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Exploring The Shifting Role and Status of Collaborative Robots In Industrial Settings

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TREO Paper

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Abstract

Despite power being an extensively studied topic, there is limited knowledge about how organizational power dynamics are changing due to novel robotic technologies. More specifically, collaborative robots, or cobots, are designed to execute tasks in collaboration with a human employee, presumably affecting the status of both the employee and the robot. In this research in progress, we aim to address this research gap by exploring how the employee–cobot relationship is perceived in industrial organizations in light of status. The study is based on semi-structured interviews of representatives of industrial organizations who have firsthand experience of cobots. In our preliminary analysis, we identified four interrelated themes on how the power dynamics and different statuses between employees and cobots are perceived. Our preliminary findings reveal certain organizational tensions: cobots are presented as subordinates or mere tools, despite their decreasing dependence on employees and an occasional status of a peer.

Keywords: Collaborative Robot, Power Dynamics, Status, Industrial Organization.

1 Introduction

The recent increase in collaborative robots, or cobots, has brought new changes to organizations. Unlike traditional industrial robots, cobots are designed to work collaboratively (e.g., Cherubini et al., 2016) in close proximity (Vicentini, 2021) with human employees, and do not demand heavy safety requirements or confined spaces but share the working environment (Hentout et al., 2019). Consequently, cobots somewhat resemble teammates or coworkers to employees working with them. This is expected to change organizational work practices as well as the roles and status of employees (e.g., Lumer and Buschmeier, 2022). Status (i.e., individual position in a group hierarchy) as a power dynamic is one significant element affecting social relationships between humans as well as between humans and robots (Kim and Mutlu, 2014; Lei and Rau, 2021).

Traditionally, robots have been seen as having lower status than those using them (Hinds et al., 2004). The so-called traditional paradigm of automation has perceived technologies as tools or servants helping in the execution of certain tasks (Wesche et al., 2022). Recently, this traditional paradigm has started to shift in new directions. Novel technologies are increasingly agentic by nature (Baird and Maruping, 2021), and in the work context, robots are expected to take over occasional supervisory positions (Andrist et al., 2013; Kim and Mutlu, 2014; Sheridan, 2016; Kropivšek Leskovar et al., 2021). The nature of cobots, then again, emphasizes the robot's cooperative role as more of a peer or a teammate (Hentout et al., 2019; Sauppé and Mutlu, 2015). That is, cobots assume a distinct role that has traditionally been fulfilled by human employees.

Despite power being an important topic in Information Systems (IS) literature (for a brief summary, see Simeonova et al., 2022), so far very little attention has been paid to how novel robotic technologies change organizational power dynamics. However, novel technologies in the workplace and the subsequent organizational transformations inevitably impact the power dynamics among employees (Lawrence et al., 2011; Markus, 1983; Silva and Backhouse, 2003). In robotics research, there is limited understanding of how the human-cobot relationship is perceived in real organizational settings (e.g.,

Hinds et al., 2004; Wesche et al., 2022). Such understanding is of importance, as organizational policies, strategies, and guidelines create organizational norms and values that influence the end users' interpretations of the robot adoption and human-robot interaction (Zeller, 2020). For instance, how a new technology is verbally introduced has a notable impact on how it is perceived, understood, and used within the organization (Siino and Hinds, 2004; Charalambous et al., 2015). To address this gap and to understand the potential on-going changes in organizational paradigms of human-robot relationships, we aim to answer the following research question: *How is the employee-cobot relationship perceived in industrial organizations in light of status?* To answer the research question, we have so far conducted 11 semi-structured interviews in Finnish industrial organizations that are currently using cobots in their production processes. More interviews are to be conducted.

2 Methodology and preliminary findings

Qualitative interviews allow the collection of data that provides rich insights into real-life experiences (Lune and Berg, 2017; Myers, 2020). The criteria for our interviewees included first-hand experience of working with collaborative robots in the industry. The interviews were conducted following the guidelines by Myers and Newman (2007). For example, we had some predetermined themes and questions for the semi-structured interviews but left room for new emerging themes and topics (Myers and Newman, 2007). The interviewees covered employers (CEOs), managers, and employees in expert positions related to robots, such as application engineers. We analyzed the interview data by following the guidelines by Braun and Clarke (2019) using thematic analysis, categorizing words, sentences, or short phrases into internally consistent themes. The analysis aimed to identify the framings and sense-making related to the cobot-employee relationship in industrial organizations. More specifically, we apply the lens of status as it is a significant element of organizational power dynamics affecting human-robot relationships (e.g., Lei and Rau, 2021).

In our preliminary analysis, we identified four interrelated themes on how the power dynamics and varying statuses between employees and cobots are perceived. First, the most prominent theme in our data framed cobots as being supervised by employees. That is, cobots were presented as subordinates to employees and having lower status compared to them. Second, cobots were framed as tools like any others. That is, organizations did not acknowledge distinct characteristics of cobots compared to other automation technologies and, for example, denied any sense of agency related to them. Third, cobots were framed as being less dependent on employees' expertise. That is, cobots are seen as significantly easier to use, program, and operate compared to traditional industrial robots, decreasing the need for education or training of the employees. The acknowledged expertise contributes to a sense of higher status, whereupon the framing of cobots as less dependent on the expertise may result in the lower perceived status affecting the individual performance as well as the employee-cobot interaction (Lei and Rau, 2021). Finally, within the fourth theme, cobots were framed as acting as a backup for employees. The industrial organizations presented cobots as occasional substitutes for humans used to, for example, cover for an employee's sick leave or as an answer to a shortage of employees. That is, at least an occasional status of a peer was identified.

3 Next steps

Our research aims to contribute to two streams of literature. First, we contribute to the literature on power in IS by answering the call to increase the understanding of power dynamics in organizations (Simeonova et al., 2022) and extending prior theorizing to the novel context of robotic technologies. Secondly, we contribute to the HRI literature by showing how industrial organizations' current framing of cobots fails to acknowledge the changing nature of the human-robot relationship, which involves collaboration and the intended peer-like status of cobots (Hentout et al., 2019). Our preliminary findings align with prior research (Sauppé and Mutlu, 2015) noting that managers tend to frame cobots similarly to other technologies. However, from a practical perspective, organizations could benefit from producing sense-making that acknowledges the evolving nature of the human-robot relationship. Implementing more autonomous collaborative robots that do not require the supervisory status of an

employee, while maintaining the current framing that partly ignores these changes, may potentially trigger organizational conflicts. Therefore, our preliminary findings call for further examination.

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