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Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions

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ABSTRACT

Disembodied conversational agents in the form of chatbots are increasingly becoming a reality on social media and messaging applications, and are a particularly pressing topic for service encounters with companies. Adopting an experimental design with actual chatbots powered with current technology, this study explores the extent to which human-like cues such as language style and name, and the framing used to introduce the chatbot to the consumer can influence perceptions about social presence as well as mindful and mindless anthropomorphism. Moreover, this study investigates the relevance of anthropomorphism and social presence to important company-related outcomes, such as attitudes, satisfaction and the emotional connection that consumers feel with the company after interacting with the chatbot.

1. Introduction

Disembodied conversational agents (DCAs) in the form of chatbots are now a reality on social media and messaging apps. Over 100,000 chatbots have been created in less than one year on Facebook Messenger alone (Johnson, 2017), and these agents are designed to execute tasks as simple as sending airline tickets, or as complex as giving health, financial or shopping advice. While companies increasingly employ these conversational agents with consumers, the technology has thus far yielded mixed results, with recent reports indicating high failure rates in interactions with Facebook users (e.g., Orlowski, 2017). Moreover, the technology itself is frequently met with consumer skepticism as shown by market research in several European countries (e.g., Elsner, 2017). Consumers indicate preference to engage with humans, and suggest a general resistance against chatbot technology.

Overall skepticism and resistance against chatbots highlights two critical challenges in implementing DCAs for real-life interactions with consumers on social media and messaging applications. First, to be successful, designers and companies must understand how to best introduce these agents to consumers and the extent to which the framing used to describe these agents influences consumer perceptions, including the level of anthropomorphism and of social presence attributed to the chatbot. Second, it is also critical to understand how designing cues to provide human-like attributes to the agent (e.g., language style, human name etc.) influence the perceptions about the conversational agent, and how these perceptions, in turn, also influence how consumers feel about companies using these agents. These challenges become increasingly relevant given that the interface between companies and consumers is "gradually evolving to become technology dominant (i.e., Intelligent Assistants acting as a service interface) rather than human-driven (i.e., service employee acting as service interface)" (Larivière et al., 2017, p. 239).

This study employs an experimental design using actual chatbots built with current technology to address these challenges. More specifically, it explores the extent to which (1) the frame used to describe the chatbot and (2) the adoption of anthropomorphic cues in the chatbot design influence perceptions about anthropomorphism and social presence attributed to the chatbot, and (3) how perceived anthropomorphism and social presence can, in turn, influence attitudes towards the company, customer satisfaction, and the level of emotional connection that consumers feel with a company.

It is important to note that conversational agents may be *embodied* or *disembodied*. *Embodied conversational agents* (ECAs) have a (virtual) body or face, usually human-like. By being

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embodied, ECAs not only engage in a dialogue via language (text or speech), but are also able to use nonverbal communication cues (e.g., facial expressions, gaze, body movements, distance) in real-time interactions with users, raising questions regarding the effects of embodiment on user perceptions of and reactions with these agents (Krämer, Bente, Eschenburg, & Troitzsch, 2009). The proposal here, however, is that chatbots on social media and messaging apps should be considered *disembodied conversational agents* (DCAs), as they communicate with users primarily via a messaging-based interface. This interface allows text and other types of media (including images, cue cards, and videos) to be exchanged between the DCA and the user in a dialogical manner, yet, importantly, it does not allow for an embodied, real-time and dynamic physical representation of the agent, except for a (static) profile picture, thereby omitting nonverbal communication cues.

This study extends earlier research by explicitly testing the influence of design cues on *disembodied* conversational agents in marketing, complementing past research on *embodied* agents (e.g., Etemad-Sajadi, 2016; Etemad-Sajadi & Ghachem, 2015; Verhagen, van Nes, Feldberg, & van Dolen, 2014). Second, it extends the notion of communicative agency framing (Corti & Gillespie, 2016), testing the extent to which framing the agent as an artificial intelligence influences perceived anthropomorphism and social presence. It also extends earlier findings regarding mindful and mindless anthropomorphism in the context of computers or websites (e.g., Kim & Sundar, 2012; Nass & Moon, 2000) by investigating the applicability of these two concepts in the context of disembodied conversational agents (DCAs). Moreover, research on conversational agents for marketing has often focused on agents integrated to *website* experiences, while this study extends this line of research to conversational agents integrated on a *social media/messaging applications* as is increasingly the case with DCAs in real-life settings. Finally, and perhaps more importantly from a practitioner perspective, it explores how DCA design and perceptions influence important outcomes for companies that may want to employ them.

In summary, the current study addresses the following question: To what extent do anthropomorphic design cues and communicative agency framing influence perceptions about the chatbot, and a company?

2. Theoretical framework

2.1. Embodied and disembodied conversations with artificial intelligence

Conversational agents can be defined as "software that accepts natural language as input and generates natural language as output, engaging in a conversation with the user" (Griol, Carbó, & Molina, 2013, p. 760). While computer agents, generally called bots, can be used for multiple reasons including, for example, Wikipedia edits (Clément & Guitton, 2015), chatbots may be considered *social* bots as they are designed to communicate with humans, and substitute for other humans (Zhao, 2003) by mimicking human-to-human communication (Edwards, Beattie, Edwards, & Spence, 2016). Current chatbots have significantly better capabilities for maintaining conversations than earlier versions (Shah, Warwick, Vallverdú, & Wu, 2016) because of ongoing advances in natural language processing and artificial intelligence.

Research shows that embodiment itself is sufficient to trigger different behavior such as repairing interactions, even if the users are aware that they are talking to a conversational agent (Corti & Gillespie, 2016). It remains to be seen, however, under which conditions the current generation of thousands of disembodied chatbots with whom social media users interact via messaging interfaces or apps, are able to trigger anthropomorphic perceptions. Moreover, conversational agent research in marketing contexts suggests that ECAs are particularly relevant for service encounters and for online sales (e.g., Chattaraman, Kwon, & Gilbert, 2012; Etemad-Sajadi, 2016; Holzwarth, Janiszewski, & Neumann, 2006; Lunardo, Bressolles, & Durrieu, 2016; McGoldrick, Keeling, & Beatty, 2008; Shank, 2013; Verhagen et al., 2014). This research usually has focused on how *physical* characteristics or *embodied* behavior of the ECA may influence consumers, for example when presented on a company website (Etemad-Sajadi, 2016; Holzwarth et al., 2006), in online virtual worlds such as *Second Life* (Jin & Sung, 2010; Jin, 2009) or even as a physical robot in a store (Bertacchini, Bilotta, & Pantano, 2017). These studies suggest that perceived anthropomorphism – i.e., "the assignment of human traits and characteristics to computers" (Nass & Moon, 2000, p. 82) – and social presence – i.e., the feeling that another being "(living or synthetic) also exist in the world and appear to react to you" (Heeter, 1992, p. 265) – are important factors in human-agent interaction.

2.2. Social reactions to conversational agents

Studies based on the Computers Are Social Actors (CASA) paradigm have shown that people tend to respond socially to computers, similarly to other humans, even when aware they are interacting with a machine (Nass & Moon, 2000; Reeves & Nass, 1996). While the initial studies focused on experiments with computers, television and media in general, this paradigm has been successfully used to investigate social responses to websites (Kim & Sundar, 2012), computer agents used for interviews (Hasler, Tuchman, & Friedman, 2013; Pickard, Roster, & Chen, 2016), Twitter bots (Edwards, Edwards, Spence, & Shelton, 2014) and physical robots (Edwards, Edwards, Spence, Harris, & Gambino, 2016).

While it is generally established that humans can respond socially to computers, it is also clear that they are aware that computers are not human. It is proposed that social responses to various computer agents are often automatic, taking place spontaneously as a mindless process in which users focus on social cues instead of other agent characteristics (Nass & Moon, 2000). This mindlessness assumption was found in a study (Kim & Sundar, 2012) explicitly comparing evaluations of *mindful* anthropomorphism of a website (i.e., conscious evaluations on whether the website was human-like, or machine-like) with *mindless* anthropomorphism (i.e., attribution of human/personal characteristics to the website, such as being friendly or sociable). Study "participants who denied treating the website in human terms […] tended more to attribute personal characters to the website" (p. 249).

Mindful and mindless anthropomorphism found for computers or websites occurring with conversational agents is yet to be studied. As users engage in a much more tangible interaction (dialogue via chat) with a conversational agent compared to navigating a website, one could argue that to deny perceiving the agent in human terms (i.e., denying mindful anthropomorphism) might be less relevant. Consequently, both dimensions of anthropomorphism – mindful and mindless – are addressed in this study by exploring the extent to which anthropomorphic design cues on chatbots influence user perceptions.

Earlier research shows that social reactions to computers in general (Nass & Moon, 2000) and to ECAs in particular (e.g., von der Pütten, Krämer, Gratch, & Kang, 2010) tend to increase when more social cues are provided, or a system exhibits human-like behavior. This behavior may be related to embodiment for ECAs, or other

human-like qualities in text messages for DCAs (Holtgraves, Ross, Weywadt, & Han, 2007). Linguistic cues (e.g., language style) and the name of the agent (e.g., human vs. machine-like name) might influence anthropomorphic perceptions, since even minimal cues can influence the extent to which humans identify with computer agents (Xu & Lombard, 2017). Linguistic cues affect social perceptions of websites (Sah & Peng, 2015) and language style can be manipulated to increase friendliness perceptions of virtual customer service agents (Verhagen et al., 2014). It is proposed that:

H1. Participants interacting with a human-like agent will perceive the agent more in human terms of (a) mindless anthropomorphism and (b) mindful anthropomorphism compared to participants interacting with a machine-like agent.

Earlier research (Xu & Lombard, 2017) explored the concept of social presence causing consumers to put less emphasis on (or even fail to notice) the role of technology and perceive that they are engaging in conversations with an actual social entity. Similar to perceived anthropomorphism, the usage of human-like cues might also positively influence social presence. It is proposed that:

H2. Participants interacting with a human-like agent will perceive the agent as having stronger levels of social presence in comparison to participants interacting with a machine-like agent.

Perceptions about the conversational agent may not only be influenced by anthropomorphic design cues *during* the conversation but also by the manner in which the agent is *introduced before* the conversation. Perspectives about an interaction partner can be influenced by the manner in which the communicative agency of the entity is framed when introduced, as commonly done in experiments that prime participants to "believe that they are engaging a fully-autonomous agent when in reality the agent is human-controlled (…) or priming them to believe that they are engaging a real person when they are in reality interacting with an agent" (Corti & Gillespie, 2016, p. 434). This priming effect could influence subsequent perceptions about a communicative agent. This raises the following question:

RQ1. To what extent does communicative agency framing influence the relationship between interacting with a human-like (vs. machine-like) agent and (a) mindful anthropomorphism, (b) mindless anthropomorphism and (c) social presence?

2.3. Agent influence on company attitudes, emotional connection and satisfaction

Given the increased relevance of technology for service encounters (Larivière et al., 2017), chatbots might influence how consumers perceive the company itself.

Earlier research (Vendemia, 2017) suggests that personalization and responsiveness are important aspects of interactivity on social media, and influence attitudes toward a company. Do bots – even if able to tailor content towards a specific social media user –create feelings of social connectedness necessary for relationship-building? This study addresses this question by investigating the effects of anthropomorphic design cues, perceived anthropomorphism and social presence on overall attitudes, emotional connection and satisfaction that consumers feel with the company, especially during a service encounter.

Social presence, in particular, has been found to be an important factor not only when considering computer agents in a general context (Xu & Lombard, 2017), but also for outcomes related to interactions with companies in service encounters. For example, the level of social presence attributed to embodied avatars displayed on company websites had a significant influence on trust of website information and its emotional appeal (Etemad-Sajadi, 2016). Social presence has been found to be an important driver for trust and intentions to purchase online (Cyr, Hassanein, Head, & Ivanov, 2007; Lu, Fan, & Zhou, 2016), as well as an important predictor of trust of recommendation agents (Hess, Fuller, & Campbell, 2009). Moreover, social presence influences the satisfaction that consumers feel about the service encounter (Verhagen et al., 2014). Consequently, this study addresses the following question:

RQ2. To what extent do perceived anthropomorphism and social presence mediate the influence of anthropomorphic design cues on consumer perceptions of a company (attitude toward the company, satisfaction and emotional connection)?

3. Methods

3.1. Design and overview of the procedure

The research questions and hypotheses were tested with a 2 (anthropomorphic vs. non-anthropomorphic agent) X 2 (intelligent frame X neutral frame) between-subjects design. Participants in the experiment first answered a set of demographic questions and an attention check, then were instructed to interact with a virtual agent as if they were in Facebook Messenger, and asked to change the address of a fictitious order of flowers that they had done on an online store. The instructions indicated that the participant was to interact with the virtual agent for no more than 3 min, and to continue to the next question regardless of whether the address change was successful, or not. The participants then answered questions regarding their perceptions about the virtual agent and the company.

3.2. Stimuli

Agent. The *anthropomorphic agent* was designed to interact with the participant using informal language, had a human name (Emma), and the participant was requested to initiate and finalize the interaction using dialogical cues usually associated with human to human communication (e.g., hello and good bye). The *non-anthropomorphic agent* was designed to interact with the participant using formal/computer-like language, had a non-human name (ChatBotX), and the participant initiated and finalized the interaction using dialogical cues associated with human-computer interactions (e.g., start and quit).[1] Considering that the focus of this study is on exploring the effects of interacting with disembodied agents, the agents had no profile pictures, and interacted with participants only with text (as shown in Fig. 1).

Frame. Before starting the interaction with the chatbots, the participants read a set of instructions indicating the task they needed to complete. In these instructions, participants exposed to the *intelligent frame* condition were told that they were to engage with "a virtual agent powered by artificial intelligence (AI)", which "uses machine learning and AI technology to engage in conversations automatically". Participants exposed to the *neutral frame* were only told that they were to engage with a "virtual agent".

3.3. Participants

A total of 207 participants took part in the experiment, and were recruited with a Facebook snowball sample (N = 29), among

[1] Both chatbots were built in Python, used API.ai for natural language processing, and were published using the Microsoft Bot Framework.

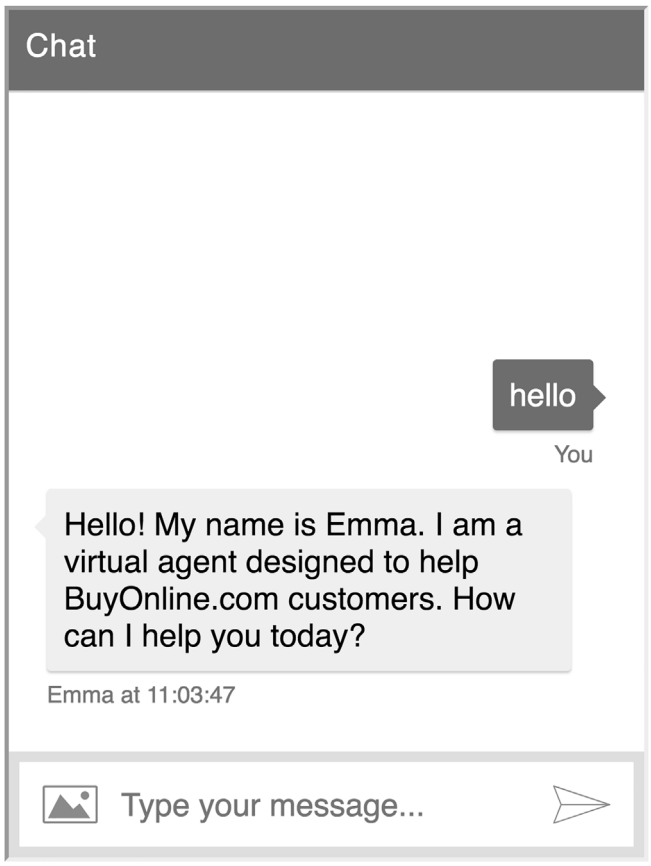

Fig. 1. Chat interface in which participants interacted with the agent (Human-like agent shown).

students of a large Western-European university (N = 48), and among Amazon Mechanical Turk (MTurk) workers located in the United States (N = 130). Students received research credits in exchange for their participation, and MTurk workers were paid between $2.50 and $3. The final sample was composed of 175 responses, as 8 (3.9%) responses were incomplete or unfinished, 2 (0.9%) did not provide informed consent, 6 (2.9%) failed the attention check, 10 (4.8%) were duplicate responses by MTurk workers (only the first response was considered), and 6 (2.9%) could not have their conversation logs retrieved due to incorrect responses. The sample was composed of 48% females, and the average age was 31.4 years (SD = 10.35).

3.4. Measures

Mindful and Mindless Anthropomorphism. *Mindful anthropomorphism* was measured using the items by Powers and Kiesler (2006), asking the participant about their perception regarding the chatbot when it comes to being human or machine-like, natural or unnatural and lifelike or artificial, along 7-point semantic differential scales. The items were averaged to form an index (M = 3.59, SD = 1.73, α = 0.90). *Mindless anthropomorphism* used the scale proposed by Kim and Sundar (2012), with participants evaluating, on a 10-point scale, the extent to which the adjectives *likeable, sociable, friendly* and *personal* described the chatbot (M = 5.86, SD = 2.48, α = 0.91).

Social Presence. Seven items adapted from Lee, Jung, Kim, and Kim (2006) were used to measure social presence on a 10-point scale. Example items included *How much did you feel as if you were interacting with an intelligent being?, How much did you feel as if you were alone?, How much did you feel as if [Chatbot name] was responding to you?*, among others (M = 6.20, SD = 2.11, α = 0.90).

Company perceptions. General attitudes were measured with a scale adapted from Becker-Olsen (2003), using five semantic-differential measures across a 7-point scale asking the participant to rate their *attitudes towards the company* (M = 5.67, SD = 1.54, α = 0.96) along *good/bad, favorable/unfavorable, satisfactory/unsatisfactory, negative/positive, disliked/liked*. *Satisfaction with the company* was measured using a three-item scale adapted from Maxham and Netemeyer (2002) with the items: *In my opinion, [Company Name] provided a satisfactory resolution to my request on this particular occasion, I am not satisfied with [Company Name]'s handling of this particular request*, and *Regarding this particular event (changing the address of an order* via *chat), I am satisfied with [Company Name]* (M = 5.84, SD = 1.38, α = 0.90). Finally, *emotional connection with the company* was measured using two items adapted from Christodoulides, De Chernatony, Furrer, Shiu, and Abimbola (2006) emotional connection brand equity scale: *I feel like [Company Name] actually cares about me* and *I feel as though [Company Name] really understands me* (M = 4.34, SD = 1.63, α = 0.90). Both satisfaction and emotional connection were measured across a 7-point scale.

Problem Resolution. Finally, conversation logs were inspected to determine whether the address was actually changed, leading to *problem resolution* (91% success), which was added as a control variable.

4. Results

4.1. The influence of anthropomorphic cues and AI frame

A series of two-way analyses of covariance (ANCOVAs) were conducted to compare the effects of human-like vs. machine-like agent and intelligent vs. neutral agency framing on mindless anthropomorphism, mindful anthropomorphism and social presence. Gender, age and problem resolution were included as covariates in all analyses.

Mindless anthropomorphism. The main effect for type of agent (human vs. machine-like) was significant for mindless anthropomorphism, F (1, 168) = 15.34, p < .001, with the human-like agent having significantly higher levels of mindless anthropomorphism than the machine-like agent according to pairwise comparisons with Bonferroni adjustments ($M_{difference}$ = 1.39, SE = 0.36, p < .001). This provides support to H1a. Agency framing was not significant, F (1, 168) = 0.44, p = .50, but the interaction between agency framing and agent type was, F (1, 168) = 8.61, p < .01. Pairwise comparisons with Bonferroni adjustment indicate that, for machine-like agents, participants exposed to the intelligent frame report significantly lower levels of mindless anthropomorphism when compared to participants exposed to the neutral frame ($M_{difference}$ = 1.29, SE = 0.50, p < .01), whereas for participants interacting with human-like agents these differences are not significant ($M_{difference}$ = 0.82, SE = 0.52, p = .12).

Mindful anthropomorphism. The main effect for type of agent (human vs. machine-like) was significant for mindful anthropomorphism, F (1, 168) = 22.61, p < .001, with the human-like agent having significantly higher levels of mindful anthropomorphism than the machine-like agent ($M_{difference}$ = 1.17, SE = 0.25, p < .001). This provides support to H1b. Agency framing was not significant, F (1, 168) = 0.002, p = .97, but the interaction between agency framing and agent type was nearly significant, F (1, 168) = 3.85, p = .052. Pairwise comparisons with Bonferroni adjustment indicate that, when comparing the intelligent frame with the neutral frame for each type of agent separately (human-vs. machine-like

agent), the differences are not significant. However, when looking exclusively at the intelligent frame, and comparing agents (human- vs. machine-like), the human-like agent has significantly higher levels of mindful anthropomorphism than the machine-like agent ($M_{difference} = 1.65$, $SE = 0.34$, $p < .001$).

Social presence. The main effect for type of agent (human vs. machine-like) was not significant for social presence, F (1, 168) = 1.03, p = .31. This does not provide support to H2. Agency framing was also not significant, F (1, 168) = 0.58, p = .45. However, the interaction between agency framing and agent type was significant, F (1, 168) = 4.99, p < .05. Pairwise comparisons with Bonferroni adjustment only indicate significant differences between the agents (human vs. machine-like) in social presence when the intelligent frame is used, with the human-like agent being attributed higher levels of social presence than the machine-like agent ($M_{difference} = 1.03$, $SE = 0.43$, $p < .05$). Moreover, when machine-like agents are used, the intelligent frame is associated with significantly lower levels of social presence than the neutral frame ($M_{difference} = 0.95$, $SE = 0.44$, $p < .05$).

Table 1 summarizes the influence of anthropomorphic cues and frame type on mindful and mindless perceptions of anthropomorphism, and on social presence.

4.2. The relevance of anthropomorphism and social presence on company perceptions

Next, to investigate the role of mindful and mindless anthropomorphism and social presence as mediators between anthropomorphic design cues and perceptions about the company, three mediation analyses were conducted using the Hayes' PROCESS macro v. 2.16.3 (Hayes, 2013). This method employs observed variable OLS regression path analysis and allows for the estimation of direct and indirect effects of multiple mediators. Model 4 of the macro was used, with agent type included as the predictor (coded as a binary variable, with human-like agent set as 1, machine-like agent as 0), mindless and mindful anthropomorphism and social presence as parallel mediators, and each of the company perceptions (i.e., attitudes towards the company, emotional connection with the company, and satisfaction) as dependent variables in separate models. For all models, 10,000 bootstrap samples were used, and bias-corrected bootstrap confidence at 95% interval are reported. Age, gender, problem resolution and intelligent frame were included as covariates (both for the mediators and for the dependent variable).

Attitude towards the company. The mediation model shows no significant direct (effect = −0.030, SE = 0.145, CI = −0.316–0.256) or total effects (effect = 0.205, SE = 0.187, CI = −0.164–0.574) from anthropomorphic cues on attitude towards the company, considering that 0 was included in the bootstrapped confidence intervals. When it comes to the indirect effects, the model also did not show significant effects for mindless anthropomorphism (effect = 0.050, SE = 0.072, CI = −0.063–0.228), mindful anthropomorphism (effect = 0.050, SE = 0.082, CI = −0.103–0.217), social presence (effect = 0.135, SE = 0.118, CI = −0.081–0.380) or total indirect effects (effect = 0.235, SE = 0.148, CI = −0.047–0.532).

Emotional connection with the company. The mediation model shows significant direct (effect = 0.302, SE = 0.053, CI = 0.198–0.407), total indirect (effect = 0.231, SE = 0.047, CI = 0.144–0.328) and total effects (effect = 0.533, SE = 0.041, CI = 0.452–0.615) of anthropomorphic cues on emotional connection with the company. When it comes to specific indirect effects, only social presence (effect = 0.242, SE = 0.050, CI = 0.150–0.350) is significant, whereas the indirect effects for mindless (effect = −0.021, SE = 0.045, CI = −0.109–0.067) and mindful anthropomorphism (effect = 0.010, SE = 0.033, CI = −0.055–0.074) were not significant.

Satisfaction with the company. The mediation model shows no significant direct (effect = 0.225, SE = 0.166, CI = −0.103–0.553) or total effects (effect = 0.298, SE = 0.182, CI = −0.062–0.658) of anthropomorphic cues on satisfaction with the company. The total indirect effect (effect = 0.073, SE = 0.124, CI = −0.162–0.325) was not significant, as were the specific indirect effects, including social presence (effect = 0.134, SE = 0.118, CI = −0.092–0.380), mindless (effect = −0.034, SE = 0.077, CI = −0.202–0.108) and mindful anthropomorphism (effect = −0.027, SE = 0.089, CI = −0.212–0.145).

5. Discussion

This study aimed at understanding the extent to which anthropomorphic design cues and communicative agency framing influence perceptions about DCAs and how these perceptions, in turn, influence company-related outcomes. DCAs in the form of chatbots are increasingly present in social media and messaging apps, yet knowledge of their performance is still lacking and their potential effects on company-related outcomes remain largely unexplored. Moreover, this investigation addresses gaps in the literature on conversational agents, especially when it comes to these agents being disembodied and available in social media and messaging applications (instead of virtual worlds or websites). It contributes to the understanding of the effects of anthropomorphic design cues on mindful or mindless anthropomorphism, and social presence. The results of an experiment using actual chatbots in a messaging interface built the same technology used in real-life consumer interactions provide several key findings.

The first key finding of this study is regarding the influence of anthropomorphic design cues in how the chatbot is perceived. The usage of human-like language or name were sufficient to increase

Table 1
Influence of anthropomorphic cues and frame type.

Hypothesis/RQ	Findings
H1a. Human-like agent → mindless anthropomorphism	Supported. Human-like agent associated with higher levels of mindless anthropomorphism than machine-like agent.
H1b. Human-like agent → mindful anthropomorphism	Supported. Human-like agent associated with higher levels of mindful anthropomorphism than machine-like agent.
H2. Human-like agent → social presence	Not supported. Differences between human- and machine-like agents not significant.
RQ1a. Intelligent agency framing → mindful anthropomorphism	No differences in main effects. Human-like agent associated with higher levels of mindful anthropomorphism when intelligent frame is used compared to machine-like agent.
RQ1b. Intelligent agency framing (AI) → mindless anthropomorphism	No differences in main effects. Intelligent frame associated with lower levels of mindless anthropomorphism than neutral frame for machine-like agents.
RQ1c. Intelligent agency framing (AI) → social presence	No differences in main effects. Social presence higher for human- than machine-like agent when intelligent frame used. Among machine-like agents, intelligent frame associated with lower levels of social presence compared to neutral frame.

perception of the agent as being human-like. This effect was found both for *mindless* and for *mindful* anthropomorphism, yet no differences were found in *social presence* between the human-like and the machine-like agent. These results are meaningful for several reasons. First, in line with earlier research on computers in general (Nass & Moon, 2000) and websites (Kim & Sundar, 2012), the presence of anthropomorphic cues did trigger stronger perceptions of *mindless* anthropomorphism. However, unlike the earlier investigations (Kim & Sundar, 2012), the human-like cues also triggered higher perceptions of *mindful* anthropomorphism. This conforms with earlier conversational agent research indicating that machines are perceived as being human-like when they have a character (Warwick & Shah, 2016), reinforcing the importance of anthropomorphic cues. Moreover, this potentially suggests that users have less of an issue attributing anthropomorphic qualities *mindfully* to conversational agents than to websites and computers, and may see these agents as a different type of interaction partner. Second, these results reinforce earlier findings indicating that human-like cues are also relevant when agents are disembodied (Holtgraves et al., 2007), highlighting that embodiment is not a precondition for an agent to be perceived as human-like. Third, it was striking that there were no significant differences in *social presence* between the human-like and the machine-like conditions. While the differences were significant in combination with the usage of the intelligent frame, this in itself seems to point to the notion that the interaction style (dialogue) and the medium (messaging interface) may be sufficient to trigger social presence.

The second set of this study's findings is related to the influence of communicative agency framing. Given the increased popular awareness of artificial intelligence, the extent to which framing the chatbot as intelligent might influence perceptions about the agent. The results indicate that adopting an intelligent frame does reduce perceptions of mindless anthropomorphism for machine-like agents, yet no such difference was found for the human-like agent. One reason for this might be that human-like cues were more important for participants when evaluating the agent and, when they were absent, as is the case of the machine-like agent, framing the agent as artificial intelligence would make the participants more aware that the interaction partner was a machine. Interestingly, these patterns were not found for mindful anthropomorphism, when participants had to consciously judge how machine-like or human-like their interaction partner was. Future research should explore this further, and compare how framing the communicative agency from the chatbot in different ways may also influence these perceptions.

The third set of this study's findings relates to how design cues and perceptions about the agent influence perceptions of companies. The most important effects found relate to the emotional connection that consumers feel with the company. The usage of human-like cues had significant influence on emotional connection. This finding provides initial evidence that bots, when using human-like cues, can have a positive effect on relationship building. Moreover, when considering the mediators, only social presence was found to be significant, thus highlighting the importance of the concept not only in a general context (e.g. (Xu & Lombard, 2017), or for embodied agents (Etemad-Sajadi, 2016), but also for DCAs in the service context. Interestingly, the same effects were not seen for satisfaction with the service provided, and attitudes towards the company. Future research should investigate this further, by for example taking into account how factors such as task complexity and familiarity with the company may also influence the process.

This study has certain limitations. First, participants interacted with the chatbot in a messenger-like interface, being asked to complete a task and evaluate a fictitious online commerce company. While this design aimed at maximizing the validity of the study, future research should refine these results by evaluating how conversational agents may impact perceptions of actual companies, to which consumers may already have preexisting expectations and attitudes. Second, while all measurement scales were derived from earlier research and had high levels of reliability, continued effort should be taken to find new methods, as recommended by earlier research (Kim & Sundar, 2012), to measure social presence and anthropomorphism. Third, a part of the sample was recruited among Mechanical Turk workers. While recruiting respondents using this method is increasingly done in communication research (Sheehan, 2018), these workers may not be representative of typical users of consumer websites. While this may be less of an issue for the present study, given that the low cost and relatively low involvement levels of the type of product and of website used as stimuli (an online store for flower delivery), future research should consider additional recruitment methods, especially when extending these findings towards higher involvement and/or higher cost products. Finally, the task given to participants was relatively easy, and had a high success rate (91%). Future research should extend our findings by evaluating tasks of increasing complexity. These limitations notwithstanding, the results of this study extend current theoretical knowledge about disembodied conversational agents in a marketing context, and help address current practical challenges related to chatbot implementation for service encounters in social media and messaging platforms.

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