Facing Alexa, the powerful lower their guard: anthropomorphization of smart personal assistants decreases privacy concerns for people with high sense of power

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Abstract

With increasing popularity, Smart Personal Assistants (SPA) are becoming prominent characters in our daily lives. Their ubiquity raises concern for data privacy as SPAs may be listening to our most intimate conversations at home. Due to their salient human-like features we are inclined to anthropomorphize them. We investigated the influence of anthropomorphization of SPAs on consumer's privacy concerns and the moderating role of sense of power in this relationship. People with high (low) power exhibited lower (higher) levels of privacy concerns when the perceived anthropomorphization was higher. We suggest that high power increases the perceived control and this illusion of control decreases privacy concerns. We extend this result by showing that lower privacy concerns lead to a greater frequency of use. Finally, we discuss the importance of understanding power in relation to increasingly human-like technologies and ramifications for consumer protection.

Keywords: Smart Personal Assistants, Anthropomorphization, Sense of Power

1. Introduction

Smart personal assistant (SPA) users have surpassed 100 million in the US alone, which is almost one third of the population of the country. In January 2019, Amazon announced that they have sold 100 million Alexa devices. With such strong penetration rate, smart personal assistants are becoming a prominent character of our daily lives. They run our errands, facilitate our entertainment and recommend us what to buy. Relying on artificial intelligence and natural language processing, they are the latest artifact of digital age that aims to enhance comfort and convenience.

Voice-controlled technologies have been around for some time, but the latest generation of these devices have increasingly human-like features and occupy our most private spaces. Their ability to speak back to us gives them a special status and leads us to attribute human-like features to them (Purington, Taft, Sannon, Bazarova and Taylor, 2017). We have ingrained over-learned rules about how to interact with other people as social beings. Attributing human-like features to non-human entities changes the way we behave towards them (Epley, Waytz and Cacioppo, 2007). It has been reported that 500,000 people have said 'I love you' to Amazon's Alexa and some even perceive Alexa as a companion (Turk, 2016). Anthropomorphized agents are seen as more social beings and people are more likely to cooperate with them (Waytz, Cacioppo and Epley, 2010; Goetz & Kiesler, 2002). On the other hand, anthropomorphization might also lead to greater feelings of discomfort, eeriness and a threat to human identity (Mende, Scott, van Doorn, Grewal and Shanks, 2019). Also, people's risk perceptions are influenced by anthropomorphization (Kim & McGill, 2011). An important distinction of our study from previous work is examining the SPAs, an entity with highly anthropomorphized features yet lacking an established ontological position.

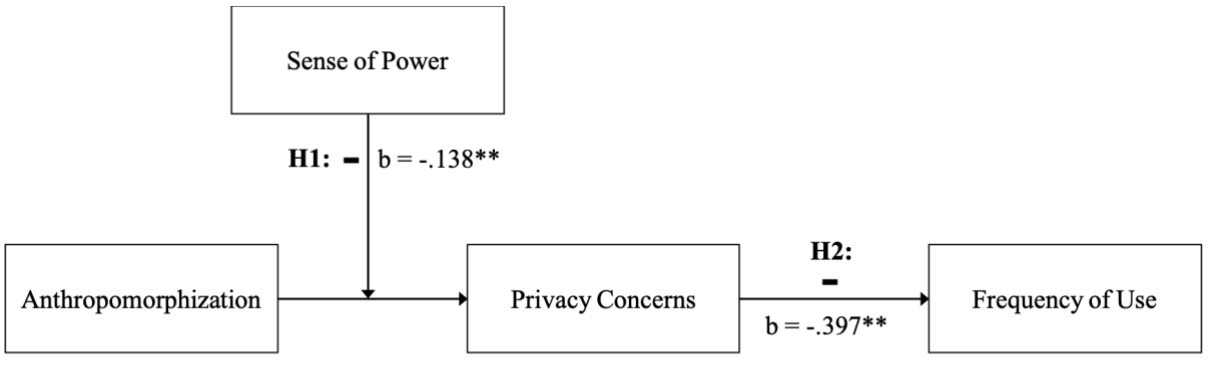
In analyzing the human-SPA relationships, we draw insights from human relationships. We identify sense of power as an important factor that shapes our behavior and social interactions. Literature suggests that when we interact with an anthropomorphized entity, we bring with us our preconceptions and our "default settings" of social interaction with humans. We may not thank a vending machine, but "Thank you, Siri" is apparently a common phrase heard by the SPAs (for a discussion of politeness towards SPAs, see Burton & Gaskin, 2019). This suggests that sense of power which is an important concept in human relationships may potentially extend and influence human to human-like technology relationships.

Just like any new technology, there are barriers to accepting the SPAs in our lives. Perhaps the most relevant of these barriers, given the digital age we are living in, is the privacy concerns. Müller-Seitz, Dautzenberg, Creusen and Stromereder (2009) proposed a revised acceptance model of technology and highlighted security concerns related to the privacy of user data as an important factor in the acceptance and subsequent use of a new technology. With many digital industry giants facing severe criticism over proper use of consumers' data, an 'assistant' residing in your living room, listening to you all day will surely need to tackle the concerns of privacy to be able to hold its place.

In this research, we examine the influence of anthropomorphization of SPAs on people's privacy concerns and subsequent usage frequency as well as the essential moderating role of sense of power in this relationship. We recruited SPA users on an online survey platform and asked them about their habits of use and perceptions of their assistant. Our results showed that sense of power has a negative moderating effect on the relationship between anthropomorphization and privacy concerns. We also show that lower privacy concerns lead to a greater frequency of use. Considering the contextual malleability of power perceptions (Galinsky, Gruenfeld and Magee, 2003), our research highlights the importance of understanding social power in relation to increasingly human-like technologies. The pervasive and almost unescapable use of online technology has sparked increasing concerns related to data privacy (e.g., Banerjee, 2019), vulnerable (i.e., powerless) groups of consumers (e.g., Nunan & Di Domenico, 2019) and digital addiction (e.g., Berthon, Pitt and Campbell, 2019). We believe that our results contribute to a better understanding of the effect of anthropomorphized technologies on consumers and generate interesting implications for the protection of the well-being of the consumer. We contribute to sense of power literature by showing that the role of power in human relationships extends to relations with human-like technologies. This study adds to the previous findings on the interplay between anthropomorphization and sense of power influencing behavior, including our sensitivity to risk (Kim et al., 2011). Finally, we highlight the importance of mitigating privacy concerns in user acceptance of new technologies.

2. Theoretical development

In this section, we build our hypotheses with inspirations from psychology, personality and consumer research literatures on anthropomorphization and its behavioral outcomes (e.g., Epley et al., 2008; Kim et al., 2011; Mende et al., 2019).



Notes. ** p <.05 *** p < .01 (two-tailed). Unstandardized coefficients reported. Control variables included Age, Income Level, Education Level and Gender. Only gender had a significant effect on privacy concerns, with females reporting higher privacy concerns overall (b = -.389***). Gender also had a significant effect on frequency of use, with males using the SPA more overall. (b= 1.913***).

Figure 1. Overview of the conceptual framework and the results of the model estimation.

2.1 Anthropomorphization. Anthropomorphization has been defined as attributing human-like features and mental states to non-human entities (Epley et al., 2007; Waytz et al., 2010). We do this almost automatically; as children we speak to our toys endlessly, give them distinct personalities and imagine how they are feeling. Even simple lines resembling a face seem to elicit anthropomorphizing responses (Kim & McGill, 2011). Anthropomorphizing non-human agents has been reported to have positive effects. People were more likely to cooperate with robots that are more human-like (Goetz & Kiesler, 2002), and greater perceived human-likeness of Amazon's Alexa was associated with greater satisfaction (Purington et al., 2017). An alternative stream of research suggests, however, that human-like features could also lead to aversive responses. The concept of uncanny valley (Mori, MacDorman and Kageki, 2012) proposes that an entity that exhibits human-like features but fails to completely meet the requirements of being a human may elicit feelings of discomfort. A recent work on humanoid service robots provides evidence for this concept by showing that consumer reported greater feelings of discomfort and more compensatory responses when interacting with humanoid service robots (Mende et al., 2019). When the anthropomorphizing cues were reduced (e.g. not giving it a human name, emphasizing that it's a robot), though, the compensatory responses were mitigated.

In our social interactions, we carry certain social expectations and adhere to generally accepted social rules. Literature suggests that we apply social expectations to the interaction when we anthropomorphize the entities (Kim & McGill, 2011). With a non-anthropomorphized entity, our expectations of a social interaction and sensitivity to risk are clearer; so we form accurate expectations according to the machine's settings and non-social disposition. However, with an anthropomorphized entity, we could perceive a mismatch

between the anticipated human qualities and the perceived imperfect qualities. For example, the human voice of a SPA would signal its human likeness, but when you get a generic, scripted answer such as "I'm not sure I understand" several times in a row, you see that the anticipated human quality is imperfect. This mismatch might be realized more saliently especially when the ontological position of the entity is not well established, as in the case of SPAs. Since consumers are all different in their perceptions and expectations in social interactions, it is important to understand how different perceptions lead to different consumer behaviors. Kim et al. (2011) provides evidence for this stream of thought by showing that risk perceptions are influenced by anthropomorphization. We next introduce sense of power and its potential role on our relationships with anthropomorphized objects.

2.2 The Role of Sense of Power. Power is a fundamental concept in social sciences that shapes our social interactions. A large body of literature suggests that power has a pervasive presence, ubiquitous in most aspects of our lives (Keltner, Gruenfeld, and Anderson, 2003; Anderson, John and Keltner, 2012). Power has been defined as the control over valued resources (Fiske, 1993), ability to influence others (Weber, 2009) and ability to do what you want without being influenced by others (French, Raven and Cartwright, 1959; Emerson, 1962). As broad as it is in its definitions, we focus on the social aspect of power; the ability to influence, have control over others, as delineated by Lammers, Stoker and Stapel (2009). In our daily lives, all our relationships function in relation to certain power dynamics (Keltner et al., 2003). Moreover, literature provides evidence that the customs of our social interactions transfer to our interactions with anthropomorphized entities. (Kim et al., 2011) Therefore, we are interested in investigating our relationship with the highly anthropomorphized SPAs in relation to our sense of power.

Kim et al. (2011) has shown that an individual's sense of power moderates the effect of anthropomorphization on risk perception. Specifically, they show that people with low (high) power perceived a higher (lower) risk when the risk-bearing entity was highly anthropomorphized. They propose that those with high power perceived greater control over the anthropomorphized entity. Previous literature provides support for this explanation; people believe they have more control when they have more power over others (Fast, Gruenfeld, Sivanathan and Galinsky, 2009). As their stimuli, Kim et al. (2011) used a casino slot machine with or without physical features that resemble a face (Experiment 1). In the second experiment, they anthropomorphized a disease, phrasing the details of the disease in the way of an anthropomorphized story (Experiment 2). Given that we are readily inclined to

attribute human-like features to non-human agents, we believe that the anthropomorphic nature of the SPA are far from subtle. Even though the SPAs do not have a physical presence (yet!), they possess highly anthropomorphic features such as a human voice and (in some cases) a human name. Although SPAs may not appear as overtly risky as a slot machine or a disease, consumers may consider the underlying risks of using SPAs related to data privacy.

Security concerns related to the privacy of the user data has been shown as a crucial part of accepting a new technology (Müller-Seitz et al., 2009). In their study, Müller-Seitz et al. investigated the acceptance of then new Radio Frequency Identification (RFID) technology and they propose that the overall attitude of consumers toward novel technologies and the intention to use this new technology is strongly tied to the privacy concerns about the use of their personal data. Concerns over consent and the protection of private data directly translate to SPAs. We use SPAs for highly personal tasks, locate them at the center of our living space and connect them with every other 'smart' part of our lives. This means data for almost every aspect of our lives, collected and analyzed for making the algorithm, and subsequently our experience, better. Confiding in an entity with such rich personal data would certainly not be without concerns.

We hypothesize:

H1: Sense of power negatively moderates the effect of anthropomorphization on privacy concerns. Specifically, the effect of anthropomorphization on privacy concerns is more negative (i.e., less concerns) when the sense of power is high.

H2: Privacy concerns has a negative direct effect on the frequency of use of the SPAs. Specifically, when the privacy concerns are low, the frequency of use increases.

3. Methodology

3.1 Measurements

The measurements included scales from prior research, with appropriate adjustments to the context. The 8-item Anthropomorphization scale was adopted from Epley, Akalis, Waytz and Cacioppo (2008). The 8-item Sense of Power scale was adopted from Anderson & Galinsky (2006). Privacy concerns were measured with 4 items asking about concerns related to personal data. Frequency of use was measured using 5 items. The frequency of use question was broken down into five categories to ensure that users think exhaustively of their use of the SPA (Entertainment, Personal Organization, Seeking Information, Device Management, Purchase-related).

Subsequently, a questionnaire was created on online survey software Qualtrics and all the items were pre-tested to ensure the understandability of the questions. Survey participants responded to seven-point Likert scales anchored at “strongly disagree” (1) and “strongly agree” (7) for Sense of Power and Privacy Concerns measures; “not at all” (1) and “very much” (7) for the Anthropomorphization measure. The frequency of use measures provided 8 choices from ‘Never’ (1) and Less than once a day (2) to More than 5 times a day (8).

We argue that using survey data provided us with high external validity, as we included only real SPA owners in this data set. This ensured familiarity of the products and a more realistic context to investigate the phenomenon. In a fictive scenario or a lab experiment, capturing the privacy concerns might have been less reliable. Instead of imagining a privacy rating, our participants are active users of SPAs and their data provides us with a first-hand, directly experienced information on privacy concerns. We believe that this approach is able to provide results with high validity.

3.2 Data Collection and Sample

400 participants were recruited from online survey platform Prolific. Currently owning a home assistant (e.g. Amazon Echo, Google Assistant) was used as pre-screening criterion. This pre-screening was provided by the platform by default. Four participants were excluded from the analysis due to facing technical problems during the survey resulting in incomplete recording of data. The final sample contained 396 usable responses. Participants included 62.1% women with overall sample age ranging from 18 to 78 (mean age: 35.6).

3.3 Results

To test our conceptual model we used structural equation path modeling by using a maximum likelihood estimator. We specified the model as depicted in Figure 1. Results of our model show that there is a negative moderating influence of sense of power on the effect of anthropomorphization on privacy concerns (H1: β_1 = -.138, p <.05). This confirms our hypothesis, showing that people with high (low) sense of power have decreased (increased) privacy concerns when the degree of anthropomorphization is high. This effect is shown in the interaction plot in Figure 2. Moreover, our results confirm that greater privacy concerns decrease the frequency of use (H2: β_2 = -.397, p <.05). However, Anthropomorphization and Sense of Power did not have direct effect on privacy concerns. Control variables Age, Income and Level of Education also did not have any influence on the privacy concerns. Gender had a significant effect on privacy concerns, with being female predicting higher privacy concerns

(β_3 = -.389, p <.01). Gender also had a significant effect on Frequency of Use, with males using the SPA more overall (β_4 = 1.913, p <.01). Results of the model estimation are shown in the conceptual framework on Figure 1 (Model Fit Information: *CFI: .862; TLI: .654; RMSEA= .045*).

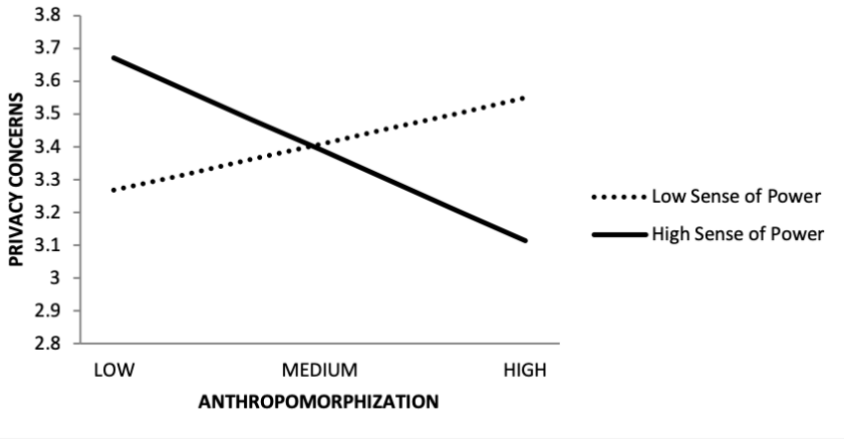


Figure 2. The interaction plot for the moderating effect of sense of power on the relationship between anthropomorphization and privacy concerns.

4. Discussion

Previous work has shown the influence of anthropomorphization on consumer behavior. Our first contribution is to investigate this established phenomenon in the context of risks associated with Smart Personal Assistants. Nowadays with an intimate place in our homes, it is important to understand this highly anthropomorphized technology. In the digital age we're living in, consumers are increasingly worried about the protection of their personal data. It's all very new; most consumers don't even have a clue about how to be protected against the negative consequences of online technologies. Major platforms are heavily criticized for not taking the issue of privacy protection seriously and governments are starting to come up with regulations on protecting the privacy of the consumer. We suggest that Smart Personal Assistants may indeed have a special status, often perceived to be more than an algorithm. We believe that consumer relationship with SPAs is a fruitful avenue for future research.

Second, drawing from the literature on the important role of power in human interactions, we bring sense of power into the discussion to probe into consumers' perception of the SPAs (Keltner, Gruenfeld, and Anderson, 2003; Anderson, John and Keltner, 2012).

We suggest that, just as influential as it is in human interactions, sense of power may indeed play a crucial role in shaping consumer perceptions and interactions of the SPAs. We provide evidence for the moderating role of power on the relationship between anthropomorphization and privacy concerns. In line with previous work, we suggest that high power increases the perceived control over the entity and this illusion of control decreases the privacy concerns (Kim et al., 2011). Understanding the role of sense of power in relation to SPAs might have important practical implications for marketers because power perceptions are highly susceptible to influence. Therefore, the fact consumers might be easily manipulated in line with the strategies of marketers is a worrying implication.

Finally, our results give insights into privacy concerns related to emerging technologies that are far from being completely understood. A better understanding of consumers' relationship with the anthropomorphized technologies will also generate important implications for the protection of the well-being of the customer.

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