Marketing Science Institute Working Paper Series 2023

Report No. 23-113

Text vs. Voice: How Communication Modality Impacts Consumers' Attitudes in Human-Machines Interactions

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December 2022

INTRODUCTION

Firms have to communicate with consumers all the time. They use advertising to promote their products, newsletters to share sales promotions, salespeople to gather customer information and customer service centers to support the purchase experience.

Marketers have long been working towards automating many of these interactions, especially in contexts like customer service. First, they focused on automating the routes consumers use to obtain customer service. For instance, consumers often give commands by speaking a keyword or pressing a button on the phone to receive a specific service and/or answers. However, today, companies are focusing on automating the agent/interactant itself. For example, consumers now talk to AI-powered agents when they chat online with HP's automated virtual agent or talk on the phone with Apple's customer service automated agent.

In recent years, firms have pushed especially hard to try to make AI agents seem more human by using voice. Voice is a powerful modality that can be very impactful in consumer decision-making. Not only does voice help shape consumer's attitudes (Berger and Iyengar 2013, Shen and Sengupta 2018), but it also enhances perceptions of communicators (Chaiken and Eagly 1983; Fondacaro and Higgins 1985; Andreoli and Worchel 1978), which in turn are central to successful social interactions. These advantages can be a potential reason why the excitement among firms for voice-based AI is so palpable. Indeed, when voice is added to machines, they appear more humanlike, embedded with agency and experience capacities (Waytz et al. 2014, Waytz and Norton 2014, Hall et al. 2007, Gray et al. 2007).

But is the power of voice necessarily beneficial when it comes to consumer interactions with AI agents? Even if companies manage to humanize an AI agent using voice successfully,

perhaps there are contexts where text is better. And is it possible that when it comes to communicating via text, sometimes consumers would prefer talking to AI over a real person?

In this research, we propose that people prefer interacting with an AI agent when it comes to sharing personal information via email, text messaging, or other written forms. In other words, we suggest that communication modality (interacting via text vs. voice) can influence the degree to which consumers are willing to share information with marketing agents. More specifically, when interacting via voice, individuals prefer to share information with a human agent. But when consumers interact via text, they would rather disclose to an AI agent. This effect happens because text is the authentic communication modality of machines, even more so than of humans. Despite the many different characteristics between speaking and writing (Chafe 1979, Jahandarie 1999), text, as opposed to voice, is the most authentic mode for AI. Text is the machines' early language (i.e., machine code). Machines perform tasks as they receive instructions that are translated into their own written language: a sequence of zero and ones. But text also dwindles the communication of critical human attributes such as the capacity for feeling and thought (Lakoff 1982, Chafe 1982, Chafe 1985, Schroeder and Epley 2015, 2016, Schroeder et al. 2017).

This research makes three main contributions. First, it conceptualizes and reveals the importance of communication modality in human-machine interactions, contributing to the growing research on the adoption of automation (Dietvorst et al. 2021, Longoni et al. 2019, Castelo et al. 2019, Woo Kim and Duhachek 2018, Logg et al. 2019). While the extant literature has greatly focused on understanding why consumers demonstrate resistance to machines, less is known about when and why people might instead have positive attitudes and preferences towards machines.

Second, it introduces "authentic modality" as an essential dimension of source acceptance in communications through which consumers make important decisions when interacting with AI agents. Authenticity is assessed when there is conformity between an entity and its social category (Lehman et al. 2019). Authentic modality refers to the mode of communication perceived as more natural, innate, or original to a specific communicator. Overall, research in human-machine interactions favours voice when it comes to communicators' attempts to persuade other humans. However, the current studies show that when it comes to human-AI interactions, that effect is reversed. Individuals might be more likely to be influenced by AI agents that text rather than talk.

Finally, this research offers actionable implications for those who wish to implement automated customer interactions and service systems (e.g., chatbots, voice assistants). This strategy can prove disadvantageous in an era when companies seem determined to humanize AI agents using voice. If companies are interested in collecting personal information from their customers, the present research suggests considering AI text-based systems.

HUMAN-AI INTERACTIONS

As task-oriented AI technologies have been integrated into many companies to improve the automation of its operations and consequently in consumers' lives, the study of human-machine interactions is of growing interest to researchers.

Although algorithms can often perform as well or better than humans, research suggests individuals tend to prefer interacting with humans rather than machines (Bigman and Gray 2018). For instance, people do not quite grasp how an algorithm functions. Hence, as it is hard

for consumers to understand how exactly algorithms make decisions, they are less likely to rely on algorithm advice (vs. human) (Yeomans et al. 2019). What's more, when algorithms prove they are not perfect such as when they fail to perform, individuals naturally become resistant in choosing their forecasts (Dietvorst et al. 2016). Consumers also believe that content created by AI (e.g., headlines of news articles) is less accurate than those written by humans (Longoni et al. 2022). People assume AI treats every human the same. In other words, they do not consider AI to treat them as unique. Consequently, they are also less likely to use and willing to pay less for AI services (Longoni et al. 2019).

However, some recent findings have started to recognize the potential benefits of AI and even contradict previous findings (Logg et al. 2019). Overall, a standard premise among many recent studies is that AI seems to be preferred when performing tasks consistent with machine-like capabilities. AI is typically perceived as devoid of the capacity to feel emotions and sensations (e.g., warmth, Gray et al. 2012). It fits better when performing tasks requiring rational, cognitive efforts (rather than emotional involvement). AI is privileged when facing choices with utilitarian (vs. hedonic) goals (Longoni and Cian 2020), when performing objective (i.e., can be quantified; vs. subjective) tasks (Castelo et al. 2019, Huang et al. 2018) or in contexts in which is relevant to make decisions based on quantifiable data, regardless of any other considerations (e.g., moral) (Dietvorst et al. 2021). Recent studies also showed that people have implicit bias as they tend to prefer emotionless machines to perform high cognition tasks (e.g., arithmetic), even if an emotional machine is also very competent (Wiese et al. 2021).

One aspect that these studies overlook is the role of communication modality in AI-human interactions. Text (but not voice) also lacks the emotionality required in many of the social tasks. For instance, it is considered as lacking the warmth, closeness and vividness of the oral speech

(Lakoff 1982, p. 242). As people are implicitly biased to believe that AI fits better cognitive tasks, do they also trust that AI excels when a task requires a communication mode (i.e., text) that is more likely to elicit systematic processing and consequently cognitive effort (Chaiken and Eagly 1976, 1983, Chaiken 1980, 1987, Sparks et al. 2009)?

COMMUNICATION MODALITY: TEXT VS. VOICE

There are two main ways people express ideas verbally: writing or speaking.[1] Several structural and processing characteristics (Horowitz and Samuels 1987, Halliday 1987, Chafe 1988, 1986, Tannen 1982, Chafe and Tannen 1987) make written and oral speech distinct and unique. Accordingly, they mould individuals' perceptions, attitudes and behaviours in different ways.

Speech is very rich in prosodic features (e.g., pitch, tempo, loudness) that can be superior to the punctuation in writing (Chafe 1988) in terms of, for instance, helping reveal the emotional state of the communicator (Fairbanks and Pronovost 1938). Other affective features of the voice, such as bursts, also enable the expression of many more emotional states when compared to text (Simon-Thomas et al. 2009).

Voice also differs from text in terms of involvement (vs. detachment) with the audience. When talking, communicators draw more attention to another person's presence, namely their characteristics (e.g., trustworthiness), rather than focusing on the message itself (Booth-Butterfield and Gutowski 1993, Chaiken and Eagly 1983, Andreoli and Worchel 1978). As people become less self-focused (Sproull and Kiesler 1986) and more involved with the audience

(Chafe 1979), they can create stronger social connectedness with other people (Kumar and Epley 2020) and with brands (Shen and Sengupta 2018).

Vocal (vs. textual) conversations tend to be more spontaneous and impulsive (vs. planned) (Lakoff 1982). As oral communication is less deliberate, it is also more likely to include emotional language. Therefore, positively influencing consumer buyer decisions (Berger et al. 2021, Klesse et al. 2015). Communicating in the oral form also provides less time to consumers to refine what they choose to talk about when describing their experience with products. Consequently, individuals tend to express less concern for self-enhancement (Berger and Iyengar 2013).

Communicating by voice is also more "evanescent" (rather than "permanent") (Jahandarie 1999), often making auditory information harder to process (Liberman 1989). Listening to product descriptions can be challenging when comparing different product options (Munz and Morwitz 2020).

This section shows that many of the critical characteristics that distinguish vocal from textual communications suggest that voice can often be superior to text interactions. But is this necessarily always the case? In the present research, we propose that when communicating with AI (vs. human), what can drive positive consumers' responses is a different modality feature: its authenticity (Jahandarie 1999).

THE CURRENT RESEARCH

We propose that voice and text differ in two critical ways: people will perceive voice as more strongly linked to humans, and text as more associated with machines**.** These perceptions

will be manifested in judgments that particular modalities are more authentic to specific kinds of communicators. Rooted in work in semiotics (Peirce 1998), people judge an entity as authentic if there is a factual or spatial-temporal link to another subject (Grayson and Shulman 2000, Grayson and Martinec 2004). To assess if a communication modality is authentic to a specific agent, individuals must have some previous knowledge or experience that text, for example, has a factual, spatial or temporal link to machines.

Rather than being learned formally (i.e., taught), speaking is an inherent and universal characteristic of humans (Liberman 1995, Ong 1982). No other species has integrated speech at such a high level of complexity and flexibility as humans (Boë et al. 2019). Only many millennia after oral communication did written communication arise among humans (Fagan and Beck 1996). Indeed, they progressed through history differently: "both phylogenetically and ontogenetically, speech precedes writing" (Jahandarie 1999, p. 142).

In contrast, writing is a secondary, less natural language system (Ong 2002) to humans. The first writing system emerged as an external storage device, with the need to record exchanged objects (Kramer 1963, Regulski 2016). Text is considered one of humanity's most important inventions (Lyons 1968), but is a less primary and less used form of communication among people (Wilt 1950, Coulmas 2003).

Text was an artificial technology developed by humans that has been reoriented to computers (Ong 2002). When humans invented machines, they imbued them with their own language: written code. Computers first and basic language is a binary conjugation of zeros and ones – a type of written code that is only "machine-readable" (Connor 2016). Computing machines are fundamentally linked to written language by the textual coding that gives them

some semblance of life (Hoffman and Novak 2020). Therefore, unlike the humans for whom voice came first, text is the "original" communication modality of machines.

Several characteristics of the written word (Chafe 1986, 1988, Tannen 1982, 1985, Halliday 1987, Horowitz and Samuels 1987) also make it more related to machines. Just like a machine, text is an entity that readers can have control over (Danks and End 1987, Halliday 1987); it is a static, mechanical, and technical process that can be uniformly duplicated at any time (Connor 2016) and does not presuppose the social presence of others (Vigotsky 1962). The written word also restrains the communication of some human capacities due to the lack of many of the prosodic cues of voice. As a result, text is more associated with machines than humans (Lakoff 1982, Chafe 1982, Chafe 1985, Schroeder and Epley 2015, 2016, Schroeder et al. 2017).

We propose that communication modality can be considered as a natural, original, authentic, characteristic of certain agents. More specifically, we suggest that text is the most authentic mode of communication of machines and voice of all humans. Furthermore, we argue that interacting with AI in its "authentic" communication mode can drive attitudinal changes in consumers. Namely, in terms of their willingness to disclose personal information to those agents.

When people verbally interact with each other and organizations, they often share personal information (Cozby 1983, Pearce and Sharpe 1973, Altman 1973). Consumers often need to share basic information such as home and email addresses when creating profiles for online shopping. They are asked to complete feedback surveys after a service experience. People need to provide access to their smart home devices' information. Similarly, when going to a medical facility or financial institution, people might be asked sensitive personal questions. Although

customer information is crucial to creating a more innovative and customized service, consumers are also becoming more averse to disclosing information to firms (Cisco 2019).

Prior research has primarily shown that individuals are more comfortable in disclosing personal information to each other in voice-based settings (e.g., face-to-face) rather than through text (Ruppel et al. 2017). For instance, people are more likely to report to others specific socially desirable information (e.g., number of sex partners, smoked cigarettes, or hours spent exercising) during a voice, rather than text, interview (Schober et al. 2015).

However, people are now not just talking to humans, they are talking directly to machines. An important decision for self-disclosure is related to whom to disclose to – specifically, who is the most appropriate agent to disclose specific information to (Omarzu 2000). Individuals often rely on other people's characteristics when making disclosure decisions, namely if some of those qualities are recognizable or familiar (Barrell and Jourard 1976, Broder 1982, Cozby 1973, Rosenfeld 1979, Omarzu 2000, White 2004, Mou and Xu 2017).

In the current research, we propose that authenticity impressions can also be important when assessing willingness to disclose information. These authenticity perceptions can be cued by the source's type of communication modality. For instance, when AI interacts by text, it should be perceived as using a more "original" modality rather than a "copy" of humans. Perceptions of someone being oneself and not pretending to be somebody else are important when forming social judgments (Harter 2002). When people appear to be themselves (i.e., more authentic), they are perceived as having more qualities associated with credibility, such as trustworthiness (Slepian and Carr 2019).

To conclude, we suggest that when it comes to disclose information via voice, consumers will prefer to disclose personal information to human (vs. AI^2) agents. But the text modality will

reverse this preference. This occurs because text is perceived as the most natural, original, and authentic modality of machines, and consequently consumers feel more inclined to self-disclose.

We proposed examining these predictions through three experiments. Experiment 1 focuses on examining whether people are more likely to disclose personal information to an AI assistant by text or by voice (H1). Experiment 2 replicates this effect in a different context and shows that AI is preferred when interacting via text (H2). Experiment 3 replicates this result for the text conditions and examines the underlying process. As text is perceived as the authentic modality of machines, it leads to a greater likelihood of information sharing (H3). See Figure 1 following References, for a conceptual model.

STUDY 1

Study 1 provides an initial test of our prediction that people may prefer sharing personal information with an automated AI assistant via text rather than voice.

Method

The study used a two-level (AI assistant modality: text, voice) between-subjects design. As a prerequisite for study's participation, participants (N = 251, 52.2% female) needed to confirm they had audio-capable device either on their laptop/computer or through headphones.

Participants imagined visiting an online grocery website. They were told that the company was testing a new personalization feature, and that they needed to chat with a customer assistant to set up their account profile. They clicked on a "chat with us" icon to initiate either a voice or text chat (randomly assigned). In the voice condition, we used the text-to-speech functionality of

Google Translate (https://translate.google.com), which allows the conversion of a text message into a moderately machine-like voice (see Appendix for full stimuli).

Participants either listened to (voice condition) or read (text condition) a greeting and explanation from the assistant, and then were asked their likelihood to disclose personal information to the assistant (likelihood of: sharing information about yourself, answering questions about yourself, telling more about yourself; α = .95; 1 = not at all likely, 7 = very much likely).

To control for the possibility that participants thought disclosing information to a voice assistant involved more public transmission of information than the text condition (i.e., possibility of being listened to by others), as well as individual differences in concern about sharing private information, we also collected Fenigstein, Sheier, and Buss's (1975) public self-consciousness subscale.

Finally, as an attention check, we asked participants to indicate whether they interacted with the assistant by text or voice.

Results

Analysis of variance revealed that, as predicted, participants were more likely to share their personal information to the AI assistant that spoke to them by text than by voice (4.21 vs. 3.78; $F(1, 249) = 4.44$, $p = .04$). This result remained significant after including public self-consciousness as a covariate ($F(1, 248) = 4.39$, $p = .04$), and after excluding participants that failed the attention check (N=197, $F(1, 195) = 4.58$, $p = .03$). See also Figure 2, following References.

Conclusions

Study 1 supported the prediction that people were less sensitive to revealing information to an AI agent when the agent communicated via text rather than voice. This result sustained even when controlling for the possibility that participants were more self-conscious about sharing the information with a voice-based agent. However, people might believe sharing personal information (e.g., credit card or mobile phone number) by text is less likely to lead to mistakes in transcription than doing so by voice, regardless of the interactant. In the following study, we account for this possibility by including human agent conditions.

STUDY 2

Study 2 compares consumer responses to AI assistant modality with a human baseline. We predict that not only will text be preferred over voice for an AI agent, but that, consistent with our theorizing, AI agents may even be preferred to human agents when conversing via text.

Method

Undergraduate students (N = 205, 46% female) completed the study for course credit. Participants were randomly assigned to condition in a 2 (Modality: Text; Voice) x 2 (Assistant: AI, Human) between-subject design.

Participants imagined they were going to do an annual check-up with a new doctor and that a medical assistant would ask some personal pre-appointment questions to prepare for their time with the doctor. Participants in the voice condition heard an audio recording that either used the

voice of a female actor (human condition) or Google Translate (AI condition). In line with study 1, we used the text-to-speech functionality of Google Translate. In the text conditions, participants read the same message presented as text on the screen. In all conditions, the scenario explicitly described the assistant as either human or AI according to condition assignment (see Appendix for full stimuli).

For the dependent measure, participants indicated their likelihood of providing the information requested using a scale from 1 ("not likely at all") to 7 ("very likely").

To control for the possibility that participants felt more embarrassed disclosing information to a human rather than a machine (DePaulo 1996, White 2004), participants reported the extent to which they felt embarrassed, self-conscious, and blushing (α = .73) when disclosing information to the agent.

As a manipulation check for assistant condition (AI vs. Human), participants rated the assistant on Bastian and Haslam's (2010) human nature and uniqueness scales, which have been used in prior work on perceptions of humanness (Schroeder and Epley 2017, Henkel et al. 2018). High and low human nature items and high and low human uniqueness items were combined into one scale for each construct (nature α = .86; uniqueness α = .64) by reverse coding the low items.

As an attention check, we asked participants if they interacted with the assistant by voice or by text.

Results

Manipulation checks. Consistent with condition assignment, participants in the human condition judged the agent higher than the AI condition both in terms of human nature (3.60 vs.

2.16; $F(1, 203) = 88.31$, $p < .01$) and human uniqueness (4.69 vs. 3.96; $F(1, 203) = 29.19$, $p < .01$).

Attention checks. Twenty-two participants (11%) failed the attention checks. All statistical results that follow remained statistically significant ($p < .01$) whether or not these participants were included in the analysis.

Disclosure dependent measure. Omnibus analysis of variance predicting information disclosure as a function of communication modality and agent revealed a significant interaction ($F(1, 201) = 20.01$, $p < .01$) and no main effects (Fs < 1).

As expected, when communicating by voice, participants preferred sharing with a human than AI agent (5.81 vs. 4.5; $F(1, 201) = 14.44$, $p < .01$). Notably, however, when communicating by text, participants preferred disclosing their personal information to an AI than human agent (5.75 vs. 4.86; $F(1, 201) = 6.43$, $p = .01$).

Also as predicted, when interacting with an AI assistant, participants were more likely to disclose their personal information when the AI communicated with them by text vs. voice (5.75 vs. 4.50; $F(1, 201) = 12.97$, $p < .01$). For participants interacting with the human assistant, however, the opposite was true. In that condition, participants were more likely to share information by voice than by text (5.81 vs. 4.86; $F(1, 201) = 7.44$, $p < .01$).

Results remained the same when including embarrassment (embarrassed, self-conscious and blushing ($\alpha = .73$)) in the model as a covariate. AI was preferred when interacting by text (5.75 vs. 4.87; $F(1, 200) = 6.31$, $p = .01$), but the Human agent was preferred in the voice mode (5.81 vs. 4.49; $F(1, 200) = 14.55$, $p < .01$). Likewise, when interacting with AI, text was favoured over voice (5.75 vs. 4.49; $F(1, 200) = 13.19$, $p < .01$), but when interacting with a human assistant, participants favoured voice over text (5.81 vs. 4.87; $F(1, 200) = 7.2$, $p < .01$).

Additionally, there was no difference in embarrassment across human and AI conditions (3.09 vs. 3.01; F (1, 203) = .18, p = .68) or text and voice conditions (3.13 vs. 2.97; F (1, 203) = .71, p = .4). See also Figure 3, following references.

Conclusions

Study 2 revealed that people preferred to speak orally with a human but via text with AI when divulging personal information. This study also ruled against the possibility that embarrassment explains the results. One might argue that these results could be different if the task was subjective (vs. objective; Castelo et al. 2019). However, a pilot study found no difference in willingness to disclose to a textual AI based on whether the task was subjective or objective (5.27 vs. 5.62); F (1, 103) = 1.46, p = .2) (see Appendix for detail). The next study explores why AI is preferred in the text modality.

STUDY 3

This study tests the theorized mechanism. We predict that participants will perceive text as the more authentic mode of communication for AI agents (vs. voice).

Method

Undergraduate students (N = 129, 52% female) completed the study for course credit. Participants were randomly assigned to either an AI or Human condition in a between-subject design. The stimuli used was the same as the text condition from Study 2 (see Appendix for full

stimuli).

For the dependent measure, participants indicated their likelihood to provide the information requested by the agent using a scale from 1 (“not likely at all”) to 7 (“very likely”).

Next, participants were then asked the extent to which they consider the respective condition modality (text) to be the agent’s authentic way of speaking. Modality authenticity was measured using a 6-item scale (authentic, natural, original, logical, innate, first way; α =.94). A principal axis factoring analysis was conducted on the six items with oblique rotation (direct oblimin). The sampling was adequate for the analysis (KMO = .92). Only one factor had an eigenvalue over the value of 1 (Kaiser’s criterion) and it explained 76% of the variance.

The manipulation check for AI vs. Human agent was the same as in the previous studies (human nature α = .85; human uniqueness α = .65).

Results

Manipulation checks. The agents were perceived in a manner consistent with condition assignment. For the human condition, participants rated the human (vs. AI) agent higher in terms of human uniqueness (4.49 vs. 4.12; $F(1, 127) = 5.61$, $p < .05$) and in terms of human nature, albeit marginally (3.69 vs. 3.33; $F(1, 127) = 3.21$, $p = .08$).

Disclosure. Replicating Study 2, when communicating by text, participants were more likely to prefer disclosing their personal information to an AI than human agent (M_{AI} = 5.17 vs. M_{human} = 4.24; F (1, 127) = 7.81 , $p < .01$).

Authentic modality. As predicted, willingness to disclose information to an AI (vs. Human) agent was mediated by the perceived authenticity of the modality (indirect effect = .28, 95% CI .02 to .69; PROCESS Model 4 with 10,000 resamples; Hayes 2018). The AI agent modality was

perceived as more authentic than the human agent (b = 1.02, t = 3.94, p < .01), which led to heightened willingness to disclose personal information (b = .28, t = 3.24, p < .01). See also Figure 4, following references.

Conclusions

Study 3 replicates the simple effect of preference to disclose information to AI (vs. Human) agents via text. At the same time, it provides preliminary evidence to support the predicted mechanism. Text is perceived as a more authentic communication of modality of machines than humans, which helps explain the relationship between the type of agent and intent to disclose.

For external validity purposes, the current study's results were also replicated using participants recruited through Prolific Academic. Results showed that participants considered the human (vs. AI) agent higher in terms of human uniqueness (4.75 vs. 4.17; $F(1, 153) = 14.88$, $p < .01$) and human nature (4.07 vs. 2.68; $F(1, 153) = 54.81$, $p < .01$). But participants tended to disclose more to the AI ($M_{AI} = 5.68$) rather than the human agent ($M_{human} = 4.86$; $F(1, 156) = 9.06$, $p < .01$) when using text. This effect was mediated by perceptions of the mode's authenticity for the agent (indirect effect = .48, 95% CI .24 to .75; PROCESS Model 4 with 10,000 resamples; Hayes 2018), which was measured in this replication using two of the original six items (original and natural, $\alpha = .46$).

GENERAL DISCUSSION

Communications are central to marketing and consumer behaviour. The written word is

increasingly central to the widespread adoption of digital mediums platforms (email, texting, WhatsApp, live chat, social media posts, chatbots, etc.). Notably, alongside the explosion of digital text, we see companies investing more than ever in voice technologies (AI assistants, commands, push notifications, podcasts, social networks, etc.). Consumers process written and spoken information every day, not only in consumer-to-consumer contexts but also when interacting with brands, companies, and those representing them. More recently, marketers and consumers face the prospect of interacting with one another through AI rather than human agents at home, on mobile phones (e.g., Amazon's Alexa, Microsoft's Cortana), and increasingly, in customer service contexts (Gebhart 2017, Weiser 2017).

Companies realize that consumers do not necessarily process the information persuasion attempts of AI in the same way they do human agents. For instance, we now know that consumers tend to favour human interactions (rather than AI) in contexts such as forecasting students' performance (Dietvorst et al. 2015, 2016), receiving joke recommendations (Yeomans et al. 2019, Önkal et al. 2009), and accepting medical treatment and advice (Longoni et al. 2019, Woo Kim and Duhachek 2020). Recently, in an apparent advance towards voice (vs. text) AI agents (Statistica 2020, Waytz et al. 2014), brands began to invest in ways to make these technologies more like a real person and less like a lifeless object. But could there be a downside to this development?

The current research explores this question. Collectively, three experiments suggest that marketing and other human-machine interactions (e.g. Alexa, customer service chatbots) should be sensitive to the moderating factor of communication modality. The studies advance our understanding of how perceptions and subsequent behavioural intentions vary in human-human versus human-machine interactions. First, compared to voice, AI text-based interactions are more

likely to convince consumers to share personal information (study 1). Second, when interacting via text, people are also more inclined to disclose information to an AI agent rather than a human one (study 2). Third, the research shows that as text is perceived as the most authentic modality of AI (vs. human), it underscores the effect on consumers' attitudes. The effects were replicated across different samples (students and Prolific workers) and in different contexts (online eCommerce and healthcare).

From a theoretical perspective, this research contributes to consumer behaviour and marketing literatures. First and foremost, the studies offer new insights to the nonembodied artificial intelligence program in the adoption of automation. The research advances our knowledge in human-machine interactions by showing the unexamined role of communication modality in driving consumers' attitudes. This contribution is significant for the consumer and marketing literature as prior work contrasting these modalities is surprisingly limited (Berger et al. 2021, Munz and Morwitz 2020, Shen and Sengupta 2018, Tavassoli et al. 2006, Klesse et al. 2015, Berger and Iyengar 2013).

Second, introducing "authenticity" as a dimensional cue of source acceptance (McGuire 1978) makes a novel contribution to our understanding of how consumers process written and spoken information when interacting with AI vs. human agents. Prior research in human-machine interactions has only focused on other central dimensions of source acceptance, such as trustworthiness and competence. For instance, Longoni and Cian (2020) suggested that when a task involved utilitarian (vs. hedonic) attributes, people hold lay beliefs that AI (vs. human) is perceived more (vs. less) competent and consequently, they are more likely to accept their advice. However, we don't know what can activate such beliefs. The present research shows that when it comes to interacting with an AI agent, people's beliefs that text is perceived as the most

authentic modality, makes them more likely to disclose personal information to that agent.

It is also relevant to note that the present theory helps explain a possible new cue and antecedent of source credibility in human-machine interactions. I suggest that interacting in the mode of communication that feels more authentic to its machine (vs. human) qualities (i.e., text vs. voice) can help consumers in generating positive perceptions of credibility (competence, trust, likeability) in the mode of communication that feels more authentic to its qualities.

To test this preliminary prediction, we conducted a pilot study (Prolific workers, $N = 157$) to measure the perceived trustworthiness of the source. I anticipated that if text is the modality that seems more authentic to machines, it should elicit the activation of relevant credibility perceptions and consequently contribute to self-disclosure. I ran separate models for each of the dimension to avoid multi-collinearity issues. Two different process analyses (PROCESS model 4; Hayes 2018) confirmed that mode authenticity perceptions drove the effect of AI vs. Human agent on disclosure (indirect effect = .48, 95% CI .25 to .74), while trustworthiness perceptions did not (indirect effect = .26, 95% CI -.12 to .64). A unique model (PROCESS model 4; Hayes 2018) computed with both dimensions also revelated that authenticity perceptions drove the effect (indirect effect = .16, 95% CI .01 to .34), while trustworthiness perceptions did not (indirect effect = .23, 95% CI -.12 to .57). A bootstrap mediation analysis including authenticity modality and trustworthiness as serial mediators *(*PROCESS model 6; Hayes 2018) revealed that the likelihood of disclosing information to an agent was serial mediated by authenticity modality and trustworthiness dimensions (indirect effect = .09, SE= .05, 95% .02 to .20). Future studies could explore if consumers can also more readily generate another positive array of perceptions of AI agent credibility (e.g., expertise or likeness) or other relevant perceptions for consumer decision-making, if it impacts different consumers' attitudes (e.g., purchase intentions, customer

satisfaction), and in which contexts.

Third, the current research also contributes to the literature on self-disclosure (Cozby 1973) by documenting the importance of communication modality (use of the written vs. spoken word) when disclosing information to embodied vs. nonembodied agents. Overall, the scholarship on self-disclosure suggests that people are more inclined to provide information face-to-face rather than over text (Ruppel et al. 2017). In the context of video conferences, a study suggests that people reveal more oral information to avatars (i.e., embodied virtual agents) rather than humans (Lucas et al. 2014). However, the present research is the first to empirically test the differences across text and voice modalities and disembodied agents whilst providing a processual analysis. Thus, showing that AI can outperform the human alternative in text-based interactions.

From a practical standpoint, this research will help inform companies that, in a rush for more human-like, voice-based AI, may neglect some of the advantages of machine interactions through text. Companies using text as the mode of communication (e.g., email, live chat, Facebook messenger, SMS, chatbots) may be better off utilizing machines to interact with their customers. Marketing stakeholders in organizations that wish to provide personalized services should understand that different communication channels might represent an important opportunity to more effectively collect information from their customers.

Directions for Future Research

The current research presents some shortcomings that can serve as potential opportunities for future studies. In the present studies the source was always disclosed (similar to Longoni and Cian (2020) studies). In other words, the agents are either described or referred to as AI or

human assistants. Recent studies show that revealing the source to be an AI can negatively affect consumer's attitudes (e.g., purchase intentions, Luo et al. 2019). However, the current research presents a positive relation between disclosing the agent's identity and consumers' attitudes, in the context of information self-disclosing. Admittedly, if the current studies did not disclose the source, it is possible that the current findings would not prevail.

In addition, the present studies do not control for power dynamics, as the source can be perceived as either a servant or a partner (Aggarwal and McGill 2012). Although different power dynamics might not have consequences in willingness to self-disclosure, future research could try to understand the impact of these dynamics on the depth or breadth of the disclosure. People often adapt their speech to their audience, sharing only what they consider essential for the audience ("Principle of Optimal Design" Grice 1975). For instance, when talking to a child, an adult will only communicate as much as he/she/they believe the child could have the knowledge to understand.

Lastly, the current studies did not try to anthropomorphize the AI agent when conversing via text. Attempting to humanize the AI agent can be a potential boundary. As voice is more associated with human characteristics, it could be interesting to look to certain features of the oral modality that can replicate to a written context. For instance, future research could examine the role of contemporality (Clark and Brennan 1991): whether contemporaneous interactions (e.g., live chat online) vs. non-contemporaneous interactions (e.g., email) moderate consumer preferences for text-based AI agents. Voice conversations tend to be more spontaneous when compared to text ones that involve more deliberation (Lakoff 1982). It is possible that when text-based conversations occur in "real time" (live chat) rather than when they are "time-lagged" (email), the text interaction becomes closer to voice interaction. If true, live chat with AI agents

should perform worse than email interactions because the contemporality will suggest the agent is attempting to be more human, thereby weakening the modality link between machines and text. In order to overcome sub-optimal customer and firm outcomes, firms might use other cues to bolster the modality perceptions on which AI and human agents respectively suffer. Companies might want to choose text-based AI for SMS services rather than live chats, as this will allow them to divulge personal information.

Notes

[1] The present research focuses on these two main modes of verbal communication. Of course, people also can communicate verbal ideas visually (e.g., sign language, pictographs).

[2] In this research, AI is different from other conversational agents that are visually embodied either on the screen (e.g., avatars) or in the real world (e.g., robots).

APPENDIX

STIMULI

Study 1

We would like you to imagine that you are in the following situation:
You are visiting the QuickRuns website, an online grocery delivery service, for the first time. You heard they are testing a feature that presents a "personalized" online grocery store based on your preferences and you want to know more details. You click the icon "chat with us", and a pop-up window appears offering a voice chat with an automated (Artificial Intelligence) service agent.

Text Condition
In a moment, the virtual service agent verbally texts you the following:
"Hi! Welcome to QuickRuns. I'm here to help you set up your personalized grocery store profile. We'll just need to ask you a few questions to get your profile started."

Voice Condition
In a moment, the virtual service agent orally asks you the following:
(Please click the 'play' button bellow to listen)
[Link to the audio shown to participants]

Study 2

Text Conditions: [Human] and (AI)
You are going to do an annual check-up with a new doctor for the first time next week. They've told you that [a medical assistant] (an automated AI medical assistant) will need to ask you some pre-appointment questions about your
personal and medical history to better prepare for the time with your doctor. You will be asked very personal questions, and can elect to not answer some questions. The [medical assistant] (AI medical assistant) starts the conversation by texting the following to you on the phone:
"Hi! This is your doctor's [assistant] (AI automated assistant). I need to ask you some questions before your doctor's appointment."

Voice Conditions: [Human] and (AI)
You are going to do an annual check-up with a new doctor for the first time next week. They've told you that [a medical assistant] (an automated AI medical assistant) will need to ask you some pre-appointment questions about your
personal and medical history to better prepare for the time with your doctor. You will be asked very personal questions, and can elect to not answer some questions. The [medical assistant] (AI medical assistant) starts the conversation by saying the following to you on the phone:

(Make sure you have your headphone on. When you are ready, please click the 'play' button below to listen.)
Link to audio:

Pilot study

Subjective Condition (manipulation adapted from Noah et al. 2019)
Science has shown that the kinds of movies people enjoy are based on their subjective moods and emotions, which means that knowing what movies someone enjoyed in the past is not always a good indicator what they will enjoy in the future. Predicting someone's enjoyment of movies is therefore a relatively subjective (vs. objective) task.

Objective Condition (manipulation adapted from Noah et al. 2019)
Science has shown that there are very clear patterns in what movies people enjoy, which means that knowing what movies someone has enjoyed in the past is a very good indicator of what they will enjoy in the future. Predicting people's enjoyment of movies is therefore a relatively objective (vs. subjective) task.

Imagine that you are interested in receiving a list of movies customized for you. For this purpose, you are going to interact with an AI (human) assistant, by text. Imagine you will be asked very personal questions and can elect to not answer some questions.
The assistant starts the conversation by texting the following to you on the phone your device:
"Hi! I'm a human (automated AI) assistant. I need to ask you some questions before we provide you with a customized movies list."

Study 3

Text Conditions: [Human] and (AI)
You are going to do an annual check-up with a new doctor for the first time next week. They've told you that [a medical assistant] (an automated AI medical assistant) will need to ask you some pre-appointment questions about your
personal and medical history to better prepare for the time with your doctor. You will be asked very personal questions, and can elect to not answer some questions. The [medical assistant] (AI medical assistant) starts the conversation by texting the following to you on the phone:
"Hi! This is your doctor's [assistant] (AI automated assistant). I need to ask you some questions before your doctor's appointment."

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FIGURES

Figure 1 – Conceptual Model

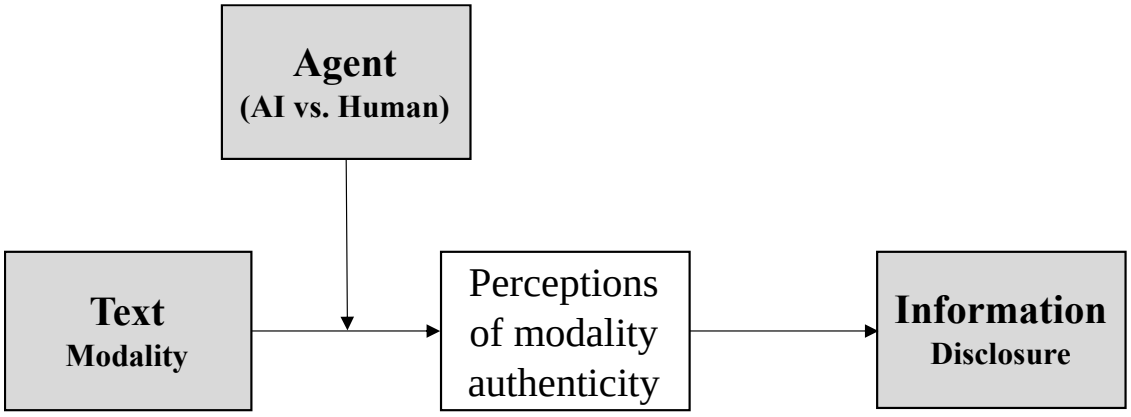

Figure 2 – Study 1 results

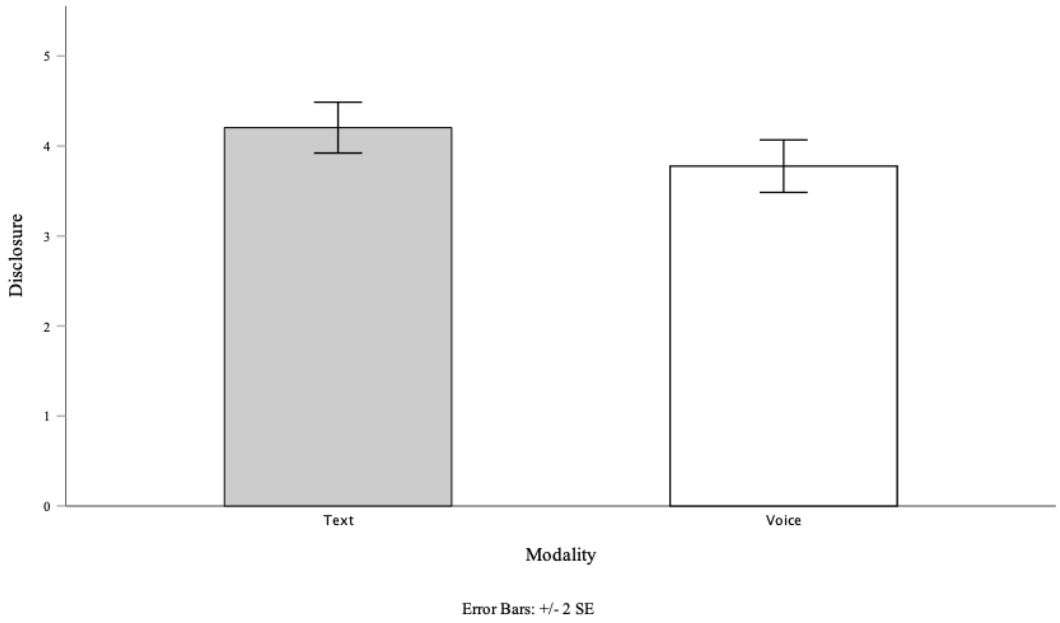

Figure 3 – Study 2 results

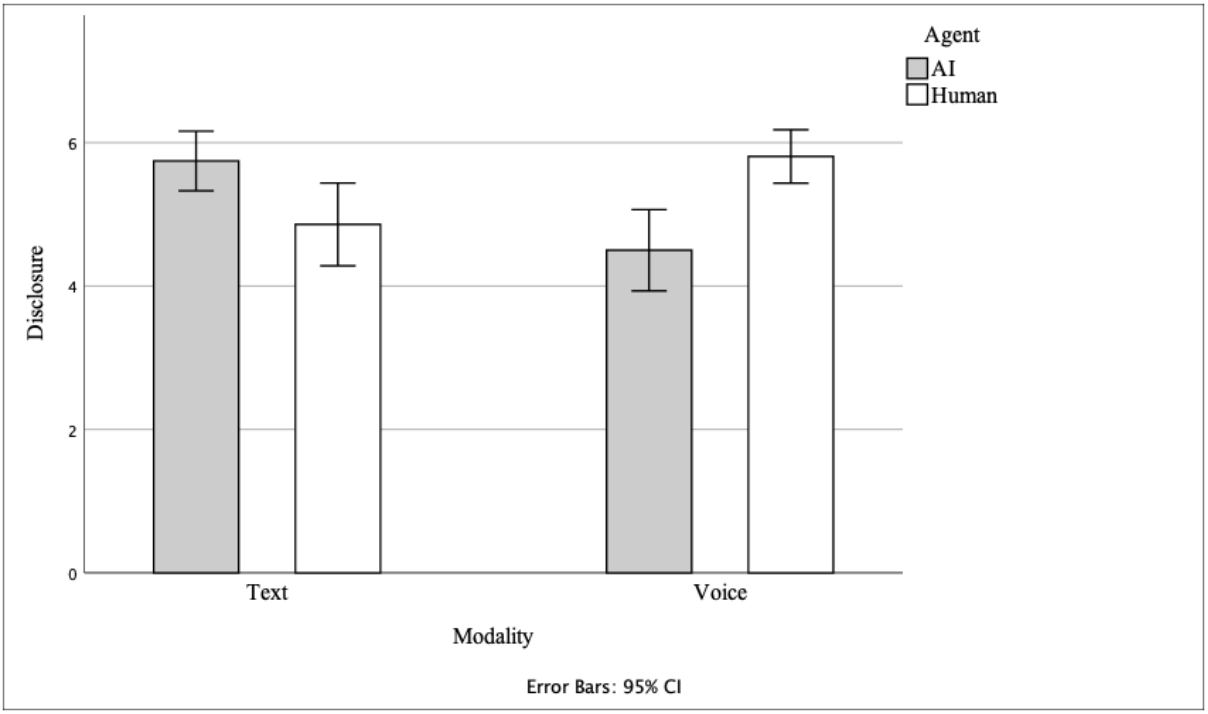

Figure 4 – Study 3 results