Title: Workers' Meanings of AI's Characteristics, Uses, and Outcomes

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Introduction

Artificial intelligence (AI) is changing the nature of work. The advances in computational power and availability of data have allowed AI to autonomously interact and learn from its environment to achieve well-defined goals today (Glikson & Woolley, 2020). Unlike previous technologies (e.g., email and computer) that serve as a tool and medium between workers' interactions, AI assumes the role of a colleague in establishing a relationship with workers (Guzman & Lewis, 2020). In this relationship, AI learns and can be perceived as a partner that shapes, and one that can influence a co-worker. This characteristic in the relationship between AI and a worker raises questions about workers' meanings of AI's characteristics, uses, and outcomes. Meanings associated with the AI artifact will have implications that shape workers' interactions and consequences of AI in the workplace (Ågerfalk & Conboy, 2021).

Typically, studies on workers' relationships with AI have developed along two arcs. In the pessimistic arc, AI is characterized as a tool used for the automation of work towards improved productivity and cost efficiency (Willcocks, 2020). Automation tends to deskill workers and threaten their employment. The optimistic arc frames AI as augmenting and collaborating with workers (Rai et al., 2019). Augmentation helps workers overcome their physical and cognitive limits. In contrast to AI being a tool, Al can also be seen as a colleague collaborating to achieve optimal outcomes that neither party can achieve on its own. AI can be trained to complete tedious physical and cognitive tasks, while workers focus on non-routine tasks demanding complex analytical and emotional abilities (Raisch & Krakowski, 2021). The potential of AI is growing and continues to be important for organizations. By 2023, International Data Corporation (2019) predicted that organizations would invest up to $97.9 billion in AI.

While AI is becoming integral to the workplace, studies have yet to analyze how the technical and social meanings of AI relate to each other, owing to the emphasis on either technical or social aspects. This emphasis has yet to illuminate how workers understand the meanings of AI in terms of (1) their relationship with AI before and after use, (2) how the social characteristics of AI figure in relation to its physical characteristic, (3) how AI's characteristics specifically relate to its uses and outcomes on work. This study adopts the structurational model of the technology to analyze the interplay of workers' relationship with AI, in terms of the meanings that workers ascribed to AI's characteristics, its uses, and outcomes on work. The research will conduct a qualitative longitudinal interview with

working professionals before and after using AI with the following guiding questions.

Research Question

RQ1a. What are the meanings of AI's physical and social characteristics as understood by workers in the work context?

RQ1b. How do workers' meanings of AI's characteristics relate to its work uses?

RQ1c. How do workers' meanings of AI's characteristics relate to its work outcome?

Literature Review

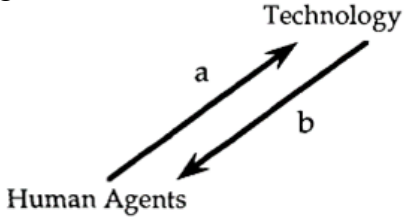
We draw on a socio-technical lens to address our research questions. Studies in the technological deterministic perspective prioritizes AI as the antecedent factor in shaping work. The unidirectional outcomes of AI on work pose limitations in analyzing how workers ascribed meanings to AI's characteristics, uses, and outcomes. Notably, studies have been concerned with AI's impacts on workers based on its pre-determined capability. These studies were interested in the extent AI impacts work attitudes and behaviors (e.g., job engagement and productivity) and competencies (e.g., skills) (Braganza et al., 2021). Additionally, the scant attention on the social aspects has revolved around AI narratives and its implication for social lives (Hovorka & Peter, 2018; Waardenburg et al., 2018)

Yet, it is also important to provide a socio-technical lens. The lens that recognizes the interplay between the contextual socio element of workers, and the technical element of AI, which has the potential to contribute new insights (Sartori & Bocca, 2022). In particular, how workers understand their relationship with AI plays out before and after use. When workers interact with AI, they bring their interpretations of it to the workplace. It is for this reason that the workers' interactions with AI shape workers' meanings of that artifact. These meanings can also shape workers' subsequent interactions, and consequences of AI, including unintended uses and outcomes (Ågerfalk & Conboy, 2021). Therefore, a socio-technical perspective is suited to analyze workers' relationship with AI.

Structurational Model of Technology Theoretical Framework

This paper adopts the structurational model of technology, a model originating from Gidden's structurational theory that recognizes the human agency and structure. The model posits how human agents, technology and institutional properties interact to influence users' (re)current use of technology (Orlikowski, 1992). This model recognizes the interaction and mutual impacts between workers and AI. Unlike the social-materiality perspective, the structurational model of technology also assumes that AI does not have agency, consistent with the research conceptualization of the weak AI hypothesis. According to Figure 1, this study focuses on human agents and technology interactions – (a) technology as a product of human agency, and (b) technology as a medium that facilitates and constrains the human agent.

Figure 1. Structurational Model of Technology Extract



Note. Reprinted from 'The Duality of Technology: Rethinking the Concept of Technology in Organizations,' by Orlikowski, W. J., 1992, *Organization Science, 3*(3), 398–427. Copyright 1992 by The Author(s).

Physical and Social Characteristics

In human interaction with technology, human agents bring their interpretations of the technology, such as its purpose and use (Orlikowski, 1992, 2000). These interpretations are shaped by the technology's physical and social characteristics. The physical characteristic refers to the technology's material and technical features. The social characteristic refers to shared interpretative schemes (e.g., assumption, knowledge, training) and societal norms (e.g., protocols and etiquette).

While the analysis of both technology's physical and social characteristics relation to each other are crucial, studies have primarily conceptualized AI based on its physical characteristics. What is missing are the social characteristics of workers' relationship with AI. AI is often described as technologies with human-like cognition (e.g., algorithms, machine learning, neural networks, natural language processing and robotics). The discussions of its forms range from robots and virtual agents to those embedded into applications such as search engines (Glikson & Woolley, 2020). Meanwhile, AI's functions are understood to mimic human intelligence with the capabilities of perceiving, reasoning, interacting, learning, and evaluating its environment to meet specific goals (Raisch & Krakowski, 2021). The investigations on AI physical characteristics have so far been limited to its uses and outcomes. AI's uses mainly revolve around automation and augmentation capabilities, and outcomes that have focused on productivity and consistency.

Instead, what is missing are the meanings workers ascribed to AI social in relation to the physical characteristics. Specifically, the unexplored asymmetrical meanings workers make together with AI, perceived as a social partner rather than a tool (Guzman & Lewis, 2020). Some of these characteristics revolve around how workers may ascribe AI with human qualities (e.g., mysterious and complex), the understanding of their roles (e.g., controller, collaborator to checker), and types of workers and AI relationship (e.g., substitution, complementarity) (Elsbach & Stigliani, 2019; Makarius et al., 2020). For example, Natale & Hendrickson (2022) argued that users could attribute qualities, such as agency and creativity to AI. The authors explained using the terms "Lovelace objection" and the "Lovelace effect". The 'Lovelace objection' states that AI is incapable of originality. This statement focuses on the instrumental functions of AI. On the other hand, the 'Lovelace

effect' states that the use of AI artifact is informed by individual and subjective understandings. This latter statement highlights the importance of non-technical aspects situated in a specific context, cultural expectation, and social dynamics. These examples depict possible social characteristics, and how these one-sided meanings in relation to the physical characteristics ascribed by workers remain unexplored.

However, one limitation of the structurational model of technology lies in its assumption of technology as a tool instead of a social entity. This study addresses this limitation by adopting the Computer as Social Actor (CASA) framework. CASA states that humans employ the same heuristics used for human-human interactions to human-computer interactions. The rationale is that human-computer interactions call to mind similar social characteristics as human-human interactions (Reeves & Nass, 1996).

Research Method and Analysis

This research will conduct a qualitative longitudinal interview of working professionals before and after using AI for work. Qualitative longitudinal interview explores in-depth and dynamic processes of participants' experiences and understanding of AI (Derrington, 2019). Unlike studies that reveal an analysis at a single point in time, qualitative longitudinal interview explores insights into how workers understand and narrate their experiences over different points in time. We will conduct semi-structured interviews of 20 workers to reach theoretical saturation from an organization planning to introduce AI. Participants will be recruited via a series of email invitations and snowball sampling. The researchers will use the primary and secondary coding cycles to analyze the data (Saldaña, 2015). The researchers' analysis will also be evaluated using the intercoder reliability technique.

Conclusion and Contribution

In conclusion, studies have yet to analyze the relationship between the technical and social meanings of AI. This study contributes by first, considering technical and social perspectives to shed light on the interplay between workers and AI. Second, it will uncover the understudied social characteristics in relation to the physical characteristics of AI. Last, it will show fine-grain connections of how different meanings workers ascribed to AI's characteristics relate to its uses and outcomes on work. Overall, this research would extend the structurational model of technology understood in fresh ways in AI and work contexts.

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