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Do people like working with computers more than human beings?

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ABSTRACT

This paper incorporates the concept of mindlessness from research on human–computer interactions with social exchange theory from sociology. We find that participants behaved no differently toward human or computerized partners during a repeated standard trust game. Despite exhibiting similar behaviors with these partners, participants believed that computers were more likely to share their interests during this game than humans. These participants also reported higher levels of commitment with computerized partners than human partners. Our results suggest that asking about social constructs (i.e. commitment) will break mindlessness in human–computer interactions. These results also highlight a disconnect between individual behaviors and their perceptions during human–computer interactions. We conclude that telling participants their partners are computers may actually improve their perceptions of interactions after they occur.

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1. Introduction

Samantha West has a pleasant-sounding voice on the telephone (Miller & Nicks, 2013). She is confident and coherent when talking with new clients. Her persona is bubbly and she exhibits noticeable excitement when selling her company's product to people as a telemarketer. Samantha is a model salesperson, except that she is not a person at all. She is a computer that talks to potential clients about buying insurance products on the phone as if she was a real human being. She will even lie to customers and deny that she's a robot (Miller & Nicks, 2013). This example highlights a change in the way that humans and computers interact with each other in various facets of life. The present study examines how people perceive their interactions with partners that are computers or human beings.

The pace of innovation in technology appears to be changing the way that humans communicate with their computers. In the 1960s and 1970s, humans had to learn complicated code to instruct a mainframe computer to produce specific types of output (e.g. analysis of variance outputs). In the 1980s and 1990s, graphics would simplify these complex codes for the average consumer who used a personal computer (e.g. Windows 3.1). Today, computers have the capacity to interact with humans before these users clearly know what they may want their machine to do for them.

For example, the IBM computer, named Watson, beat two human contestants on the game show *Jeopardy*!, while an estimated 15-million people watched it respond to questions from another person. The Apple iPhone and iPad mobile devices have voice-recognition software, named Siri, that responds to a variety of verbal questions or statements from human users. The romantic movie, Her, won an Academy Award for Best Picture by telling the story of a man falling in love with his computer operating system. Simply put, it appears that computers have become more social with the advancement of information technology.

This paper applies social exchange theory from sociology to the study of human–computer interactions. Social exchange theory explains how the pattern of interactions between people affects their perceptions of each other in groups. The social exchange-theoretic approach traditionally defines a group as two or more humans that work together on some collective task. We broaden this definition of a "group" to include humans and computers with artificial intelligence capabilities. We then use an experiment to test if the behaviors and attitudes of participants will significantly vary when their partners are human beings or computers. Our results show that asking people about their perceptions of interactions can "break" their mindlessness during human–computer interactions, even though they exhibit similar behavior toward human and computerized partners during an exchange task. This break, in turn, can inflate user perceptions of their interactions with computers in contrast to humans.

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2. Theoretical background

2.1. Social exchange theory

Social exchange is the reciprocal transfer of resources between two or more people during a repeated number of interactions (Emerson, 1976). Theories of social exchange explain how these transfers affect the attitudes and behaviors of people in groups. The social exchange-theoretic framework views exchange outcomes as interdependent (Emerson, 1976; Homans, 1958). Thus, the outcomes of past exchanges can affect how individuals behave in future exchange relationships.

There is considerable evidence from experiments in sociology that enduring patterns of social exchange affect the feelings and beliefs of those housed within groups (Lawler & Yoon, 1996, 1998; Molm, 1994; Molm, Takahashi, & Peterson, 2000). For example, studies find that people experience positive feelings when they gain resources for themselves during social exchange (Lawler & Yoon, 1996, 1998). When they gain resources during several periods of social exchange, these experiments find that positive feelings will affect the formation of cohesion in groups (Lawler, Thye, & Yoon, 2008; Lawler & Yoon, 1996, 1998).

Other research has found that enduring patterns of exchange can influence the degree of cohesion that exists in small groups (Molm, 1994; Molm et al., 2000). This research proposed that risk of non-reciprocity is a necessary condition for trust to form between people in groups (Molm et al., 2000). When group members begin to recognize a pattern of reciprocity during social exchange, experiments find that perceptions of cohesion emerge in these groups (Molm et al., 2000). Thus, a stable pattern of reciprocity that social exchange produces over time can lead individuals to trust their partners and, in turn, produce group cohesion.

The definition of "group" by social exchange theorists is typically defined as two or more humans that work together on some collective task. We propose broadening this treatment to include groups where humans work with partners that are computers. With the rapid advancement of technology, computers now have the capacity to socially interact with people without direct inputs from users. These social capacities raise questions about the degree that the interpersonal dynamics known to affect the attitudes and behaviors of humans also exists when humans work with partners that are computers.

2.2. Social computing and mindlessness

Mindlessness refers to the over-reliance on habits from past experiences that one applies to their new experiences (Langer, 1992). Such over-reliance leads one to rely on preexisting scripts that may not take into account some important qualities of the individual and the situation. Numerous studies suggest that people mindlessly rely on "scripts" – typically used for interpersonal interactions – when they interact with computers (Nass & Moon, 2000).

For example, Nass and Moon (2000) use the concept of mindlessness to interpret research finding that people tended to evaluate a computer with a man's voice as more competent than a computer with a woman's voice, unless the computer was talking about stereotypically feminine subjects (Nass, Moon, & Green, 1997). There was no difference in the dialogues used by these two machines, yet participants appear to have continued to rely on scripts imported from interactions with humans without considering the scripts' irrelevance to computers. Similarly, Posard (2014) found that evaluations of a computer's performance on a group task did not significantly change when the machine was named "James" or "Julie," however, these participants did estimate the former costs significantly more to purchase than the female machine. This finding suggests that participants rely on the social "script" of gender when asked to formulate cost estimates of their computers.

Nass and Moon (2000) also argued that the mindless applications of scripts and stereotypes can alter perceptions of machines when the differences are based on in-group ethnic identity (Nass, Isbister, & Lee, in press) and group identity based on minimal, arbitrary differences (Nass, Fogg, & Moon, 1996). This application of mindlessness also extended to normative behavior, where Nass and Moon (2000) argued that the norm of reciprocity (Gouldner, 1960) extends to people's interactions with "helpful" computers (Fogg & Nass, 1997). Nass and Moon (2000) observe that throughout their research they have never encountered a participant who verbally declared that computers should be understood or treated like humans—yet, across many studies, people have been shown to often behave as if human scripts and stereotypes applied equally well to computers.

In the present study, we ask two important questions for research on human–computer interaction. First, what are the conditions that break mindlessness for people during these interactions? Second, could breaking this mindlessness have benefits for the way that people perceive their interactions with computers?

3. Predictions

Drawing from research on mindlessness that suggests people treat computers as if they are humans across a wide range of situations (Nass & Moon, 2000), we expect participants to exhibit similar behaviors toward partners that are described as being humans or computers, unless sufficiently motivated to examine the identities of their partners. Shank (2012) suggested that disrupting this process of mindlessness by having participants encounter normatively unexpected behaviors from their partners would provide such motivation. This argument leads to our first hypothesis, predicting that participants will behave no differently toward human or computerized partners who behave generously toward them because generosity is normatively expected in this situation. We define generous partners as those who give the vast majority of their resources to participants during each period of exchange (i.e. they gave 95% or more of their resources to participants). We make the following prediction:

Hypothesis 1. Participants will give an equal amount of resources to human or computerized partners who behave generously toward them.

Shank (2012) expected that a partner's coercive behaviors (that he defined as the use of punishments to gain compliance) would disrupt participants' mindlessness, which would lead participants to examine the identity of their partner. When the partner is a computer, participants might conclude that a machine cannot intentionally behave in an unjust manner and is therefore less deserving of retribution. Although Shank (2012) proposed several mechanisms to explain his findings, the results largely support what was predicted by his treatment of mindlessness, and we expect a similar process to occur when participants interact with a selfish partner. Hypothesis 2 predicts that selfish behaviors by partners will "break" the mindlessness of participants because such behavior is not normatively expected, and that a closer evaluation of the partner's identity may lead participants to behave more generously toward partners that are described as computers instead of humans. This is because it may be harder to apply human characteristics, such as selfishness, to computers. We define selfish partners as those who keep the vast majority of their resources for themselves during each period of exchange (i.e. they keep 95% or more of their resources for themselves instead of giving it to participants). We make the following prediction:

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