Facilitating Employee Intention to Work with Robots

Research Idea Abstract

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Abstract

Organizations are adopting and integrating robots to work with and alongside their human employees. However, their human employees are not necessarily happy about this new work arrangement. This may be in part due to the increasing fears that robots will eventually take their jobs. Organizations are now facing the challenge of integrating robots into their workforce by encouraging humans to work with their robotic teammates. To address this issue, this study employs similarity and attraction theory to encourage humans to work with and alongside their robotic co-worker. Our research model asserts that surface and deep level similarity with the robot will impact a human's willingness to work with a robot. We also seek to examine whether risk moderates the importance of both surface and deep level similarity. To empirically examine this model, this proposal presents an experimental design. Results of the study should provide new insights into the benefits and limitations of similarity to encourage humans to work with and alongside their robot co-worker.

Keywords: human-robot similarity, trust, risk, willingness to work with robots, and robots

Facilitating Employee Intention to Work with a Robotic Partner

Research Idea Abstract

Introduction

Organizations are increasingly adopting robots to both replace and work alongside their employees. For example, Amazon operates 45,000 robots that work alongside their employees and are adding 15,000 more yearly (Patrick and Bhasin 2017; Shead 2017). At the same time, many employees are growing resentful to the use of robots because they fear the loss of their own job or their co-workers (Surowiecki 2017; Takayama et al. 2008). This fear can engender negative attitudes toward robots, which can deteriorate trust, job satisfaction, and performance. As a consequence, organizations are now facing the challenge of integrating robots into their workforce (Robert and You 2014; You and Robert forthcoming, You and Robert 2017). To counter this, organizations must foster a positive attitude toward robots and encourage their employees to work with them (Nomura et al. 2006).

Despite the importance, there has been little attention directed at understanding the precursors and conditions that determine when humans are more or less likely to want to work with robots (Robert and You 2014; You and Robert forthcoming, You and Robert 2017). Instead, the majority of studies have been directed at examining domestic service robots (Gaudiello et al. 2016; Graaf 2015; Heerink et al. 2008) or social robots like robotic pets (Lee et al. 2006; Woods et al. 2007). Research that has examined the robot adoption in work settings has typically studied on how robots altered the work processes once they have been put in place (Barbash et al. 2014; Barrett et al. 2012; Beane and Orlikowski 2015; Lee et al. 2012; Wasen 2010). Much less attention has been paid to identifying factors which promote positive attitudes toward robots and working with them.

Theoretical Background and Research Model

To address this issue, we turn to the similarity theory as a cognitive mechanism that enhances an employee's willingness to work with their robotic coworker. The similarity theory has provided a useful lens to study both interpersonal and human-robot interaction (Bernier and Scassellati 2010; Zellmer-Bruhn et al. 2008). The effects of similarity with robots are possible because people tend to humanize robots (Duffy 2003; Robert 2017). The humanization of robots occurs in part when humans "attribute human-like qualities to robots" (Robert 2017, p. 1). Similarity among individuals in organizations can facilitate trust and has led to better worker outcomes (Ely et al. 2012). In the human-robot interaction literature, the similarity between humans and robots with regards to gender and personality has been associated with stronger engagement with social robots (Andrist et al. 2015). Research has also found that individuals demonstrate higher levels of liking and emotional attachment toward robots with a similar personality to theirs (Lee et al. 2006; Woods et al. 2007). Such findings suggest that similarity between an individual and a robot (human-robot similarity) should lead to positive perceptions of the robot and their willingness to work with that robot.

We propose a research model, which illustrates how the surface-level and deep-level similarity between a robot and an individual can increase trust in the robot, which ultimately increases willingness to work with the robot and the subsequent willingness to replace one's human co-worker with a robot (Figure 1). We propose to examine two types of similarity: surface- and deep-level. The surface-level similarity refers to characteristics such as gender (Fisher et al. 2012). Gender is one of the most salient and robust external cues in the design of robots (Carpenter et al. 2009; Tay et al. 2014). We proposed to study the effects of the robot's gender to invoke a perception of the surface-level similarity (Tay et al. 2014; Van Knippenberg et al. 2004). On the other hand, the deep-level similarity is related to characteristics such as personality and knowledge (Harrison et al. 2002). As robots are becoming more intelligent and capable of communicating with people in natural ways, people tend to believe that robots manifest values and opinions (Takayama et al. 2008). This warrants an investigation of the impacts of deep-level similarity.

The research model also illustrates that the links among trust, work intention, and replacement intention are moderated by the risk of danger in the collaborative task. Given that robots are adopted to a wide range of teamwork, from service work to life-saving missions, it is essential to understand when teams can benefit from human-robot similarity. The dual-process approach explains that individuals engage in more deliberate and conscious cognitive process in risky situations (Duckitt 2001; Hung et al. 2012, 2004; Mukherjee 2010; Robert et al. 2009; Yaari 1987). Likewise, it is possible that the positive impacts of human-robot similarity on subsequent attitudes toward the robot are true only in low-stakes situations, while the impacts are weak or non-existent in high-stake situations. We also highlight that our research model examines a worker's willingness to replace their human co-worker with a robot (i.e., I would like the robot to do the job for my teammate). Although the greater willingness to work with a robot may lead to the stronger preference for robots, the link can exist only when the risk of danger is low, not high. Specifically, high risk of danger can activate a deliberate thought process, by which workers may conclude that it is better to work with robots to a dangerous situation than to risk human lives.

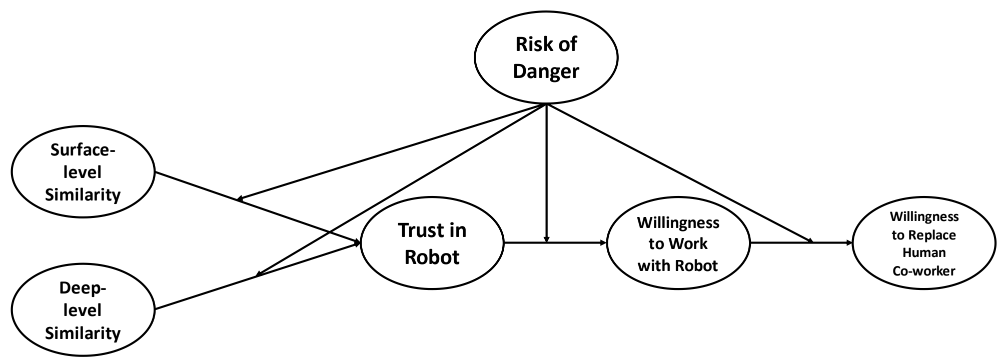

Figure 1. Proposed Research Model

Method

We propose to conduct an online experiment using Amazon Mechanical Turk. The experiment will be a 2 (surface-level similarity: same vs. different gender) x 2 (deep-level similarity: same vs. different work style) x 2 (risk of danger: high vs. low) between-subjects design. Individual participants will be randomly assigned to one of the eight conditions and presented with a scenario with videos, in which they perform a collaborative task with an intelligent robot. The procedure will involve a post-questionnaire after the online interaction with a robot, which contains measures for trust toward the robot, willingness to work with the robot, and willingness to replace their teammates with the robot, as well as manipulation checks.

Surface-level similarity will have two conditions based on robot gender: the same vs. different gender with a participant. Robot gender will be manipulated through a video that will contain a synthesized computer voice and a name suggesting a typical gender attribution (e.g., Jessica or David). On the other hand, deep-level similarity will also have two conditions: the same vs. different work style. Participants will be given a series of questions regarding various work styles based on Zellmer-Bruhn et al. (2008). The questions are intended to make participants choose an opinion on matters regarding beliefs about and habits of work (e.g., central leadership vs. shared leadership). Finally, we will manipulate perceived risk by varying the task conditions: high vs. low risk. In the high-risk condition, participants will be presented with a much more dangerous scenario than in the low-risk condition. Robots are often employed for dangerous tasks that are too hazardous for humans (Shead 2017; Takayama et al. 2008).

Potential Contributions

We expect that this study will provide new insights into research. This study will unpack the cognitive process by which similarity with a robot leads to higher levels of trust and willingness to work with it through examining the moderation effect of risk of danger. We expect to open a new area for research to investigate in what circumstance and why an individual chooses to work with a robot. Also, this study has potential to provide practical guidelines for robot designers and organizations.

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