurement of perceived humanness and less obtrusive measures.

In addition, although anthropomorphization of non-human objects is a pervasive human tendency, presumably grounded in our extensive experience of ourselves and of other humans (which provides us with easily accessible schemes to be applied to other objects), computers have become ubiquitous. Indeed, some contemporary humans may spend more time with various screen-based devices than with other humans. It has resulted in the emergence of "inverted anthropomorhization"; we humans increasingly describe ourselves and others in terms of our technologies (Johnson *et al.*, 2008). This is clearly also the case when researchers (including the present authors) approach the human brain with terms such as "information processing" and "hardwired." Thus we humans are able to "technomorphize" humans – and we can do so because we are able to attribute various technical characteristics (e.g. size of the screen and capacity of the hard disc) to our technologies. And such characteristics are likely to influence our overall evaluations. This indicates that the humanness of a VA is unlikely to be the sole predictor of VA-generated customer satisfaction. Further studies should therefore explore if "technomorphizing" of VAs exists and, if it does exist, how it contributes to overall evaluations.

When it comes to antecedents to perceived humanness, the present study included only some capability variables (i.e. agency, emotionality and morality). To expand the knowledge in this area, other capabilities should be examined. It has been suggested, for example, that openness and warmth are relevant capability variables within a humanness framework (Haslam and Bain, 2007). Similarly, the capabilities to have thoughts and to learn (Martini *et al.*, 2016), intelligence (Johnson *et al.*, 2006), exercising control (Johnson *et al.*, 2008), the capability to recognize and understand that there are differences between human individuals (Longoni *et al.*, 2019) and sensitivity to how we are perceived by others (Epley and Waytz, 2010) are aspects of humanness, too. It would also be fruitful to examine more advanced capabilities. For example, it has been argued that one of the critical markers of a fully developed theory of mind is the capability to recognize another person's false beliefs (Epley and Waytz, 2010), and this appears to be relevant in a service encounter context. Presumably, customers can have many false beliefs that interfere with their consumption satisfaction, and a clever human frontline service employee would be able to address this already in the pre-purchase stage of the consumer's decision-making process (e.g. when a mountain guide assesses, and corrects, a potential client's beliefs about the effort and skills

needed to reach one particular peak). It should be relatively easy to include this aspect in a study of participants' perceptions of VAs (e.g. with questionnaire items such as "The VA identified that I was wrong about some aspects related to the offer" and "The VA corrected my beliefs").

With respect to variables that may moderate the perceived humanness–satisfaction association, the present study examined task importance (yet it did not influence the association). Other task-related variables, however, may indeed serve as moderators. Castelo *et al.* (2019) report findings suggesting that the type of task can moderate the impact of the humanization of an algorithm and trust in the algorithm. More specifically, under the condition of low algorithm humanization, algorithms produced more trust for objective tasks (i.e. quantifiable and measurable facts exist) than for subjective tasks (i.e. personal opinion and intuition are needed). Under the high humanization condition, however, these differences disappeared, thus suggesting that humanization can be used to build trust when algorithms are used for subjective tasks. Given that trust can produce satisfaction (Anderson and Narus, 1990), further research should explore if the type of task (objective or subjective) moderates also the humanness–satisfaction association. Moreover, Hadi (2019) found that for customers who entered a chatbot interaction with anger, chatbot humanization had a negative impact on satisfaction. This indicates that the customer's initial emotional state can moderate the influence of VA humanization on customer satisfaction. Presumably, this may reflect an inability of current chatbots to empathize with customers who are in a negative state of mind, which in turn may reduce satisfaction. Given that basic emotions are discrete, in the sense that they feel different and have different antecedents and consequences (Söderlund and Rosengren, 2004), further research is needed to explore if other initial emotions than anger have a moderating potential. Previous research also indicates that customers differ with respect to the extent to which they need or want personal assistance in a service context (McGoldrick *et al.*, 2008), and it seems likely that those who do not want this are less influenced by the humanness of a VA.

Finally, the main dependent variable in the present study was customer satisfaction. However, other outcome variables (i.e. potential consequences of perceived humanness) do exist, particularly with respect to customer behavior in a service encounter before it is completed. For example, it has been argued that a strong form of anthropomorphism entails *behaving* toward non-human object as if it possesses humanlike traits (Epley *et al.*, 2008). Previous research indicates that perceived humanness/anthropomorphism can affect behaviors that are relevant in a service encounter context, such as prosocial behaviors (less cheating and more generosity) and performance in joint action tasks (Wiese *et al.*, 2017). It can also affect how much money the customer spends (when a slot machine is anthropomorphized; Riva *et al.*, 2015), and it may influence customers' replacement decisions (Chandler and Schwarz, 2010). Presumably, the perceived humanness of a VA can also make the VA easier to remember (cf. Kiesler *et al.*, 2008) and evoke more trust (Etemad-Sajadi, 2016), and these two aspects are likely to have implications for repatronize decisions. Moreover, the results presented by Holzwarth *et al.* (2006), showing that the presence of an (humanlike) avatar increases perceptions of entertainment value for website visitors, indicate that the perceived humanness of a non-human can be entertaining. This, in turn, may boost the customer's experience in terms of the notion of an experience in the literature on experiential offers (Brakus *et al.*, 2009). Outcomes such as these, then, should be examined to add more details to the influence of the perceived humanness of VAs in service encounters.

References

Aggarwal, P. and McGill, A.L. (2007), "Is that car smiling at me? Schema congruity as a basis for evaluating anthropomorphized products", *Journal of Consumer Research*, Vol. 34 No. 4, pp. 468-479.

Ambady, N. and Rosenthal, R. (1992), "Thin slices of expressive behavior as predictors of interpersonal consequences: a meta-analysis", *Psychological Bulletin*, Vol. 111 No. 2, pp. 256-274.

Anderson, J.C. and Narus, J.A. (1990), "A model of distributor firm and manufacturer firm working partnerships", *Journal of Marketing*, Vol. 54 No. 1, pp. 42-58.

Bagozzi, R.P., Gopinath, M. and Nyer, P.U. (1999), "The role of emotions in marketing", *Journal of the Academy of Marketing Science*, Vol. 27 No. 2, pp. 184-206.

Bai, F. (2017), "Beyond dominance and competence: a moral virtue theory of status attainment", *Personality and Social Psychology Review*, Vol. 21 No. 3, pp. 203-227.

Bandura, A. (2006), "Toward a psychology of human agency", *Perspectives on Psychological Science*, Vol. 1 No. 2, pp. 164-180.

Bastian, B., Loughnan, S., Haslam, N. and Radke, H.R. (2012), "Don't mind meat? The denial of mind to animals used for human consumption", *Personality and Social Psychology Bulletin*, Vol. 38 No. 2, pp. 247-256.

Batty, M. and Taylor, M.J. (2003), "Early processing of the six basic facial emotional expressions", *Cognitive Brain Research*, Vol. 17 No. 3, pp. 613-620.

Bigman, Y.E., Waytz, A., Alterovitz, R. and Gray, K. (2019), "Holding robots responsible: the elements of machine morality", *Trends in Cognitive Sciences*, Vol. 23 No. 5, pp. 365-368.

Bitner, M.J., Booms, B.H. and Tetreault, M.S. (1990), "The service encounter: diagnosing favorable and unfavorable incidents", *Journal of Marketing*, Vol. 54 No. 1, pp. 71-84.

Brakus, J.J., Schmitt, B.H. and Zarantonello, L. (2009), "Brand experience: what is it? How is it measured? Does it affect loyalty?", *Journal of Marketing*, Vol. 73 No. 3, pp. 52-68.

Brambilla, M. and Leach, C.W. (2014), "On the importance of being moral: the distinctive role of morality in social judgment", *Social Cognition*, Vol. 32 No. 4, pp. 397-408.

Castelo, N. (2019), "Blurring the line between human and machine: marketing artificial intelligence", Doctoral dissertation, Columbia University.

Castelo, N., Bos, M.W. and Lehmann, D. (2019), "Let the machine decide: when consumers trust or distrust algorithms", *NIM Marketing Intelligence Review*, Vol. 11 No. 2, pp. 24-29.

Cavanaugh, L.A., Bettman, J.R. and Luce, M.F. (2015), "Feeling love and doing more for distant others: specific positive emotions differentially affect prosocial consumption", *Journal of Marketing Research*, Vol. 52 No. 5, pp. 657-673.

Chandler, J. and Schwarz, N. (2010), "Use does not wear ragged the fabric of friendship: thinking of objects as alive makes people less willing to replace them", *Journal of Consumer Psychology*, Vol. 20 No. 2, pp. 138-145.

Cheetham, M., Suter, P. and Jäncke, L. (2011), "The human likeness dimension of the 'uncanny valley hypothesis': behavioral and functional MRI findings", *Frontiers in Human Neuroscience*, Vol. 5 (November), Article 126.

Cialdini, R.B. (2007), *Influence: The Psychology of Persuasion*, Collins, New York, NY.

Coeckelbergh, M. (2010), "Moral appearances: emotions, robots, and human morality", *Ethics and Information Technology*, Vol. 12 No. 3, pp. 235-241.

Delbaere, M., McQuarrie, E.F. and Phillips, B.J. (2011), "Personification in advertising", *Journal of Advertising*, Vol. 40 No. 1, pp. 121-130.

Dion, K., Berscheid, E. and Walster, E. (1972), "What is beautiful is good", *Journal of Personality and Social Psychology*, Vol. 24 No. 3, pp. 285-290.

Du Sautoy, M. (2019), *The Creativity Code*, HarperCollins, London.

Epley, N. (2018), "A mind like mine: the exceptionally ordinary underpinnings of anthropomorphism", *Journal of the Association for Consumer Research*, Vol. 3 No. 4, pp. 591-598.

Epley, N. and Waytz, A. (2010), "Mind perception", in Fiske, S.T., Gilbert, D.T. and Lindzey, G. (Eds), *The Handbook of Social Psychology*, Wiley, New York, NY, pp. 498-541.

Epley, N., Schroeder, J. and Waytz, A. (2013), "Motivated mind perception: treating pets as people and people as animals", *Objectification and (de)Humanization*, Springer, New York, NY, pp. 127-152.

Epley, N., Waytz, A. and Cacioppo, J.T. (2007), "On seeing human: a three-factor theory of anthropomorphism", *Psychological Review*, Vol. 114 No. 4, pp. 864-886.

Epley, N., Waytz, A., Akalis, S. and Cacioppo, J.T. (2008), "When we need a human: motivational determinants of anthropomorphism", *Social Cognition*, Vol. 26 No. 2, pp. 143-155.

Etemad-Sajadi, R. (2016), "The impact of online real-time interactivity on patronage intention: the use of avatars", *Computers in Human Behavior*, Vol. 61 No. 8, pp. 227-232.

Feldman, J.M. and Lynch, J.G. (1988), "Self-generated validity and other effects of measurement on belief, attitude, intention, and behavior", *Journal of Applied Psychology*, Vol. 73 No. 3, pp. 421-435.

Fen, S. (2019), *Will AI Replace Us: A Primer for the 21st Century*, Thames and Hudson, London.

Flannery, K. and Marcus, J. (2012), *The Creation of Inequality: How Our Prehistoric Ancestors Set the Stage for Monarchy, Slavery, and Empire*, Harvard University Press, Boston, MA.

Fornell, C. (1992), "A national customer satisfaction barometer: the Swedish experience", *Journal of Marketing*, Vol. 56 No. 1, pp. 6-21.

Gnewuch, U., Morana, S. and Maedche, A. (2017), "Towards designing cooperative and social conversational agents for customer service", *Proceedings of the 38th International Conference on Information Systems (ICIS), South Korea*, pp. 1-13.

Goodwin, G.P. (2015), "Moral character in person perception", *Current Directions in Psychological Science*, Vol. 24 No. 1, pp. 38-44.

Goodwin, G.P., Piazza, J. and Rozin, P. (2014), "Moral character predominates in person perception and evaluation", *Journal of Personality and Social Psychology*, Vol. 106 No. 1, pp. 148-168.

Graham, J., Nosek, B.A., Haidt, J., Iyer, R., Koleva, S. and Ditto, P.H. (2011), "Mapping the moral domain", *Journal of Personality and Social Psychology*, Vol. 101 No. 2, pp. 366-385.

Gray, K. and Wegner, D.M. (2012), "Feeling robots and human zombies: mind perception and the uncanny valley", *Cognition*, Vol. 125 No. 1, pp. 125-130.

Gray, H.M., Gray, K. and Wegner, D.M. (2007), "Dimensions of mind perception", *Science*, Vol. 315 No. 5812, pp. 619-619.

Gray, K., Young, L. and Waytz, A. (2012), "Mind perception is the essence of morality", *Psychological Inquiry*, Vol. 23 No. 2, pp. 101-124.

Hadi, R. (2019), "When humanizing customer service chatbots might backfire", *NIM Marketing Intelligence Review*, Vol. 11 No. 2, pp. 30-35.

Haidt, J. (2008), "Morality", *Perspectives on Psychological Science*, Vol. 3 No. 1, pp. 65-72.

Harenski, C.L. and Kiehl, K.A. (2011), "Emotion and morality in psychopathy and paraphilias", *Emotion Review*, Vol. 3 No. 3, pp. 299-301.

Haslam, N. (2006), "Dehumanization: an integrative review", *Personality and Social Psychology Review*, Vol. 10 No. 3, pp. 252-264.

Haslam, N. and Bain, P. (2007), "Humanizing the self: moderators of the attribution of lesser humanness to others", *Personality and Social Psychology Bulletin*, Vol. 33 No. 1, pp. 57-68.

Haslam, N., Loughnan, S., Kashima, Y. and Bain, P. (2008a), "Attributing and denying humanness to others", *European Review of Social Psychology*, Vol. 19 No. 1, pp. 55-85.

Haslam, N., Bain, P., Douge, L., Lee, M. and Bastian, B. (2005), "More human than you: attributing humanness to self and others", *Journal of Personality and Social Psychology*, Vol. 89 No. 6, pp. 937-950.

Haslam, N., Kashima, Y., Loughnan, S., Shi, J. and Suitner, C. (2008b), "Subhuman, inhuman, and superhuman: contrasting humans with nonhumans in three cultures", *Social Cognition*, Vol. 26 No. 2, pp. 248-258.

Hayes, A.F. (2012), "PROCESS: a versatile computational tool for observed variable mediation, moderation, and conditional process modeling", White paper, The Ohio State University.

Heider, F. and Simmel, M. (1944), "An experimental study of apparent behavior", *The American Journal of Psychology*, Vol. 57 No. 2, pp. 243-259.

Herrmann, E., Call, J., Hernández-Lloreda, M.V., Hare, B. and Tomasello, M. (2007), "Humans have evolved specialized skills of social cognition: the cultural intelligence hypothesis", *Science*, Vol. 317 No. 5843, pp. 1360-1366.

Ho, C.C. and MacDorman, K.F. (2010), "Revisiting the uncanny valley theory: developing and validating an alternative to the Godspeed indices", *Computers in Human Behavior*, Vol. 26 No. 6, pp. 1508-1518.

Holzwarth, M., Janiszewski, C. and Neumann, M.M. (2006), "The influence of avatars on online consumer shopping behavior", *Journal of Marketing*, Vol. 70 No. 4, pp. 19-36.

Horberg, E.J., Oveis, C. and Keltner, D. (2011), "Emotions as moral amplifiers: an appraisal tendency approach to the influences of distinct emotions upon moral judgment", *Emotion Review*, Vol. 3 No. 3, pp. 237-244.

Huang, M.H. and Rust, R.T. (2017), "Technology-driven service strategy", *Journal of the Academy of Marketing Science*, Vol. 45 No. 6, pp. 906-924.

Johansson, G. (1973), "Visual perception of biological motion and a model for its analysis", *Perception and Psychophysics*, Vol. 14 No. 2, pp. 201-211.

Johnson, S.C. (2003), "Detecting agents", *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, Vol. 358 No. 1431, pp. 549-559.

Johnson, R.D., Marakas, G.M. and Palmer, J.W. (2006), "Differential social attributions toward computing technology: an empirical investigation", *International Journal of Human-Computer Studies*, Vol. 64 No. 5, pp. 446-460.

Johnson, R.D., Marakas, G.M. and Palmer, J.W. (2008), "Beliefs about the social roles and capabilities of computing technology: development of the computing technology continuum of perspective", *Behaviour and Information Technology*, Vol. 27 No. 2, pp. 169-181.

Johnson, R.E., Rosen, C.C., Djurdjevic, E. and Taing, M.U. (2012), "Recommendations for improving the construct clarity of higher-order multidimensional constructs", *Human Resource Management Review*, Vol. 22 No. 2, pp. 62-72.

Johnston, V.S. (1999), *Why we Feel: The Science of Human Emotions*, Perseus Publishing, Cambridge, MA.

Jones, M.S., House, L.A. and Gao, Z. (2015), "Respondent screening and revealed preference axioms: testing quarantining methods for enhanced data quality in web panel surveys", *Public Opinion Quarterly*, Vol. 79 No. 3, pp. 687-709.

Karr-Wisniewski, P. and Prietula, M. (2010), "CASA, WASA, and the dimensions of us", *Computers in Human Behavior*, Vol. 26 No. 6, pp. 1761-1771.

Kätsyri, J., Förger, K., Mäkäräinen, M. and Takala, T. (2015), "A review of empirical evidence on different uncanny valley hypotheses: support for perceptual mismatch as one road to The Valley of eeriness", *Frontiers in Psychology*, Vol. 6 (April), Article 390.

Kiesler, S., Powers, A., Fussell, S.R. and Torrey, C. (2008), "Anthropomorphic interactions with a robot and robot–like agent", *Social Cognition*, Vol. 26 No. 2, pp. 169-181.

Kim, Y. and Sundar, S.S. (2012), "Anthropomorphism of computers: is it mindful or mindless?", *Computers in Human Behavior*, Vol. 28 No. 1, pp. 241-250.

Klein, K.J. and Hodges, S.D. (2001), "Gender differences, motivation, and empathic accuracy: when it pays to understand", *Personality and Social Psychology Bulletin*, Vol. 27 No. 6, pp. 720-730.

Koda, T. and Maes, P. (1996), "Agents with faces: the effects of personification of agents", *Proceedings of HCI*, No. 96, pp. 98-103.

Köhler, C.F., Rohm, A.J., de Ruyter, K. and Wetzels, M. (2011), "Return on interactivity: the impact of online agents on newcomer adjustment", *Journal of Marketing*, Vol. 75 No. 2, pp. 93-108.

Komiak, S.Y., Wang, W. and Benbasat, I. (2004), "Trust building in virtual salespersons versus in human salespersons: similarities and differences", *E-Service*, Vol. 3 No. 3, pp. 49-64.

Kozak, M.N., Marsh, A.A. and Wegner, D.M. (2006), "What do I think you're doing? Action identification and mind attribution", *Journal of Personality and Social Psychology*, Vol. 90 No. 4, pp. 543-555.

Kteily, N.S. and Bruneau, E. (2017), "Darker demons of our nature: the need to (re)focus attention on blatant forms of dehumanization", *Current Directions in Psychological Science*, Vol. 26 No. 6, pp. 487-494.

Larivière, B., Bowen, D., Andreassen, T.W., Kunz, W., Sirianni, N.J., Voss, C. and De Keyser, A. (2017), "'Service encounter 2.0': an investigation into the roles of technology, employees and customers", *Journal of Business Research*, Vol. 79 No. 10, pp. 238-246.

Lee, M.K. (2018), "Understanding perception of algorithmic decisions: fairness, trust, and emotion in response to algorithmic management", *Big Data and Society*, Vol. 5 No. 1, pp. 1-16.

Lee, J.J., Lim, Y. and Oh, H.I. (2018), "Does customer satisfaction matter to managers' earnings forecasts and stock returns?", *European Journal of Marketing*, Vol. 52 Nos 9/10, pp. 2026-2051.

Leslie, A.M., Friedman, O. and German, T.P. (2004), "Core mechanisms in 'theory of mind'", *Trends in Cognitive Sciences*, Vol. 8 No. 12, pp. 528-533.

Leyens, J.P., Paladino, P.M., Rodriguez-Torres, R., Vaes, J., Demoulin, S., Rodriguez-Perez, A. and Gaunt, R. (2000), "The emotional side of prejudice: the attribution of secondary emotions to ingroups and outgroups", *Personality and Social Psychology Review*, Vol. 4 No. 2, pp. 186-197.

Longoni, C., Bonezzi, A. and Morewedge, C. (2019), "Resistance to medical artificial intelligence", *Journal of Consumer Research*, Vol. 46 No. 4, pp. 629-650.

Luo, J.T., McGoldrick, P., Beatty, S. and Keeling, K.A. (2006), "On-screen characters: their design and influence on consumer trust", *Journal of Services Marketing*, Vol. 20 No. 2, pp. 112-124.

McGoldrick, P.J., Keeling, K.A. and Beatty, S.F. (2008), "A typology of roles for avatars in online retailing", *Journal of Marketing Management*, Vol. 24 Nos 3/4, pp. 433-461.

Malle, B.F., Guglielmo, S. and Monroe, A.E. (2014), "A theory of blame", *Psychological Inquiry*, Vol. 25 No. 2, pp. 147-186.

Malle, B.F., Magar, S.T. and Scheutz, M. (2019), "AI in the sky: how people morally evaluate human and machine decisions in a lethal strike dilemma", in Aldinhas Ferreira, M., Silva Sequeira, J., Singh Virk, G., Tokhi, M. and Kadar, E.E. (Eds), *Robotics and Well-Being. Intelligent Systems, Control and Automation: Science and Engineering*, Springer, Cham.

Mano, H. and Oliver, R.L. (1993), "Assessing the dimensionality and structure of the consumption experience: evaluation, feeling, and satisfaction", *Journal of Consumer Research*, Vol. 20 No. 3, pp. 451-466.

Martini, M.C., Gonzalez, C.A. and Wiese, E. (2016), "Seeing minds in others – can agents with robotic appearance have human-like preferences?", *PloS One*, Vol. 11 No. 1, p. e0146310.

Mikhail, J. (2007), "Universal moral grammar: theory, evidence and the future", *Trends in Cognitive Sciences*, Vol. 11 No. 4, pp. 143-152.

Moll, J., Oliveira-Souza, R.D., Garrido, G.J., Bramati, I.E., Caparelli-Daquer, E.M., Paiva, M.L. and Grafman, J. (2007), "The self as a moral agent: linking the neural bases of social agency and moral sensitivity", *Social Neuroscience*, Vol. 2 Nos 3/4, pp. 336-352.

Morera, M.D., Quiles, M.N., Correa, A.D., Delgado, N. and Leyens, J.P. (2018), "Perception of mind and dehumanization: human, animal, or machine?", *International Journal of Psychology*, Vol. 53 No. 4, pp. 253-260.

Mull, I., Wyss, J., Moon, E. and Lee, S.E. (2015), "An exploratory study of using 3D avatars as online salespeople", *Journal of Fashion Marketing and Management*, Vol. 19 No. 2, pp. 154-168.

Nitzl, C., Roldan, J.L. and Cepeda, G. (2016), "Mediation analysis in partial least squares path modeling", *Industrial Management and Data Systems*, Vol. 116 No. 9, pp. 1849-1864.

Norenzayan, A., Hansen, I.G. and Cady, J. (2008), "An angry volcano? Reminders of death and anthropomorphizing nature", *Social Cognition*, Vol. 26 No. 2, pp. 190-197.

Nowak, K.L. and Biocca, F. (2003), "The effect of the agency and anthropomorphism on users' sense of telepresence, copresence, and social presence in virtual environments", *Presence: Teleoperators and Virtual Environments*, Vol. 12 No. 5, pp. 481-494.

O'Sullivan, D. and McCallig, J. (2012), "Customer satisfaction, earnings and firm value", *European Journal of Marketing*, Vol. 46 No. 6, pp. 827-843.

Palan, S. and Schitter, C. (2018), "Prolific.ac: a subject pool for online experiments", *Journal of Behavioral and Experimental Finance*, Vol. 17, (March), pp. 22-27.

Pazda, A.D., Thorstenson, C.A., Elliot, A.J. and Perrett, D.I. (2016), "Women's facial redness increases their perceived attractiveness: mediation through perceived healthiness", *Perception*, Vol. 45 No. 7, pp. 739-754.

Pennebaker, J.W., Mehl, M.R. and Niederhoffer, K.G. (2003), "Psychological aspects of natural language use: our words, our selves", *Annual Review of Psychology*, Vol. 54 No. 1, pp. 547-577.

Powers, A. and Kiesler, S. (2006), "The advisor robot: tracing people's mental model from a robot's physical attributes", *Proceedings of the 1st ACM SIGCHI/SIGART Conference on Human-Robot Interaction*, pp. 218-225.

Rauschnabel, P.A. and Ahuvia, A.C. (2014), "You're so lovable: anthropomorphism and brand love", *Journal of Brand Management*, Vol. 21 No. 5, pp. 372-395.

Reber, R., Winkielman, P. and Schwarz, N. (1998), "Effects of perceptual fluency on affective judgments", *Psychological Science*, Vol. 9 No. 1, pp. 45-48.

Reeves, J. (2016), "Automatic for the people: the automation of communicative labor", *Communication and Critical/Cultural Studies*, Vol. 13 No. 2, pp. 150-165.

Riva, P., Sacchi, S. and Brambilla, M. (2015), "Humanizing machines: anthropomorphization of slot machines increases gambling", *Journal of Experimental Psychology. Applied*, Vol. 21 No. 4, pp. 313-325.

Rosenthal-von der Pütten, A.M., Straßmann, C., Yaghoubzadeh, R., Kopp, S. and Krämer, N.C. (2019), "Dominant and submissive nonverbal behavior of virtual agents and its effects on evaluation and negotiation outcome in different age groups", *Computers in Human Behavior*, Vol. 90 No. 1, pp. 397-409.

Sarstedt, M., Hair, J.F., Jr, Cheah, J.H., Becker, J.M. and Ringle, C.M. (2019), "How to specify, estimate, and validate higher-order constructs in PLS-SEM", *Australasian Marketing Journal*, Vol. 27 No. 3, pp. 197-211.

Sarstedt, M., Hair, J.F., Jr, Nitzl, C., Ringle, C.M. and Howard, M.C. (2020), "Beyond a tandem analysis of SEM and PROCESS: use of PLS-SEM for mediation analyses!", *International Journal of Market Research*, Vol. 62 No. 3, pp. 288-299.

Schein, C. and Gray, K. (2015), "The unifying moral dyad: liberals and conservatives share the same harm-based moral template", *Personality and Social Psychology Bulletin*, Vol. 41 No. 8, pp. 1147-1163.

Sears, D.O. (1983), "The person-positivity bias", *Journal of Personality and Social Psychology*, Vol. 44 No. 2, pp. 233-250.

Shank, D.B. (2012), "Perceived justice and reactions to coercive computers", *Sociological Forum*, Vol. 27 No. 2, pp. 372-391.

Shank, D.B. (2013), "Are computers good or bad for business? How mediated customer–computer interaction alters emotions, impressions, and patronage toward organizations", *Computers in Human Behavior*, Vol. 29 No. 3, pp. 715-725.

Sherman, G.D. and Haidt, J. (2011), "Cuteness and disgust: the humanizing and dehumanizing effects of emotion", *Emotion Review*, Vol. 3 No. 3, pp. 245-251.

Söderlund, M. (2016), "Employee mere presence and its impact on customer satisfaction", *Psychology and Marketing*, Vol. 33 No. 6, pp. 449-464.

Söderlund, M. (2020), "Employee norm-violations in the service encounter during the corona pandemic and their impact on customer satisfaction", *Journal of Retailing and Consumer Services*, Vol. 57, doi: 10.1016/j.jretconser.2020.102209. (November).

Söderlund, M. and Rosengren, S. (2004), "Dismantling 'positive affect' and its effects on customer satisfaction: an empirical examination of customer joy in a service encounter", *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, Vol. 17, pp. 27-41.

Söderlund, M., Oikarinen, E.-M. and Tan, T.M. (2021), "The happy virtual agent and its impact on the human customer in the service encounter", *Journal of Retailing and Consumer Services*, Vol. 59, (March), doi: 10.1016/j.jretconser.2020.102401.

Sproull, L., Subramani, M., Kiesler, S., Walker, J.H. and Waters, K. (1996), "When the interface is a face", *Human-Computer Interaction*, Vol. 11 No. 2, pp. 97-124.

Steinhoff, L., Arli, D., Weaven, S. and Kozlenkova, I.V. (2019), "Online relationship marketing", *Journal of the Academy of Marketing Science*, Vol. 47 No. 3, pp. 369-393.

Suich Bass, A. (2018), GrAIt expectations, Special report, The Economist, March 31st.

Sundar, S.S. and Nass, C. (2000), "Source orientation in human-computer interaction: programmer, networker, or independent social actor", *Communication Research*, Vol. 27 No. 6, pp. 683-703.

Thomke, S. (2020), "Building a culture of experimentation", *Harvard Business Review*, Vol. 98 No. 2, pp. 40-48.

Thompson, J.C., Trafton, J.G. and McKnight, P. (2011), "The perception of humanness from the movements of synthetic agents", *Perception*, Vol. 40 No. 6, pp. 695-705.

Van den Hende, E.A. and Mugge, R. (2014), "Investigating gender-schema congruity effects on consumers' evaluation of anthropomorphized products", *Psychology and Marketing*, Vol. 31 No. 4, pp. 264-277.

Verhagen, T., Van Nes, J., Feldberg, F. and Van Dolen, W. (2014), "Virtual customer service agents: using social presence and personalization to shape online service encounters", *Journal of Computer-Mediated Communication*, Vol. 19 No. 3, pp. 529-545.

Walker, L.J. and Hennig, K.H. (2004), "differing conceptions of moral exemplarity: just, brave, and caring", *Journal of Personality and Social Psychology*, Vol. 86 No. 4, pp. 629-647.

Wan, J. (2018), "Paying the doughboy: the effect of time and money mind-sets on preference for anthropomorphized products", *Journal of the Association for Consumer Research*, Vol. 3 No. 4, pp. 466-476.

Wang, W. (2017), "Smartphones as social actors? Social dispositional factors in assessing anthropomorphism", *Computers in Human Behavior*, Vol. 68, (March), pp. 334-344.

Wang, X. and Krumhuber, E.G. (2018), "Mind perception of robots varies with their economic versus social function", *Frontiers in Psychology*, Vol. 9, Article 1230.

Waytz, A., Morewedge, C.K., Epley, N., Monteleone, G., Gao, J.H. and Cacioppo, J.T. (2010), "Making sense by making sentient: effectance motivation increases anthropomorphism", *Journal of Personality and Social Psychology*, Vol. 99 No. 3, pp. 410-435.

Wiese, E., Metta, G. and Wykowska, A. (2017), "Robots as intentional agents: using neuroscientific methods to make robots appear more social", *Frontiers in Psychology*, Vol. 8, (October), pp. 1-19.

Wiese, E., Wykowska, A., Zwickel, J. and Müller, H.J. (2012), "I see what you mean: how attentional selection is shaped by ascribing intentions to others", *PloS One*, Vol. 7 No. 9, p. e45391.

Wirtz, J., Patterson, P.G., Kunz, W.H., Gruber, T., Lu, V.N., Paluch, S. and Martins, A. (2018), "Brave new world: service robots in the frontline", *Journal of Service Management*, Vol. 29 No. 5, pp. 907-931.

Wojciszke, B., Abele, A.E. and Baryla, W. (2009), "Two dimensions of interpersonal attitudes: liking depends on communion, respect depends on agency", *European Journal of Social Psychology*, Vol. 39 No. 6, pp. 973-990.

Zaichkowsky, J.L. (1985), "Measuring the involvement construct", *Journal of Consumer Research*, Vol. 12 No. 3, pp. 341-352.

Zhao, X., Lynch, J.G., Jr,. and Chen, Q. (2010), "Reconsidering Baron and Kenny: myths and truths about mediation analysis", *Journal of Consumer Research*, Vol. 37 No. 2, pp. 197-206.

Further reading

Gray, K. and Schein, C. (2012), "Two minds vs two philosophies: mind perception defines morality and dissolves the debate between deontology and utilitarianism", *Review of Philosophy and Psychology*, Vol. 3 No. 3, pp. 405-423.

Gray, K., Knobe, J., Sheskin, M., Bloom, P. and Barrett, L.F. (2011), "More than a body: mind perception and the nature of objectification", *Journal of Personality and Social Psychology*, Vol. 101 No. 6, pp. 1207-1220.

Guzman, A.L. and Lewis, S.C. (2019), "Artificial intelligence and communication: a human–machine communication research agenda", *New Media and Society*, doi: 10-1177/1461444819858691.

Corresponding author

Magnus Söderlund can be contacted at: Magnus.Soderlund@hhs.se