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Travis Loof  
*University of South Dakota*

Rachel Spinks  
*University of South Dakota*

Lindsay Gagnon  
*University of South Dakota*

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My Co-Worker Is a Real Tool: Perceptions of Human-AI Teamwork

Travis Loof, Rachel Spinks, and Lindsay Gagnon
University of South Dakota, USA

While there is no shortage of excitement about the future use of AI, and perhaps, over speculation about its potential (Bowman, this collection), this paper aims to articulate how current uses of generative AI may be extended from being merely an intelligent tool to a responsive collaborator. In short, we seek to provide a roadmap to better understand AI’s capacity to complement and augment existing tasks through the lens of Human-AI teams (HATs) and encourage an interdisciplinary research agenda to tackle these pressing issues.

Groups, Teams, and Communication Dynamics
In collaboration literature, the terms groups and teams are often used interchangeably. Teams are characterized by members who collaborate repeatedly, relying on one another and sharing a history, a commitment to a task, and a vision for the future. Larson and LaFasto explained that teams thrive on well-defined goals and members that possess essential skills and abilities, harbor a strong desire to contribute, and can collaborate seamlessly. An AI teammate brings the inherent qualities we expect in a team member, complemented by the unique advantages offered by computational technology and the ability to generate natural human language. Indeed, AI is already used within groups and teams in the form of a variety of tools. However, as technology develops, AI will move from being purely a tool to becoming a contributor in a team.

The Dynamics of Human-AI Interactions
AI-advised human decision-making is already being employed in domains like healthcare, search and rescue missions, and organizational knowledge work, to name a few. The breadth of industries, uses, and roles of AI exemplify the evolving relationship between humans and AI. This form of collaboration is a testament to the potential of HATs. HATs are comprised of two or more subjects, with at least one human and one AI component. These entities interact interdependently, performing shared tasks to achieve common goals. The essence of human-AI teaming emphasizes hyper-coordination between human and AI teammates, all working towards a shared objective. For these teams to function optimally, humans and AI must share essential information through various communication channels, predict each other’s actions, and progress through tasks with high-level coordination.

Much of the existing research on AI collaboration has examined intra-team dynamics between human and AI teammates. However, there exists a discernible gap in comprehending how decision-makers will perceive these teams. For instance, how might a policymaker evaluate an analysis produced by a HAT? To bridge this understanding, we invite a comprehensive interdisciplinary research approach. In advocating for interdisciplinary collaboration (modeling the AI Summit), we emphasize the need to understand the mental models shaping human interactions with AI, explore the evolution of social norms around HATs and their contributions, and to integrate these insights to better understand decision-maker perceptions of these hybrid teams.
Mental Models and Schemas in Human-AI Interactions

Mental models play a pivotal role in shaping our interactions with AI. Mental models are knowledge structures used by humans to explain the world around them. Grounded in schema theory, these mental models serve as cognitive blueprints that guide our interactions. For example, in a HAT, a mental model of AI might explain what the interaction might look like (e.g., expected agency, interactivity, and influence to be expected; for more information on this agent-agnostic perspective, see Banks and de Graaf), whereas a schema of AI would categorize an AI as a social actor or a tool.

Research demonstrates that schemas can shape our expectations of AI behavior. The Computer-Are-Social-Actors (CASA) paradigm posits that humans, influenced by their schemas, treat AI as social actors, attributing human-like qualities to them. However, the research team of Velez, Loof, Smith, Jordan, Villarreal, and Ewoldsen found that initial interactions with AI might not always provoke a human schema in subsequent interactions. Such incongruence between schemas can disrupt predictions regarding social interactions and mental models.

By better understanding the nuances and applications of individual mental models and schema toward AI, researchers may be able to better understand how to create more effective HATs through the development of shared mental models within a team. Shared mental models occur when members of a team share a mental model of both the team, teammates, and the task, thus improving overall team performance. Further interdisciplinary research in AI will be needed to fully examine how mental models are created and updated, under what conditions certain schemas are activated, and how to construct a shared mental model from both the perspective of the human and the AI.

Social Norms and AI

Beyond having a mental model by which to evaluate and interact with HATs, humans also rely on social norms to direct their behavior. Social norms are the human expectations about what is appropriate behavior when interacting within a group context. In other words, social norms tell us what we should do, what we ought to approve of, and provide guidance about the standards and expectations within team interactions. Individuals actively use social norms to navigate social interactions in organizations or teams. Developing social norms within a team increases team communication, establishes shared values, and creates an overall sense of support.

Research has found that social norms, although important for team interactions, are seen as unimportant by AI developers working in the field of human-computer interaction. Also, research is needed to explain social norms towards an AI teammate and a HAT. We echo this call in suggesting that future research should begin to explain and predict the formation and utilization of social norms within HATs. Once the human members of the team establish and enact the expectations and appropriate behaviors within the group, the AI members will be able to recognize and adapt to these patterns of behavior as well, resulting in a more effective team.

Stakeholder Perceptions in AI Teams

Human decision-makers and human team members play a crucial role in shaping the mental models and social norms within a HAT. As such, understanding how stakeholder perceptions
(both norms and mental models) can influence team dynamics, decision-making processes, and overall performance may offer insight into the challenges and opportunities that lie ahead for HATs. For example, shared mental models can help in anticipating the distribution of tasks and teammates' behaviors, leading to more efficient team operations. Additionally, by understanding these perceptions, research can also better understand how decision-makers could apply their own mental models and use social norms to evaluate the work product created by HATs. Such investigations will become paramount to better understanding not only how the human-AI collaboration process works but also identifying areas where such collaboration is unwarranted or areas of communication and team breakdown.

**Future Implications and the Road Ahead**

Future research should focus on equipping humans with a better understanding of their future AI teammates. Further empirical work is needed to examine the links between schemas, mental models, shared mental models, and social norms in human-AI teams. A transdisciplinary approach, integrating insights from media and communication, other social science fields, and STEM fields, is the need of the hour. By fostering collaborations across disciplines, we can hope to unravel the complexities of AI and harness its potential for the greater good. This paper invites a dialogue about the multifaceted dynamics within HATs and their implications for decision-making and insight generation. By unpacking these processes and stakeholder dynamics within HATs, we move towards a deeper understanding of the relationship between AI and humans in various contexts.

**References**


