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Impressions of computer and human agents after interaction: Computer identity weakens power but not goodness impressions ☆

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ABSTRACT

Although computer agents routinely replace people as companies' representatives, few researchers consider the impressions customers develop about these computers and humans in the same organizational positions. I ask: how do customers develop impressions of the goodness and power for computers agents compared to human agents? I propose a theoretical model by which the agent's computer identity weakens social processes that lead to goodness and power impressions. This model explains conflicting prior research and proposes specific hypotheses for the current study. I test the hypotheses with a laboratory experiment where participants believe they are buying products online from a representative of a real organization. I manipulate product quality to alter goodness impressions, the organization's constraint of the representative to alter power impressions, and human versus computer identity to test the hypothesized weakening interaction effects. The weakening hypothesis for goodness is not supported, while the weakening hypothesis for power is fully supported. Future work should test the goodness and power weakening hypotheses under different conditions and with different manipulations to determine under what conditions the former operates and to provide additional support for the latter.

1. Introduction

Customers routinely interact with companies through their online agents, both human and computerized. These interactions can take many forms: online chat, automated emails, virtual worlds, bots in games, automated phone systems, or bids on a website. Unlike face-to-face human interaction, both mediated interaction and interaction with computer agents often include only minimal social cues and characteristics, such as a label of the agent as a computer or human. As companies increasingly use computer agents, it is important to understand the process by which that computer label could alter the customer's experience. One fundamental aspect of this experience is how a customer will socially evaluate the agent, such as impressions about an agent's valence – goodness, warmth, and likeability – and of potency – power, competence, and agency. In this paper I focus on this identity-label-only situation and ask the following question: How do customers develop impressions of goodness and power for computer versus human agents representing organizations?

People's information, beliefs, and experiences with other social beings helps form impressions about them (Heise, 2007). While impressions may be nuanced or even idiosyncratic, most impressions can be categorized in terms of positive or negative valence – or how good or bad someone or something seems – and high or low potency – how powerful someone or something seems. Goodness (and the more social variant *status*) and power dimensions orchestrate social interaction (Kemper, 1978; Kemper and Collins, 1990) and social cognition (Fiske et al., 2007), distinguish affective differences in meaning across cultures (Heise, 2010; Osgood et al., 1975; Osgood et al., 1957), contribute to cultural identities (Heise, 2010; MacKinnon and Heise, 2010), and organize one's own self-concept (MacKinnon and Heise, 2010). This paper focuses on these two dimensions because they explain the most variations among impressions of social actors (Heise, 2007; Heise and Smith-Lovin, 1981; Osgood et al., 1975; Osgood et al., 1957). Furthermore, cultural impressions of technology vary in both goodness and power (King, 2001; Shank, 2010).

Previous research has hypothesized that identity as a computer agent would weaken the effect of social processes on goodness impressions, but found mixed support for that hypothesis (Shank, 2013). I expand on that research by examining new data in an attempt to resolve those mixed findings with regards to goodness impressions and by adding a theoretical model and subsequent test of power impressions. Notably this model contributes to the

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literature in three ways: It creates an explicit theoretical explanation for impression differences in interaction with computer and human agents, unifies the disparate findings of previous research studies, and leads to an empirical test that manipulates the conditions leading to goodness and power impressions. I test this proposed model in a mock commercial setting with ostensibly real organizations where customers' impressions can change by interacting with technology (Braddy et al., 2008; Shank, 2013). In this setting, I conduct a controlled experiment where I manipulate computer identity, product quality, and organizational constraint. By examining the experimental results, I address the hypotheses, suggest alternative explanations, and point to future research directions.

2. Human and computer agents

A research tradition that argues that *computers are social actors* establishes the legitimacy of studying people's social reaction to computers agents (Brave and Nass, 2008; Kim and Sundar, 2012; Lee and Nass, 2002; Mitchell et al., 2011; Nass and Moon, 2000; Nass and Yen, 2010; Reeves and Nass, 1996). This research empirically verifies that people engage in social behavior according to the psychological mechanisms present in traditional human–human interaction even when interacting with technology. Therefore, if an individual interacts with a computerized agent that occupies a social role or exhibits a social cue, that individual should have a *similar* social-psychological reaction as they would to another human.

Even with similar reactions, there are a number of obvious differences based on physical characteristics when interacting with humans or computers. Research studies have found that sensory characteristics such as embodiment, voice, and nonverbal communication often influence mediated interactions and their outcomes (Brave et al., 2005; Guadagno et al., 2011; Isbister and Nass, 2000; Lee and Nass, 2002; Nass and Yen, 2010; Parise et al., 1999; von der Pütten et al., 2010). For technology that exhibits such sensory characteristics – automatic phone systems, bots in games, virtual reality, ATMs – those sensory perceptions explain many of the differences between interactions with computers versus interactions with humans. Sensory characteristics, however, are not always present to distinguish humans from computers. Often identity labels alone – the knowledge vis-à-vis a label of an agent as computer program or human – distinguishes a company's representatives in cases such as email, web chat, website bids, and online financial trading. Making a direct comparison of mediated computer and human agents necessitates that they behave in similar ways, fill a similar social role, and differ only in their label – or identity – as a *human* or *computer*.

Researchers have compared mediated human and computer interaction merely distinguished by identity labels on social and psychological outcomes such as teamwork, negotiations, emotion and influence (Ferdig and Mishra, 2004; Johnson and Gardner, 2007; Katz et al., 2008; van Wissen et al., 2012; von der Pütten et al., 2010). Only a handful of studies focus on impression outcomes characteristic of goodness and power, and so I review these below in more detail. Some of these studies use identity labels only, whereas others include identical sensory components – such as image or voice – for both computers and humans.

2.1. Literature on impressions of human versus computer agents

The few studies on impressions of goodness and power for mediated computer and human agents used many different methodologies, measurements, and settings which, consequently, led to varied results. However, reviewing each study briefly helps inductively uncover general patterns for those impressions. Below, I give an overview of six experiments (some are published in multiple articles) that include some variant of goodness and/or power impressions. Then I summarize the findings followed by introducing a model to explain the conflicting results from these studies.

Merritt et al. (2011a, 2011b) examined people's blame of and cooperation with human and computer game partners. They had participants play a real-time computer game that allowed each player to engage in risky actions that could potentially benefit their teammate. They found that participants blame their computer partners more for mistakes and that participants make less accurate skill assessments of computer partners (Merritt et al., 2011b). Participants perceived human teammates as more cooperative and the participants were more willing to engage in risk-taking on their behalf (Merritt et al., 2011a). In other words, participants' impressions of goodness – in terms of more perceived cooperation and less blame – were greater for humans than computers. Power impressions of teammates – only in terms of skill assessment – suggest individuals perceived humans as more powerful than computers.

Lee and Nass (2002) considered differences in public and private conformity and visual representation between mediated human and computer agents by conducting an experiment on influence in decision making for a choice-dilemma. A choice-dilemma is a hypothetical scenario where one option is both higher risk and more rewarding than another. While visual representation altered some of the outcomes, here I review only the effect they found for human or computer identity on impressions. Lee and Nass (2002) included impressions of social attractiveness, competence, and behavioral conformity. Relevant to goodness impression, they found that humans were rated as more socially attractive than computers. Relevant to power impression, humans and computers did not differ in impressions of competence. Behavioral conformity, while not an impression, could indicate a social power process. While those who interacted with computers demonstrated less public normative compliance than those who interacted with humans, they did not differ in private conformity (Lee and Nass, 2002). In other words, the human or computer identity did not change social power, only normative influence.

Shank (2008, 2012) conducted an experiment focusing on how people perceive computer and human agents who use a coercive strategy in a repeated social exchange situation. He used specific measures of goodness and power impressions, called evaluation and potency, respectively (Shank, 2008), and also measured justice impressions (Shank, 2012). His results indicated that the individuals perceived the coercive computers as more just and greater in evaluation compared to the coercive human counterparts. There was no difference in potency between computers and humans. This study suggests that individuals perceive computer agents as greater in goodness than human agents, but no different in power.

In a different laboratory experiment, Shank (2013) had participants play the role of customers buying either low or high quality products from a human or computer representing a company. He measured evaluation[1] and morality impressions to represent aspects of the goodness dimension and potency, responsibility, and control impressions to represent aspects of the power dimension. Unsurprisingly, the high or low quality of the products affected the goodness impressions. Controlling on the product quality, customers' impressions favored human agents over computer agents

[1] Here I will use *goodness* or *valence* to refer to the broader concept, and *evaluation* to refer to a specific measurement of it. Shank (2013) simply used *goodness* to refer to both.