

HUMAN-AI COLLABORATION IN GROUP CREATIVITY

TREO Paper

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Abstract

AI tools have proliferated in workplace settings to support various tasks. The extent and nature of their use continue to evolve as new A.I. tools, like generative A.I., disrupt the business landscape. To date, most human-AI collaboration research studies chatbots and their use in customer service settings, thus focusing past investigations on basic one-on-one interactions. However, as organizations are increasingly structured alongside teams, understanding human-AI collaboration to support true collaboration (i.e., between multiple users) and activities that reach beyond customer service settings, appears crucial. Hereto, this paper explores the role of chatbot communication style—human versus machine—and chatbot role—as a passive process facilitator versus an active ideator—in influencing group collaborative creativity in the context of remote teamwork. Expanding our understanding of human-AI collaboration has the potential to generate significant theoretical and practical implications for collaborative and remote work uses of AI tools characteristic of today’s hybrid workplaces.

Keywords: Human-AI Collaboration, Chatbots, Group Creativity, Remote Teams

1 Introduction

The proliferation of AI tools in workplace settings is burgeoning, with 73% of businesses already using or planning to use them (Haan and Watts, 2023). However, while existing research has focused largely on chatbots in customer service and on one-on-one interactions (Rapp et al., 2021), there's a noticeable gap in our theorizing about true human-AI collaboration, i.e., the interaction of a group of people with an AI tool, like a chatbot, to complete collaborative tasks and outcomes (Peng et al., 2019).

Understanding the interaction of AI tools with a team of people is crucial, particularly in today's dynamic world in which organizations are increasingly structured in teams. Hence, future interactions with AI are likely to be group-based, underscoring the need to design AI tools to effectively support team collaboration. This study aims to fill this gap by investigating human-AI collaboration specifically in the context of team creative collaborations—a critical class of collaborations for today’s organizations and one likely affected by AI in the future given the rapid evolution and proliferation of generative AI technologies in organizations.

Our research questions therefore ask: *What are the effects of chatbot communication style and chatbot role vis-à-vis group creativity in the context of remote teamwork? How do chatbot characteristics affect underlying collaborative creativity mechanisms including serendipity, group cohesion, and psychological safety?* By focusing on team creativity, we seek to uncover the idiosyncrasies of human-AI collaboration in remote team settings—typical of today’s hybrid workplaces—and the role of chatbot design in enhancing truly collaborative outcomes, namely team creativity, an area that has been largely overlooked in current research on human-AI collaboration.

2 Theoretical Foundation and Research Model

Team creative collaboration may be influenced by a plethora of underlying factors. The theory of organizational creativity (TOC) aims to explain the mechanisms underpinning creativity (Woodman et al., 1993) and emphasizes how the creative situation is influenced by both individual and situational context.

Mechanisms affecting teamwork and group creativity include, among others, *group cohesiveness*, *serendipity*, and *psychological safety*. In this study, we leverage key concepts from TOC—including creative behavior, situational contexts, individual and group characteristics—to understand their interplay as well as their functioning in the context of human-AI collaboration; specifically, the effect of chatbot characteristics (*role* and *conversational style*) on antecedents of group creativity and *group creativity* per se. Figure 1 shows the proposed research model.

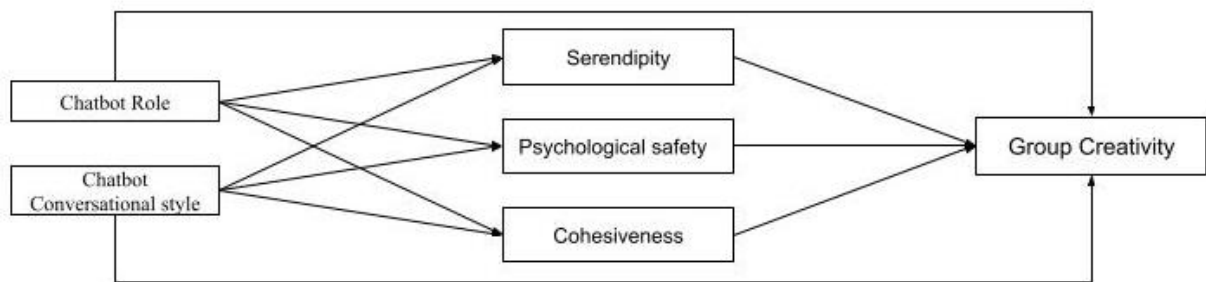


Figure 1. Proposed Research Model.

3 Methodology

3.1 Research Design

To address our research questions, an online 2x2 between-subjects experiment is currently underway involving the manipulation of two chatbot characteristics, namely the conversational style used by the chatbot (human-like vs. machine-like) and the chatbot's role in the creative process (facilitator—i.e., passive participant orchestrating the process—vs. ideator—i.e., an active participant in the idea creative process)). Although conversational style is in line with existing chatbot research, its role in group settings has not been explored. Furthermore, considering the proliferation of generative AI tools and applications, a desire to understand the impact of active chatbot involvement in the creative process—e.g., the ability to propose ideas—highlights the relevance of the second manipulation.

For this controlled experiment, ultimately 32 groups per condition (4 conditions total) and 3 participants per group (i.e., 384 participants) will be recruited, as determined through a G*Power analysis. The study participants will comprise individuals with prior team collaboration experience; hence, we will recruit participants who hold at minimum a graduate degree. Recruited participants will be placed in groups of three, excluding the chatbot (i.e., the chatbot will be the fourth participant). For the preliminary results reported below, we rely on 10 groups per condition as data collection is still ongoing.

3.2 Procedure

Participants are being recruited via Prolific and assigned to teams of 3 for a 45-minute online activity. The scenario entails each group collaborating to create slogans to promote public transportation among university students with the aim of improving environmental sustainability. Each participant will first engage in a 5-minute individual brainwriting session (before being admitted to the group chat session), followed by a group brainstorming session, following recommendations in extant creativity literature.

The objective of the first group stage of the experiment (divergent creativity or brainstorming) is to generate as many slogan ideas as possible. The second stage (convergent creativity) asks each group to choose their most creative slogan and submit it for a contest.

3.3 Measurement

Following the completion of the group experiment, individuals are asked to fill out a post-experiment survey. Surveys are distributed electronically via Qualtrics and are based on scales validated in existing literature for measuring underlying mechanisms including serendipity, group cohesiveness, psychological safety (Edmondson, 1999; McCay-Peet & Toms, 2011; Salisbury et al., 2006). In addition, group creativity is measured as an output of the team's activity, specifically the quantity and quality of the ideas generated, with quality being assessed by experts using Tierney & Farmer's (2002) three-dimensional scale. Additionally, we also collected responses vis-à-vis a self-reported creative performance scale (Shi & Zhou, 2007).

4 Data Analysis and Preliminary Findings

Although more sophisticated analytical techniques will be used to analyze the full data set, we conducted a preliminary analysis of 131 participants, with 10 groups for each of the four conditions, using a non-parametric two-tailed exact Wilcoxon rank sum test. Our preliminary analysis reveals several interesting findings, including a significant difference in serendipity between the two chatbot roles of ideator and facilitator ($p < 0.1$), with groups in which the chatbot takes on a more active role reporting higher levels of perceived serendipity. Although not significant (likely due to the current, small sample size), the mean number of slogans generated by the ideator groups was higher than that of the facilitator groups. Another interesting finding is that 20% of groups in the ideator conditions ultimately selected a slogan suggested by the bot as their most creative slogan in the convergence stage, which might be an early indicator of a possible positive effect on idea quality (which has not yet been measured in the exploratory study, as data collection needs to be completed before eliciting expert reviews for assessing idea quality).

5 Discussion and Concluding Remarks

This study seeks to better understand the role of human-AI collaboration in truly collaborative settings, namely that of team creativity, an activity of critical importance in today's organizations. By delving into the nuanced dynamics of chatbot communication style and role and the influence thereof on collaborative mechanisms and creative performance, this research aspires to shed light on uncharted territory, offering insights into the intricate interplay between technology and creativity in collaborative settings. Preliminary findings suggest that the chatbot's role, such as acting as a peer (ideator condition), may profoundly influence serendipity, a critical antecedent to creativity, in addition to enhancing the outcome of the creative process, including the number of ideas generated and possibly idea quality. This highlights how human-AI collaboration in remote team settings, especially in instances where chatbots play a more generative (i.e., ideator) role, may give rise to significant discoveries and innovations. Considering that creativity is the root-cause of innovation, the trend of hybrid and remote work, as well as the increasing adoption of AI tools in workplace settings, this study has the potential to generate critical insights and implications for today's hybrid organizations and collaborative workplaces.

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References

- Edmondson, A. (1999). *Psychological Safety and Learning Behavior in Work Teams*. Administrative Science Quarterly, 44(2), 350–383. <https://doi.org/10.2307/2666999>
- Haan, K., & Watts, R. (2023, December 11). *24 top AI statistics and Trends in 2024*. Forbes. <https://www.forbes.com/advisor/business/ai-statistics/>
- McCay-Peet, L., & Toms, E. G. (2011). *The serendipity quotient*. Proceedings of the American Society for Information Science and Technology, 48(1), 1–4. h
- Peng, Z., Kim, T., & Ma, X. (2019). *GremoBot: Exploring Emotion Regulation in Group Chat*. 2019 Computer Supported Cooperative Work and Social Computing, 335–340.
- Rapp, A., Curti, L., & Boldi, A. (2021). *The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots*. International Journal of Human-Computer Studies, 151, 102630. <https://doi.org/10.1016/j.ijhcs.2021.102630>
- Salisbury, W. D., Carte, T. A., & Chidambaram, L. (2006). *Cohesion in Virtual Teams: Validating the Perceived Cohesion Scale in a Distributed Setting*. Database for Advances in Information Systems, 37(2/3), 147–155.
- Shin, S. J., & Zhou, J. (2007). *When is educational specialization heterogeneity related to creativity in research and development teams? Transformational leadership as a moderator*. Journal of Applied Psychology, 92(6), 1709–1721. <https://doi.org/10.1037/0021-9010.92.6.1709>
- Tierney, P., & Farmer, S. M. (2002). *Creative Self-Efficacy: Its Potential Antecedents and Relationship to Creative Performance*. Academy of Management Journal, 45(6), 1137–1148.
- Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). *Toward a Theory of Organizational Creativity*. The Academy of Management Review, 18(2), 293–321. <https://doi.org/10.2307/258761>