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The happy virtual agent and its impact on the human customer in the service encounter

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ABSTRACT

Few existing virtual agents (VAs) that customers interact with in service encounters can experience emotions, but they can be (and often are) designed so that they appear to have this capability. The purpose of this study was to assess VAs' display of happiness in service encounters when the only means they have to express themselves is the text that they transmit. Linguistic elements that influence the perceived happiness of a (human) sender of text messages were identified in a pilot study, and they were used to manipulate VA display of happiness in two experiments. In addition, a field study was carried out to capitalize on customers' existing experience of service encounters with VAs in bona fide commercial settings. The experiments showed that VA text manipulated to signal VA happiness boosts overall VA evaluations, and the field study showed that perceived VA happiness is positively associated with overall VA evaluations. Taken together, the findings indicate that we humans are so hardwired for interactions with other humans that we react to VA display of happiness in ways that resemble our reactions when we are exposed to happy humans. The findings also provide designers of VAs and service marketers with a set of easily implemented linguistic elements that can be employed to make VAs appear happy in service encounters.

1. Introduction

Many firms use artificial intelligence-powered virtual agents (VAs) as representatives in service encounters – particularly when such encounters are screen-mediated and take place in online settings (Rese et al., 2020). Typically, existing VAs resemble humans in several ways; they may have a name and a gender, they communicate with natural language, and they are interactive in the sense that they can base their messages on what the customer asks for. Such resemblance to humans appears to be a deliberate choice made by VA designers, and it is in tune with research suggesting that we humans are hardwired to interact with other humans – and that the use of existing interaction schemes, developed for human-human interactions, makes it easier for us to interact with non-humans (Duffy, 2003; Epley, 2018; Han et al., 2019).

So far, existing VAs lack many characteristics that humans have. One central aspect of being human is the capability to experience emotions (Gray et al., 2007; Haslam and Bain, 2007; Haslam et al., 2008), but few contemporary VAs have this capability. However, many VAs, as well as other robots, are designed to display behaviors that we humans can interpret as emotions (Arbib and Fellous, 2004; Franzoni et al., 2019; Kirby et al., 2010). That is to say, a VA can be given characteristics so that it appears – from the customer's point of view and within the context of a service encounter – as if the VA is in an affective state.

Humans can display emotions in several ways (e.g., with paralinguistic signals such as facial expressions, tone of voice, and body posture). Many contemporary VAs, however, are visible only by the text they produce; the typical human–VA encounter in a commercial context comprises an exchange of text in the same way as an SMS or e-mail conversation between humans. Several studies indicate that human receivers of messages from human senders can use the sender's language for inferences about the sender's affective state (Argaman, 2010; Cohn et al., 2004; Gill et al., 2008; Hancock et al., 2007). To date, however, little is known about the possibility that also a VA may be ascribed an affective state by the way it uses language.

The present study focuses on the potential of VA usage of language as a means to suggest to a human interaction partner that the VA is happy (also referred to as joy in many emotion models). An obvious way for a VA to signal that it is happy within the frame of a text-based conversation is to state this explicitly (e.g., "I feel really happy today!"), but this is likely to be received as somewhat odd given that computer programs

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cannot experience emotions. Another way for a VA to express its happiness is to use smiling emojis; when they are included in messages from a human sender, they have a positive influence on the receiver's happiness (Warfield Smith and Rose, 2020). Again, however, VA usage of such emojis may appear as strange given VAs' lack of emotionality. Therefore, the present study comprises more subtle and implicit linguistic elements as potential drivers of perceived sender happiness. In any event, and for human–human interactions, previous research has identified several effects of perceiving a human sender as happy, both in everyday settings and in commercial settings in which the receiver is a customer. Typically, the happy sender is attributed various positively charged characteristics (Hack, 2014; Reis et al., 1990; Turner and Hunt, 2014) and is more positively evaluated than an unhappy sender (Söderlund and Berg, 2019). The latter is a particularly significant outcome in a service encounter, because the representative of the company (i.e., the customer's interaction partner) *is* the company from the customer's point of view (Bitner et al., 1990; Prentice and Nguyen, 2020). Indeed, previous studies of service encounters have identified a positive association between the customer's evaluation of the service employee and overall satisfaction with the firm for which the employee works (e.g., Söderlund and Rosengren, 2008). Yet not much is known if similar effects of perceived happiness would occur also when the sender is a non-human VA.

In the context of service encounters in which customers interact with VAs through exchange of text, then, the purpose of the present study is to examine (a) if linguistic elements in the text submitted by a VA can influence perceptions of VA happiness, and (b) if (and how) perceived VA happiness affects the overall evaluation of the VA. To this end, two experiments and one field study were carried out.

2. Theoretical framework and hypotheses

2.1. Display of affect in social settings

As a point of departure, we assume that an ability to identify others' emotional expressions is essential to guide social interactions. Such expressions provide information not only about others' emotions; they can also indicate beliefs and intentions (Keltner and Haidt, 1999; Morris and Keltner, 2000). Consequently, we humans are typically sensitive to (and good at correctly identifying) others' emotions (Batty and Taylor, 2003; Ebner et al., 2010).

2.2. Display of affect with text

Many existing attempts to examine display of affect and its effects in social settings (i.e., in human-human interactions) comprise the sender's facial expressions – particularly smiles. All languages, however, provide senders with an array of strategies for conveying emotions (Fussell, 2002), and several authors stress that the language used by the sender indicates the sender's emotions, too (e.g., Argaman, 2010; Cohn et al., 2004). In other words, it is assumed that the language people use reveals important aspects of their psychological worlds (Pennebaker et al., 2003). This is indeed a main assumption behind researchers' use of computerized text-analysis programs when they search for a link between language-related elements in a person's text and his/her happiness and other emotions (e.g., Cohn et al., 2004; Gill et al., 2008; Pennebaker et al., 2003). The same assumption is made also by researchers who are developing ways for VAs to detect emotions of humans with whom they interact by exchanging text (Chatterjee et al., 2019), by researchers who develop machine learning-based emotion detection approaches for text data (e.g., Hasan et al., 2019) and by researchers who build "hedonometers" to assess happiness in texts appearing in social media (Dodds et al., 2011).

Moreover, again in the context of human-human interactions, researchers have identified several specific linguistic elements as indicators of sender happiness. One obvious indicator is when a sender explicitly says that he or she is happy; messages with such statements have been shown to influence the receiver's perceptions of sender happiness (Steinel et al., 2007). In the present study, however, and as already indicated, the focus is on implicit happiness indicators in a text. With respect to such implicit indicators, a positive association has been found between sender happiness and the sender's use of positively charged words (Gill et al., 2008), the total number of words in a message (Hancock et al., 2007) and the number of intensifiers, such as "extremely" and "really" (Argaman, 2010). A negative association has been found between sender happiness and usage of first-person singular pronouns (Pennebaker and Lay, 2002), negations (Hancock et al., 2007), and negative affect terms (Hancock et al., 2007). Similarly, grief, a negatively charged emotional state, which can be assumed to indicate a low level of happiness, has been found to produce texts with more negative emotion words, more use of present tense, and more use of the personal pronoun "I" (Boals and Klein, 2005).

Some studies have explicitly identified that receivers (i.e., participants in studies) of only text from a sender show high agreement about sender happiness (Gill et al., 2008) and that receivers indeed perceive happy senders to be happy (Hancock et al., 2007). In terms of specific linguistic elements that can predict the receiver's perceptions of sender happiness, it has been found that the number of exclamation marks is positively associated with perceived sender happiness (Hancock et al., 2007), while the number of negations is negatively associated with perceived sender happiness (Hancock et al., 2007). In sum, in human-human interactions, there are several ways in which specific linguistic elements used by a sender can inform a receiver about the sender's happiness.

What would happen, then, when humans interact with non-humans – such as VAs – that use text to signal emotions? This issue has been subject to very few empirical studies, yet de Melo et al. (2011) found that computer agents using only text to signal that they are happy were indeed perceived to be happy. It should be noted that de Melo et al. (2011) examined *sellers'* perceptions of computer agents (in the present study, we examine customers' perceptions), that the happiness text message in de Melo et al. (2011) contained explicit statements about the agents' happiness, such as agents saying "I like the way things are going, I can only be happy with this" (in the present study, the happiness signals/manipulations are more subtle), and that the dependent variable in de Melo et al. was demand difference, which we interpret as the difference between the seller and the buyer after negotiations had come to an end (in our studies, the main dependent variable is the overall evaluation of the agent). In any event, the finding in de Melo et al. (2011) is consonant with the assumption that we humans are hardwired to interact with other humans (Karr-Wisniewski and Pritula, 2010; Shank, 2013), and that this often carries over to interactions with non-humans so that we respond to computers and computer programs in ways that resemble how we respond to other humans (Lee, 2018; Sundar and Nass, 2000; Wang, 2017). One particular finding along such lines is relevant for this study: Guadagno et al. (2011) found that human interaction partners versus non-human interaction partners who displayed happy emotions (with their faces) produced no difference in interaction satisfaction, interaction enjoyableness, and comfort in the interaction for their participants.

Given this, it is expected in the present study that the sender's language usage serves as a source of inference about the sender's emotional state when the sender is a VA (i.e., a computer program). More specifically, it is expected that when a VA is using only text as a means to communicate, human receivers would respond to happiness indicators in ways that resemble the responses when such indicators are used by human senders. The following, then, is hypothesized:

H1. When a VA-generated text comprises linguistic elements that have been shown to have a positive influence on perceived sender happiness in human-human interactions, such elements have a positive influence on perceived VA happiness

2.3. Perceived sender happiness and the overall evaluation of the sender

In human-human interactions, and given that the receiver has made an assessment of the sender's happiness, we assume in the present study that perceived sender happiness would have a positive impact on the overall evaluation of the sender. Based on Söderlund and Berg (2019), it is also assumed that this influence can occur in terms of several routes.

One route can be conceptualized in terms of halo mechanisms. It is based on the assumption that perceivers use information concerning another person's emotional state as a source of inferences about the person's other attributes (Forgas, 2011; Hareli and Hess, 2012). In the present study, we focus on one such attribute, competence, which is a universal dimension in person perception settings (Fiske et al., 2007). When a target person is a human, several studies show that the person's display of happiness positively influences perceptions of the person's competence (Hack, 2014; Reis et al., 1990; Woodzicka, 2008). Presumably, one main reason is that a happy facial expression is a norm in many social settings, so displaying happiness signals that the sender is socially competent. Similarly, display of happiness by employees who represent a firm is demanded by many service firms (Tan et al., 2004), and prolonged exposure to this behavior is likely to make displays of happiness a signal of employee competence (Söderlund and Berg, 2019). Given that we humans tend to respond to computers and computer programs in ways that resemble how we respond to other humans (Sundar and Nass, 2000; Wang, 2017), we expect that the display of happiness–competence association would materialize also in a service encounter with a VA. Hence the following is hypothesized:

H2a. Perceived VA happiness has a positive impact on perceived VA competence

Moreover, for human-human interactions, the perceived competence of a person typically serves as a main input to overall evaluations of the person (Fiske et al., 2007). This association has also been identified in settings in which the target person is representing a firm and the perceiver is a customer (Söderlund and Berg, 2019). Given again that we humans tend to respond to computers and computer programs in ways that resemble how we respond to other humans, we expect that this association would materialize in a service encounter with a VA:

H2b. Perceived VA competence has a positive impact on the overall evaluation of the VA

Another route comprises the combined influence of two mechanisms in the individual's processing of information. The first step is that the receiver's perceptions of sender happiness enhances the receiver's own positive emotions. This is consonant with the notion that emotions in general, and happiness in particular, are contagious in social settings (Chanes et al., 2018; Hatfield et al., 1992). Several studies have identified this contagious aspect also in service encounters (e.g., Li et al., 2018). Some researchers, particularly those that examine emotional displays in the form of facial expressions, assume that emotional contagion occurs because the receiver's facial muscles imitate the sender's facial muscles and that the receiver's facial muscles "inform" the receiver about his/her own emotions (Adolphs, 2005; Hatfield et al., 1992). Receiver facial muscle activity, however, has been found to elicit emotions also in the case in which only text is available to display affect (Foroni and Semin, 2009). If we humans respond to computers and computer programs in ways that resemble how we respond to other humans, we expect that this association would materialize also in a service encounter with a VA:

H2c. Perceived VA happiness has a positive influence on the receiver's own positive emotions

Furthermore, it is assumed that the receiver's own emotions inform the evaluation of the sender in a valence-congruent way. This has been referred to as the "feelings-as-information" hypothesis in the literature (Pham, 2004). That is to say, feelings are used as a proxy for value, which enables focused and quick responses of the type "what feels good must be good" (ibid.). This reaction pattern is consonant with the notion of affect infusion (Forgas, 1995) and the emotion-imbued choice model (Lerner et al., 2015). Presumably, it has evolved to facilitate decisions regarding proximity seeking and avoidance (Breazeal, 2003). In other words, emotions prioritize and organize ongoing behaviors when they influence evaluations (Morris and Keltner, 2000). Several marketing-related studies have identified that positive emotions evoked by a product are positively associated with evaluations of the product (e.g., Schroll et al., 2018), and the specific happiness-evaluation association is highlighted in the meta-analysis by Kranzbühler et al. (2020). Hence the following is expected for a receiver who is interacting with a VA in a service encounter:

H2d. The receiver's own positive emotions have a positive influence on the overall evaluation of the VA

Taken together, then, VA-generated text comprising linguistic elements that have been shown to have a positive influence on perceived sender happiness in human-human interactions is expected to set in motion a response process involving perceived VA happiness, perceived VA competence, and the receiver's own positive emotions in such a way that the net result is a positive influence on the overall evaluation of the VA. To explicitly assess this net result, the following is hypothesized:

H3. The presence in a VA-generated text of linguistic elements that have been shown to have a positive influence on perceived sender happiness in human-human interactions produces a higher level of overall VA evaluations than the absence of such elements

The first step to test these hypotheses was to carry out a pilot study to identify specific linguistic elements with the capacity to influence a receiver's perceptions of sender happiness in a setting in which only text is transmitted from a sender who is the representative of a firm. In the next step, the identified elements were used in the manipulations of VA-generated text in two separate experiments.

3. The pilot study

A 2 X 2 between-subjects experimental design, in which the manipulated factors were two linguistic elements with a potential to influence perceived sender happiness, was used to identify specific happiness-inducing elements in a text message.

The first factor was the absence or presence of exclamation marks. Such marks have been shown to indicate sender happiness in previous studies (Hancock et al., 2007), presumably because they mirror the upbeat tone of voice that would be a happiness signal when vocal affect display cues are available (Visser et al., 2013). Moreover, in Dodds et al.'s (2011) text-based hedonometer, the exclamation mark indicates a higher level of happiness than, for example, the words "kiss", "yes" and "heaven" (but less happiness than the words "sun" and "summer"). The second factor was the use of positive words instead of negative words to convey the same content (Gill et al., 2008). The assumption regarding impact in this case is based on findings showing that many words have a valenced charge – and that this charge affects the receiver's own emotions in a valence-congruent way (Bradley and Lang, 1999). Here, in the present study, it is assumed that the valenced charge of words are used by the receiver as cues regarding the sender's emotional state.

The message in the pilot study was an e-mail invitation to a commercial event, and the sender was presented as "Thomas G. Moore, the marketing manager of the firm that hosts the event". Four versions of the same e-mail was created so that the versions differed only with respect to some sentences in which (1) exclamation marks were used instead of period marks and (2) negative words were used instead of positive words. For example, one sentence in the exclamation marks/positive words condition was "We want this event to be a positive experience!", which was changed to "We do not want this event to be a negative experience" in the no exclamation marks/negative words condition. The

participants, which were recruited from a course in business administration ($n = 157$, $M_{age} = 20.38$, 79 men and 78 women), were randomly allocated to one of the four e-mail versions. A set of questionnaire items to assess perceived sender happiness and the overall evaluation of the sender followed after exposure to the e-mail.

Perceived sender happiness was measured with the question "What is your view of Thomas G. Moore?", which was followed by the adjective pairs "unhappy–happy", "sad–joyful", and "in bad mood–in good mood" scored on a 10-point scale (Cronbach's alpha = .93). The overall evaluation of the sender was captured with the item "Your overall evaluation of Thomas G. Moore" followed by the adjective pairs "poor–good", "do not like him–like him", and "negative impression–positive impression". They were scored on a 10-point scale (alpha = .97).

A two-way ANOVA with perceived sender happiness as the dependent variable revealed that there was a significant main effect of the exclamation mark factor ($F = 72.36$, $p < .01$). The level of perceived sender happiness was higher for the participants who received the message with exclamation marks ($M = 8.17$) compared to those who received the message without exclamation marks ($M = 6.04$). There was also a main effect of the word valence factor ($F = 11.87$, $p < .01$); the participants who received the positive word version of the message responded with a higher level of perceived sender happiness ($M = 7.57$) than those who received the negative word version ($M = 6.55$). The interaction was not significant. These results, then, indicate that the two linguistic elements were able to influence perceptions of sender happiness in the case when the sender is a human.

A second two-way ANOVA with the overall evaluation of the sender as the dependent variable showed that there was a significant main effect of the exclamation marks factor ($F = 11.18$, $p < .01$). The evaluation level was higher for the participants who received the message with exclamation marks ($M = 6.60$) compared to those who received the message without exclamation marks ($M = 5.35$). There was also a significant main effect of the word valence factor ($F = 6.63$, $p < .05$); the evaluation level was higher for the participants who received the message with positive words ($M = 6.44$) compared to those who received the message with negative words ($M = 5.44$). The interaction was not significant. Thus, the linguistic elements influenced also the overall evaluation of the human sender.

The pilot test provided support for H1 and H3 in a situation in which the message consists only of text and in which the sender is a *human* representative of a firm. In the next step, the two linguistic elements from the pilot study were used to assess H1-H3 in service encounter situations in which the sender is a VA.

4. Study 1

Study 1 was a between-subject experiment in which the participants encountered a VA that delivered pre-purchase information on an e-retailer's website. As a manipulation, two versions of the VA communication were created (negative words and no exclamation marks vs. positive words and exclamation marks).

4.1. Stimulus development and data collection

A role-play approach was used in which the participants were asked to assume the role of a customer who is searching for a jacket on an e-retailer's website. In this role, they received online assistance from a VA, called Alex, who was described as "an artificial intelligence-powered virtual agent". In the negative words and no exclamation marks version, the text from Alex had no exclamation marks and negative or neutral words to be replaced by positive words in the other version. In the positive words and exclamation marks version, full stops in the end of sentences were replaced by exclamation marks, and negative/neutral words were replaced by positive words (see Stimulus material).

As a manipulation check, we used the Linguistic Inquiry and Word Count (LIWC) software. This lexicon-based means for text analysis, which is described in detail by Tausczik and Pennebaker (2010), is used frequently in marketing research (Hartmann et al., 2019). More specifically, as has been done previously by, for example, Kim et al. (2018), we used it to assess the emotional tone in the two versions of the text. The emotional tone can take on values in the 0–100 range (the higher the value, the more positive the tone), and the emotional tone for the negative words and no exclamation marks text version (78.13) was lower than for the positive words and exclamation marks version (95.24).

The two versions, printed on paper, were randomly allocated to the participants (i.e., each participant was exposed to one of the two versions). After exposure, the participants were asked to respond to a set of questionnaire items. The participants were business school students recruited from courses in marketing. Three of them were removed from the analysis, because they failed to respond correctly to an attention check item ("The online assistant that you interacted with in this study was …", followed by the response alternatives "a human being" and "a virtual agent"). The analysis below was based on the remaining participants ($n = 97$; $M_{age} = 26.08$; 43 men, 54 women). Forty-seven of them received the negative words and no exclamation marks version and 50 received the positive words and exclamation marks VA version.

4.2. Measures

A 10-point scale was used for each measure. We used SmartPLS 3.0 to assess the properties of the measures in terms of Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). The outcomes are reported below. An analysis of discriminant validity with the heterotrait-monotrait approach showed that no ratio was >0.85.

Perceptions of sender happiness were measured with the question "What is your view of Alex?" followed by the adjective pairs "unhappy–happy", "sad–joyful", and "in bad mood–in good mood" (CA = 0.90, CR = 0.94, AVE = 0.83). Competence, in general, has to do with traits related to ability, such as intelligence, skills, and efficacy (Fiske et al., 2007). In the present study, however, competence was used in a more narrow sense, namely in terms of the ability to perform well in interactions with customers. Therefore, in the present study, *competence* was measured with the items "poor interaction skills–good interaction skills" and "low customer-orientation–high customer-orientation" (CA = 0.86, CR = 0.94, AVE = 0.88). The measure for *the receiver's own emotions* was the question "How would you describe your emotions after your interaction with Alex?" followed by the adjective pairs "negative emotions–positive emotions", "sad–joyful", and "bad mood–good mood" (CA = 0.94, CR = 0.96, AVE = 0.89).

The overall evaluation of the sender was captured with the item "Your overall evaluation of Alex", followed by the adjective pairs "poor–good", "do not like–like", and "negative impression–positive impression" (CA = 0.96, CR = 0.97, AVE = 0.93). As a validity check, and given that evaluations are assumed to be predictors of intentions, the intention item "To what extent would like to interact with Alex again?" (scored as 1 = not at all, 10 = very much) was included. The evaluation variable and the intention variable were positively associated ($r = 0.79$, $p < .01$), which indicates validity for the overall evaluation variable.

4.3. Analysis and results

Hypothesis 1 together with and Hypotheses 2a-2d were viewed as our proposed model (cf. Table 1), and these hypotheses were tested simultaneously with SmartPLS 3.0. The manipulation was scored as 1 = no exclamation marks, negative/neutral words, 2 = exclamation marks, positive words. This proposed model had a good level of fit with the data (SMRS = 0.06) and the path coefficients are reported in Table 1.

The outcomes reported in Table 1 indicate that H1 and H2a-d were supported. It can be noted that perceived VA competence and the receiver's own emotions explained 71 percent of the variance in the overall evaluation of the VA, and that competence served as a more

Table 1
Path coefficients in the proposed model for Study 1.

Hypotheses	Path coefficient	*t*	*p*
H1: Linguistic elements – VA happiness	0.46	5.93	<.01
H2a: VA happiness – VA competence	0.56	7.38	<.01
H2b: VA competence – Evaluation of VA	0.52	4.01	<.01
H2c: VA happiness – Receiver's own emotions	0.73	12.71	<.01
H2d: Receiver's own emotions – Evaluation of VA	0.39	2.77	<.01

important predictor ($b = 0.52$) than the receiver's own emotions ($b = 0.39$). As for H3, the evaluation of the VA was lower for the participants who received the negative words and no exclamation marks version ($M = 7.37$) than for the participants who received the positive words and exclamation marks version ($M = 8.20$). This difference was significant ($t = 2.47$, $p < .05$). Thus H3 was supported.

4.4. Discussion

Study 1 indicated that text used by a VA influenced perceptions of VA happiness and that perceived VA happiness had a positive, indirect influence on the overall evaluation of the VA. To examine if these results would replicate in a different setting (i.e., for another type of service, other participants, and another type of data collection), Study 2 was conducted.

The purpose of Study 2 was also to examine an additional variable, namely perceived VA humanness. The following assumptions were made. First, it was assumed that perceived VA happiness would have a positive influence on perceived VA humanness. One reason is that emotionality, the capacity to experience emotions, is a fundamental aspect of being human (Duffy, 2003; Epley et al., 2013; Epley, 2018; Haslam et al., 2008; Waytz et al., 2014). Therefore, if someone – a human agent or a non-human agent – is displaying emotions, such as happiness, it is expected that this display would contribute positively to the perceived humanness of the agent. In empirical terms, this association has been identified by, for example, Eyssel et al. (2010) in a study of robot cats. Hence the following is hypothesized:

H2e. Perceived VA happiness has a positive influence on perceived VA humanness

Second, it was assumed that perceived VA humanness would contribute positively to the overall evaluation of the VA. A main reason is that we humans appear to have a bias in our processing of social information, in the sense that humans in general have a positive rather than a negative charge (Sears, 1983), which is probably based on the fact that most of us need other humans for both practical and existential issues (Epley et al., 2013). Another reason is that perceived humanness indicates similarity with a human perceiver, and we humans tend to evaluate positively those who we perceive as similar to us (Rauschsnabel and Ahuvia, 2014). In addition, given that an agent is perceived as high in humanness, it should be able to control its actions (i.e., it has agency), and we humans tend to trust those who are in control more than those who are not (Waytz et al., 2014). Trust, in turn, is likely to enhance cooperation and reduce uncertainty (Morgan and Hunt, 1994), and these two aspects are assumed to contribute positively to overall evaluations. In empirical terms, a positive perceived humanness-overall evaluation association has been identified for non-human objects such as cars (Aggarwal and McGill, 2007), laptops and cellphones (Hart et al., 2013), clothing and sport shoes (Rauschnabel and Ahuvia, 2014), brands (Golossenko et al., 2020), and service robots (Tussyadiah and Park, 2018). Therefore, the following is hypothesized for a setting in which customers interact with VAs in service encounters:

H2f. Perceived VA humanness has a positive influence on the overall evaluation of the VA

5. Study 2

Study 2 was a between-subject experiment in which the participants encountered an interactive VA that provided etiquette advice on a website. The same manipulation of the VA's communication as in Study 1 was used (i.e., negative words and no exclamation marks vs. positive words and exclamation marks).

5.1. Stimulus development and data collection

As in Study 1, a role-play approach was used. The participants were asked to assume the role of a customer who had been given a chance to test an online etiquette service in which advice was provided by "a virtual agent powered by artificial intelligence (AI)". This customer had a specific question about etiquette and became engaged in a text-based interaction with a VA (again called Alex). Two versions of the interaction were created. In the negative words and no exclamation marks version the text from Alex had no exclamation marks and negative or neutral words to be replaced by positive words in the happy version. In the positive words and exclamation marks version, full stops in the end of some sentences were replaced by exclamation marks, and negative/neutral words were replaced by positive words (see Stimulus material). Again, as a manipulation check, LIWC was employed to assess the texts' emotional tone. The tone of the negative words and no exclamation marks version (21.03) was lower than the positive words and exclamation marks version (65.74), which indicates that the manipulation worked as intended.

The participants were recruited from the Prolific online panel, and the two versions of the VA encounter were randomly allocated to the participants. After exposure, the participants were asked to respond to a set of questionnaire items. Two-hundred Prolific panel members were invited to Study 2. Nine of them were removed, however, because they failed to respond correctly to the same attention check item as in Study 1. The analysis below, then, was based on the remaining participants ($n = 191$; $M_{age} = 35.67$; 47 men, 143 women, 1 other). Ninety-six of them received the negative words and no exclamation marks version and 95 received the positive words and exclamation marks version.

5.2. Measures

The same measures as in Study 1 were used for *perceived sender happiness* (CA = 0.87, CR = 0.92, AVE = 0.80), *competence* (CA = 0.91, CR = 0.96, AVE = 0.92), *the receiver's own emotions* (CA = 0.89, CR = 0.93, AVE = 0.81), and *the overall evaluation of the sender* (CA = 0.96, CR = 0.98, AVE = 0.93). An analysis of discriminant validity with the heterotrait-monotrait approach showed that no ratio was >0.85. Again, as a validity check for the overall evaluation variable, the intention item "To what extent would you like to interact with Alex again?" (scored as 1 = not at all, 10 = very much) was included. The evaluation variable and the intention variable were positively associated ($r = 0.69$, $p < .01$), which indicates validity for the evaluation variable. For the additional variable involved in H2e and H2f, *perceived humanness*, we used the items "Alex behaved very much like a human", "Alex was humanlike" and "Alex acted like humans typically do". They were scored on a 10-point scale (1 = do not agree at all, 10 = agree completely; CA = 0.94, CR = 0.96, AVE = 0.89). Similar items have been used, for example, by Golossenko et al. (2020) and Söderlund (2020).

5.3. Analysis and results

Hypothesis 1 together with and Hypotheses 2a-2f were used as our proposed model (cf. Table 2), and these hypotheses were tested simultaneously with SmartPLS 3.0. Again, the manipulation was scored as 1 = no exclamation marks, negative/neutral words, 2 = exclamation marks, positive words. This proposed model had a good level of fit with the data (SMRS = 0.05), and the path coefficients are reported in Table 2.

The results presented in Table 2 indicate support for H1 and H2a-f. In this model, 62 percent of the variation in the overall VA evaluation was

Table 2
Path coefficients in the proposed model for Study 2.

Hypothesis	Path coefficient	*t*	*p*
H1: Linguistic elements – VA happiness	0.24	3.59	<.01
H2a: VA happiness – VA competence	0.56	7.38	<.01
H2b: VA competence – Evaluation of VA	0.36	7.00	<.01
H2c: VA happiness – Receiver's own emotions	0.73	12.71	<.01
H2d: Receiver's own emotions – Evaluation of VA	0.18	3.89	<.01
H2e: VA happiness – VA humanness	0.43	7.10	<.01
H2f: VA humanness – Evaluation of the VA	0.44	7.12	<.01

explained, and perceived humanness ($b = 0.44$) was a more important predictor than competence ($b = 0.36$) and the receiver's own emotions ($b = 0.18$). Moreover, with respect to H3, the overall evaluation of the VA was lower for the participants who received the negative words and no exclamation marks version ($M = 8.06$) than for the participants who received the positive words and exclamation marks version ($M = 8.55$). This difference was significant ($t = 2.17$, $p < .05$). Thus H3 was supported.

5.4. Discussion

The Study 2 results were similar to what was obtained in Study 1: when the VA text had linguistic markers signaling VA happiness, it boosted perceptions of VA happiness and the overall evaluation of the VA. Both Study 1 and Study 2, however, were based on simulated role-plays in controlled experimental settings rather than real customer-VA interactions. Therefore, we decided that an additional study was needed – a study that would capitalize on customers' real experience in interacting with existing VAs. It should be noted that most studies of customers' interactions with VAs comprise agents that exist only as manipulations in researchers' experiments (such as in our Study 1 and Study 2). Thus so far there have been only a few published studies based on customers' responses to real VAs used by firms for commercial purposes (e.g., Mimoun and Poncin, 2015; Prentice and Nguyen, 2020; Rese et al., 2020).

6. Study 3

It should be recalled that our main thesis is that linguistic elements in a text from a VA can set in motion a chain of effects that ultimately influences the overall evaluation of the VA. One part of this chain involves the assumption that perceived VA happiness has a positive impact on the evaluation of the VA. The purpose of Study 3 was to assess this specific assumption with data from the field. More specifically, the purpose of Study 3 was to examine if (a) perceived VA happiness is associated with the overall evaluation of the VA and if (b) this association is mediated by one of the previously mentioned variables (perceived humanness from Study 2). Thus Study 3 does not address the linguistic elements–perceived VA happiness association in the beginning of the chain, because data were collected in such a way that is was not considered meaningful to ask participants about linguistic elements.

More specifically, participants who had interacted with a VA (which was defined as "a computer-generated character, sometimes powered by artificial intelligence, which provides customer service") were invited to Study 3. They were asked to think about one specific service encounter when they – as consumers – had been interacting with a VA that was representing a firm. Then, with open-ended question, the participants were asked to specify which type of firm the VA represented and for what task they interacted with it. The participants were instructed to have this particular interaction in mind when they answered the subsequent VA-related questions. Given this approach to collect data, it was acknowledged that it would not be useful to ask questions about subtle VA text details (e.g., "Was the VA that you encountered using exclamation marks?"). The participants ($n = 110$; $M_{age} = 23.05$, 34 percent were males) were recruited from bachelor and master courses in business administration.

The same measures as in Study 1 and Study 2 were used for the overall evaluation of the VA (CA = 0.95) and perceived VA humanness (CA = 0.91). Perceived VA happiness, however, was measured with other items, namely "The virtual agent expressed happiness in the encounter", "The virtual agent appeared to have felt joy in the interaction with me" and "I got the impression that the virtual agent enjoyed the encounter" (1 = do not agree at all, 10 = agree completely; CA = 0.91).

The analysis indicated that there was a significant zero-order correlation between perceived VA happiness and perceived VA humanness ($r = 0.29$, $p < .01$), between perceived VA humanness and the overall evaluation of the VA ($r = 0.34$, $p < .01$), and between perceived VA happiness and the overall evaluation of the VA ($r = 0.22$, $p < .05$). A mediation assessment (Hayes' Model 4 was used; cf. Hayes, 2012) with VA happiness as the independent variable, perceived humanness as the mediator, and the overall evaluation of the VA as the dependent variable indicated a significant indirect effect from the bootstrap analysis of 0.08 (5000 bootstrap samples, 95% CI limits 0.01 and 0.18). The direct effect, 0.11, was not significant ($p = .18$).

The field study, then, generated results that supports an influence of perceived VA happiness on the overall evaluation of the VA. These results are consonant with the Study 2 results (i.e., in Study 2 perceived VA happiness was positively associated with perceived humanness, and perceived humanness was positively associated with the overall evaluation of the VA). They are also consonant with results in previous studies regarding social perceptions of humans, in the sense that several studies show that there is a positive association between how happy a target person is perceived to be and the overall evaluation of this person. This association has manifested itself both in general social settings (e.g., Chanes et al., 2018) and, more specifically, when the target person is a service firm employee (e.g., Söderlund and Sagfossen, 2017; Söderlund and Berg, 2019).

7. General discussion

7.1. Conclusions

It has been suggested that a communication environment allowing for no non-verbal cues at all, such as in computer-mediated communications in which there is exchange of only text, would deny users important information – such as the emotional state of others (Walther et al., 2005). The present study, however, shows that the mere presence or absence of various linguistic elements (which should be seen as expressions of style rather than content) in text-based interactions can influence people's perceptions of sender happiness. This is in tune with authors who stress that language is a carrier of emotional information (e.g., Pennebaker et al., 2003). Presumably, the sensitivity for emotional cues has evolutionary roots and reflects the adaptive value of being able to identify other persons' emotions (Keltner and Haidt, 1999).

The present study also shows that the perception of an agent's emotions can bootstrap a receiver's other reactions to the agent; such perceptions influenced the attribution of competence and humanness to the agent, as well as the receiver's own positive emotions, and these reactions boosted the overall evaluation of the agent. These findings are consonant with previous studies of the consequences of affective display in human-to-human interactions (e.g., Hack, 2014; Söderlund and Berg, 2019). Happiness, the focal emotion in the present study, appears to play a particularly important role as an antecedent in the causal chain in human-human interactions; a happy facial expression is recognized very rapidly (Batty and Taylor, 2003) and it is connected to a stimulus person's happiness with a higher rate than the rate with which other facial expressions are connected to other emotional states (Ebner et al., 2010). It may be noted that not all previous authors have acknowledged the

causal potency of emotions stemming from a non-human; Wirtz et al. (2018), for example, argue that customers are unlikely to respond to robot-displayed emotions as they would to authentic emotions from human frontline employees.

It should be underscored that the findings were obtained in a setting in which the interaction party was a non-human (i.e., a VA). Why, then, would humans be influenced by text transmitted by a non-human in such a way that the nature of the text affects perceptions of sender happiness? And why would such perceptions influence the overall evaluation of a non-human? After all, most of us know that a virtual agent (i.e., a computer program) cannot experience emotions. The main reasons for influence are likely to be found among factors that represent reasons why we humans have a strong tendency to anthropomorphize non-humans. First, our self-knowledge (i.e., we know what it is to be happy) is likely to serve as a basis for inferences about non-human agents, because such egocentric knowledge is much more accessible than knowledge about what it is to be non-human (Epley et al., 2007). Second, we humans have a need for understanding, controlling and predicting the behavior of others – and these activities are facilitated if we assume that a non-human agent is driven by what typically drives humans (ibid). Given such explanations, it is not surprising that several studies (in which human-human interaction is explicitly assessed in comparison with human-computer interactions) show that we humans appear to react to computer programs in ways that resemble how we react to other humans. For example, Aharoni and Fridlund (2007) and Shank (2013) present results showing that there were no differences in the participants' level of happiness between the conditions of interacting with a computer versus interacting with a human. It should be noted that our pilot study was an attempt to mirror text-based human-to-human communication, and the results regarding H1 and H3 were indeed very similar to those obtained in Study 1 and Study 2 (which were attempts to mirror human-to-computer communications). Thus the present study adds further evidence to the stream of research stressing that we humans tend to respond to computers and computer programs as if they were social actors (Lee, 2018; Sundar and Nass, 2000; Wang, 2017).

A response tendency that is built on the assumption than an agent is similar to ourselves, however, appears to not be unique for humans, because animals seem to "animalize" humans (Urquiza-Haas and Kotrschal, 2015). An interesting issue for the future, then, is if something similar can be expected from virtual agents when they become more intelligent and more independent of their human programmers. That is to say, will they "virtualize" the humans with whom they interact? What this means for emotional cues transmitted in an interaction, and their influence on other variables, remains to be seen.

7.2. Managerial implications

Some observers predict that there will be few human-to-human interactions in service encounters and thus that the number of human frontline employees will be reduced or eliminated altogether (Steinhoff et al., 2019). Given this, it seems imperative that firms adapt their service encounters to a situation in which customers interact with VAs. In the light of this, the results of the present study offer some guidelines for managers. More specifically, in a service encounter context in which VAs are used for interactions with customers, and in which the interaction is text-based, the managerial implications of the present study are straightforward: it is beneficial if VAs are designed so that the text they transmit signals that the sender is happy. The present study shows that this can be accomplished in relatively simple ways by the use of exclamation marks and a mindful use of words with a positive charge. The main outcome of customers' perceptions of an agent as being happy is that the agent is evaluated more positively, which is particularly valuable in a service encounter setting – in this setting, the behavior of the firm's representative is highly influential for the customer's view of the firm (Bitner et al., 1990). Moreover, a possible by-product of designing a VA so that it signals positive emotions may be that this facilitates the VA's ability to recognize others' emotions (Arbib and Fellous, 2004). This, in turn, is likely to make interacting with a VA more pleasant.

However, managers should be mindful about the possibility that consumers, who are likely to believe that a VA cannot have emotions, may view a happy VA as a form of hidden persuasion attempt. Indeed, deliberately designing VAs so that they display happiness is similar to the (ubiquitous) use of happy persons as models in advertising (Söderlund and Berg, 2019). And if consumers indeed view the use of happy VAs as a persuasion attempt, it may result in reduced message effectiveness (Holzwarth et al., 2006). In other words, and as argued by Adolphs (2005), if a robot reveals that it is designed to fool us into crediting it with internal states, we are likely to think of it as simply engaging us in a deception game. Moreover, if a happy VA is not seen as a persuasion attempt, and if it indeed produces the results indicated by the present study, it can be questioned if the use of such VAs contributes to the consumer's ability to make informed choices.

In addition, if managers deliberately design VAs to appear happy, the results from Study 2 (a positive association between perceived VA happiness and perceived VA humanness) indicate that VAs' display of happiness would increase the extent to which they are anthropomorphized. From a societal point of view, however, it has been argued that anthropomorphic robots encourage the general public to think that artificial intelligence (AI) has advanced further than it actually has and to misidentify AI as comprising only human-like systems (Zlotowski et al., 2015). Focusing on anthropomorphic robots may also hinder progress in AI, in the sense that it may direct attention toward human-like intelligence rather than generic or even mindless intelligence (ibid.).

7.3. Limitations and suggestions for further research

The present study focused on some specific linguistic elements (exclamation marks and positively charged words) in text-based communications. However, there are other such elements with a potential to influence perceptions of sender happiness, so further research should explore a richer gamut of elements than this study did.

It should also be noted that happiness – the focal emotion in the present study – is likely to distinguish itself from other emotions in a text-based communication setting, because the words of natural human language have a positivity bias (Dodds et al., 2015). That is to say, positively charged words are more prevalent than negative words in many languages, including English (Kloumann et al., 2012), which was used by the VAs in the present study. This means that even a VA that has not been explicitly manipulated to express happiness (or any other emotion) is likely to express happiness anyway. Evidence for this can be seen in the in Study 1 and Study 2: although the VAs that were manipulated to appear as relatively less happy (by using negative words and no exclamation marks) were indeed perceived as less happy, they did not produce perceived happiness scores below the perceived happiness scale midpoint. Thus the levels of perceived happiness produced by the two VA versions in the present study should therefore be seen in relative terms. Therefore, further research is needed to examine what happens when a VA is happy as opposed to unhappy. Given that negative events typically receive more attention and elicit more thorough information processing than positive events (Baumeister et al., 2001; Taylor, 1991), one may expect that VA display of unhappiness has stronger effects than display of happiness.

Happiness is typically viewed as a primary emotion (Adolphs, 2005), which humans attribute more frequently to non-humans than secondary emotions such as embarrassment, shame, and guilt (Urquiza-Haas and Kotrschal, 2015). Nevertheless, given a human sensitivity to emotional cues, even in a text, and given a strong tendency to anthropomorphize non-humans, it seems possible that text messages can be used to signal other emotional states than happiness. Such other states are indeed relevant in marketing-related settings. For example, sad human faces are often employed in fundraising campaigns (Pham and Septianto, 2020).

Another example is anger; it has been shown that a negotiator that is perceived as angry as opposed to happy may expect larger concessions from the opponent (Van Kleef et al., 2004). Further research, however, is needed to explore if linguistic elements can boost perceptions of VAs' other emotional states than happiness in a consumer-related context.

Another potential limitation has to do with the experimental treatments in Study 1 and Study 1. In these studies, the VAs were described as relatively advanced, in the sense that they were capable of conducting the type of conversation that is natural for humans. This means that we may have described the stimuli VAs at a more advanced level than what characterizes many contemporary VAs that exist in the marketplace. The absence of realism check items of the type used by, for example, Karande et al. (2007) makes it impossible to say something about the perceived realism of our VAs. Further research along similar lines would therefore benefit if such items are included. Measures of perceived realism may also be used as conceptual variables to examine the extent to which realism – as a characteristic of a VA – influences perceptions of VAs. It should be noted, however, that there are different views of realism in experiments. Some authors argue that an experiment used for assessing theoretical mechanisms does not need to mirror the reality outside the experiment; the argument is that if a theory is general, it can be tested in any environment that comprises the same structural properties as the tested theory is making statements about (Mook, 1983; Zelditch, 1969). The issue of realism in experiments becomes knotty also in cases in which the reality covered by an experiment has not yet materialized. That is to say, progress in the accumulation of knowledge will be hampered if experimenters are not allowed to assess objects and events that do not exist right now but has the potential to exist in the future (e.g., advanced AI-powered agents).

In addition, the measures of perceived sender happiness used in the present study were adapted from studies in which the sender is a human (e.g., Söderlund and Berg, 2019). Some authors, however, have criticized the practice of measuring perceptions of non-human emotions along the lines that guided the present study (i.e., explicitly asking participants about VA happiness in the same way as questions are typically asked about a human's happiness). This approach, according to the critics, may have low validity, because it may put participants in a kind of suspension-of-disbelief mode similar to what would happen if researchers ask questions about the perceived happiness of, say, King Lear or Mademoiselle Julie or other fictitious characters (Zlotowski et al., 2015). Ultimately, the validity of such measures seems to be dependent on if VAs can have emotions or not. In the present study, it was assumed that a computer program or a robot has not (yet) the capacity to experience emotions, yet there are researchers who believe that they have indeed created robots with this capacity (Parisi and Petrosino, 2010). In any event, further research on the perceptions of non-humans' emotions may benefit if researchers complement their measures of perceptions of one particular VA's emotions with assessments of the extent to which the VA can experience emotions.

Moreover, the service encounters in the present study where of the type in which the display of happiness by a firm representative is common and therefore also probably expected by a customer. There are situations, however, in which display of agent happiness (human or virtual) is likely to be out of place – such as in contacts with insurance companies after a main accident, in interactions with a lawyer in order to deal with a devastating divorce, and in encounters with funeral companies. In other words, display of happiness needs to be congruent with other parts of a message or an offer in order to produce positive effects (Pham and Septianto, 2020). For example, in a study of customers' anthropomorphizing of cars, Windhager et al. (2008) found that cars that were perceived as angry (as well as dominant and hostile) were liked better than cars perceived as happy, which may be due to expected benefits from angry-looking cars in the daily battles on the roads. Similarly, if the customer's mood differs from the perceived mood of a VA it may produce a mood-incongruent effect, which is likely to be negatively charged for the customer (cf. Puccinelli et al., 2007). For customers who are in a negative mood when they enter into an interaction with a VA that is programmed to always appear happy, and when this VA is indeed perceived as happy by the customer, this mood-incongruent situation may result in a negatively charged service encounter for the customer. Thus there may be situations in which perceived VA happiness is not producing positive effects on other variables, and they should be examined in further research to identify boundary conditions for the type of effects generated by the present study.

It should also be acknowledged that the present study focused on the human customer and his or her reactions to VA display of emotions in service encounters. A human-to-human service encounter, however, is inherently social – the customer's counterpart is also likely to react to what is happening. If VA's can be taught to detect customers' emotions, and to react to them, it would be possible to examine customers' reactions to VA display of emotions in a more dynamic setting in which emotions are truly social rather than intrapersonal.

Finally, the last downstream variable in the present study was the overall evaluation of a VA. By comprising such evaluations, this study has taken a small step forwards in relation to several existing academic studies of VAs (in which the dependent variable typically is some specific VA attribute). That is to say, overall evaluations represent a general response variable in many attitude and customer satisfaction theories as well as a response that is assumed to influence subsequent customer behavior. However, the extent to which evaluations of VAs really explain and predict customer behavior needs to be assessed empirically with behavioral data and should not merely be assumed. Thus the lack of behavioral data is a limitation in the present study. This should be seen in contrast to what is happening in an increasing number of firms, particularly in firms with online activities: several firms are continuously engaging themselves in controlled online experiments, sometimes referred to as A/B testing, with their own customers (Kohavi and Thomke, 2017; Thomke, 2020). This testing can be used, for example, to assess new interfaces, such as the presence of a VA, and new parts of the offer – and it typically captures the customer's behavior in terms of how long the customer stays on a webpage, what the customer clicks on, and if the customer buys something or not. Presumably, when firms' A/B testing increases further, it may create a gap vis-à-vis researchers' activities when the latter include no behavioral outcomes, and it may be followed by managerial perceptions that what academic researchers do is less relevant. Further research on the effects of happy VAs, then, needs to move beyond the scope of the present study and assess if VA display of happiness influences customer behavior.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jretconser.2020.102401.

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