When Interact with Generative AI: The Impact of Anthropomorphized Generative AI on Productivity

Kate Jeonghee Byun
NEOMA Business School
Shijin Yoo
Korea University
Michael Haenlein
ESCP Business School
Daegon Cho
KAIST
Youngchan Hwang
KAIST

Cite as:
Byun Kate Jeonghee, Yoo Shijin, Haenlein Michael, Cho Daegon, Hwang Youngchan (2024), When Interact with Generative AI: The Impact of Anthropomorphized Generative AI on Productivity. *Proceedings of the European Marketing Academy*, 52nd, (119456)

Paper from the 53rd Annual EMAC Conference, Bucharest, Romania, May 28-31, 2024

EUROPEAN MARKETING ACADEMY

When Interact with Generative AI: The Impact of Anthropomorphized Generative AI on Productivity

Abstract

Generative artificial intelligence (AI) has proven beneficial across various domains, offering customized recommendations and functional as a personal assistant. However, there remains limited understanding of how human-like attributes in generative AI impact individuals' productivity. This paper aims to explore the influence of emotional language and visual signals on user productivity. Across four studies, including a field experiment and three lab experiments, the authors demonstrate that encountering emotional language in generative AI can enhance productivity by saving time and improving performance. This effect is expected to be further strengthened when generative AI is anthropomorphized. The authors also intend to uncover the driving forces behind these effects, identifying trust and engagement as mechanisms. The findings suggest that both pre-training generative AI in emotional language and designing anthropomorphism play pivotal roles in boosting productivity.

Keywords: *Generative AI, Anthropomorphism, Human-AI interaction*

Track: *Digital marketing & social media*

1. Introduction

The proliferation of generative artificial intelligence (AI) has brought significant changes for individuals and companies on a large scale. For example, novices can easily find solutions for coding using Github Copilot, students or marketers get helps in writing their essays or advertising copy by utilizing ChatGPT, Bard, or Bing, and creators let generative AI create contents more easily through DALL-E. Professional workers who demonstrate subpar performance often find the greatest advantage in utilizing generative AI, offering the substantial improvements in productivity for companies (Shanbhogue, 2023). Using MetaGPT, which is to assign different roles to GPTs to form a collaborative software entity for complicated tasks, helps product managers, architects, and engineers. Nascent but growing literature demonstrates that generative AI can enhance productivity by conducting economic experiments (Brands, Israeli, & Ngwe, 2023), or by helping participants to complete tasks faster and with higher quality (Noy & Zhang, 2023; Peng, Kalliamvakous, Cihon, & Demirer, 2023).

The emergence of generative AI introduces a significant shift to interactive business in that generative AI may either displace humans or complement existing human's role. For example, Meta launched its own AI characters in its Messenger to interact with humans for actual tasks or more entertainment-focused purposes, such as ride-or-die older sister or free-spirited friend. The medical consultation tool run by generative AI may substantially complement the role of existing doctors by asking patients' individual or situational conditions, diagnosing their symptoms, and recommending the over-the-counter medicine at the pharmacy regardless of time and physical constraints. The human-AI interactions save the individual's time, money, and/or efforts, but also help human service providers (e.g., doctors) and users to focus on important factors (e.g., emergent patients, prioritized tasks).

This research would examine the role of emotional language of generative AI that should be incorporated to build relationships in the natural manner. Interactions are fundamentally social and emotional, and emotional language can serve as the impactful communication devices (Yu, Berg, & Zlatev, 2021). Considering that human-to-human interaction can be extended to human-computer interaction, emotional language of generative AI may evoke individual's perception and responses (Lombard & Xu, 2021). Moreover, generative AI can possess varied anthropomorphic element such as human-like appearance that influences perceptions (Karra, Nguyen, & Tulabandhula, 2022). Previous research revealed that individuals are prone to share their thoughts and pay attention to AI when AI exhibits resolute and determined demeanor (Gurcan, Cagiltay, & Cagiltay, 2020). However, how emotional language of AI influence consumer reactions and the patterns of interaction between human and AI is underexplored (Bharadwaj et al., 2022; Liao & Yan, 2022).

The current work addresses this literature gap by focusing on the impact of emotional language and anthropomorphism of generative AI on user productivity. We propose that emotional language such as happiness or empathy of generative AI may enhance user productivity in terms of saving users' time and enhancing the quality of outcomes. According to Computers are Social Actors (CASA) paradigm, social signals (i.e., emotion, language) affect responses toward technologies (Lombard & Xu, 2021). Specifically, informal and warm (e.g., encouraging and friendly) language styles exerted more influence on perception toward technologies compared to formal and cold language (Sah & Peng, 2015). Previous research revealed that positive emotions increase individuals' productivity by leading them to be more active and persistent on tasks (Staw, Sutton & Pelled, 1994).

Next, we argue that anthropomorphized generative AI would positively strengthen the effect of generative AI's emotional language on productivity because anthropomorphized computer-generated entities evoke greater willingness for users to respond than inanimate ones (Miao et al., 2022) and introducing a more human-like quality to AI could potentially reduce less favorable responses (Yalcin & Puntoni, 2023). Lastly, we plan to demonstrate that trust and engagement mediate the relationship between generative AI's emotional language and users' productivity as trust and engagement are critical factors in which extent individuals accept and use the technology when establishing the relationship between human-AI.

Given the rapid increase of integrating generative AI as an entertaining and effective tool and the ensuing academic interest in them, our research regarding the impact of emotional language of generative AI with a human appearance on productivity would be a timely endeavor to better understand the human-AI interaction as well as how to use generative AI in a productive way alongside opportunities for the firms.

2. Conceptual Framework

2.1. Emotional Language of Generative AI

Previous research has shown that emotional language of computer-generated entities provokes individuals' perception and responses (Leite et al., 2012; Lombard & Xu, 2021; Sah & Peng, 2015). For example, individuals, who experienced emotional language of robot that exhibits empathetic behavior, perceive it as friendlier and better at establishing and maintaining a positive relationship (Leite et al., 2012). After being trained, the computer-generated entities can adapt its internal state and mood to align with the emotional state of its human partner (Sönmez, Köse & Barkana, 2020) and large language model (LLM) can embrace their own personality or characteristic along with the datasets that form their foundation (Karra et al., 2023; Jiang et al., 2023).

Research has identified language of computer-generated entities as a trigger for users' responses, however, some studies argue that language has not consistently resulted in strong reactions (Lombard & Xu, 2021). For example, a voice assistant mobile app's emotional language (e.g., "I like it soooo much," "Super!!!") did not influence users' perceived attraction and perceived trustworthiness of the product (Xu, 2020). Contrarily, we argue that generative AI's emotional language may elicit greater productivity for users. We begin with the idea that anthropomorphized generative AI can satisfy the users' needs to interact real-time as well as to obtain fine-tuned results for specific domains, thus it can enhance customer experience by heightened quality of human-AI interaction (Ameen, Tarhini, Reppel, & Anand, 2021). Accordingly, generative AI is distinctive from previous types of computer-generated entities that have relatively weak influence in emotional language. Moreover, users may adapt generative AI to suit their own needs by utilizing it with various types of knowledge (Brand et al., 2023) and interact with generative AI in an environment that being virtually enveloped so that emotional language may lead users to respond in a differentiated way. Taken together, we hypothesize as follows:

Hypothesis 1. Emotional language exhibited by generative AI, specifically expressions of happiness or empathy, may have a positive impact on users' productivity.

2.2. Anthropomorphism in Generative AI

Anthropomorphism can be coined as the degree to which an object looks like human (Nowak & Rauh, 2006). Enabling computer-generated entities to have human-like attributes shapes people's responses because individuals remind of social norms or human-like abilities when they observe anthropomorphized entities (Miao et al., 2022). The large body of research have demonstrated that anthropomorphism elicits enhanced responses, such as authenticity (Stein et al, 2022), perceived competency (Westerman, Tamborini, & Bowman, 2015; Waytz, Heafner, & Epley, 2014), trust (Nass & Moon, 2000), and credibility as a source of social influence (Miao et al., 2022). Additionally, individuals prefer anthropomorphic entities as those are perceived as in-group rather than out-group, incurring comparable emotional responses (Breves et al., 2021). All in all, we propose the following hypothesis.

Hypothesis 2. The presence of human-like appearance in generative AI strengthens the relationship between emotional language expressed by generative AI and users' productivity.

Trust and engagement play an essential role in all human-computer interactions and affect in what extent individuals accept and use the computer-generated entities (Bickmore & Picard, 2005). Empowered generative AI that entails cognitive and emotional intelligence can autonomously interact with humans by analyzing and responding to users' requests, thereby substantially increasing users trust and engagement (Miao et al., 2022). Considering that anthropomorphism of computer-generated entities leads to higher trust (Nass & Moon, 2000), we posit that emotional language by anthropomorphized generative AI would inflate the trust and engagement. Therefore, we propose a mediating effect, and a moderated mediation as follows.

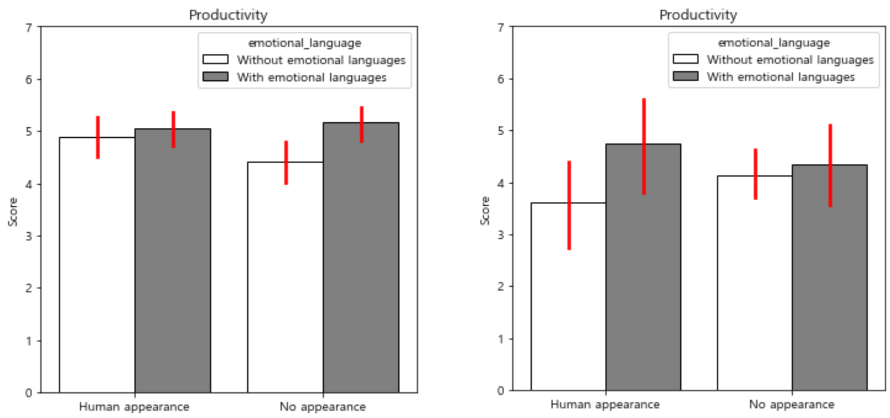
Hypothesis 3. Trust and engagement act as mediating factors in the relationship between emotional language expressed by generative AI and users' productivity.

Hypothesis 4. Human-like appearance in generative AI amplify the mediating effect of emotional language by generative AI on trust and engagement.

3. Empirical Overview

Across four studies, using a combination of real-world and experimental data, we plan to examine the various components of our theoretical concepts to collectively reinforce our hypotheses. In Study 1, the first of three experiments, we recruited 329 participants (M_{age} = 38.22, 53% male) through CloudResearch. We manipulated generative AI's emotional language regarding happiness and asked participants to what extent they believed using anthropomorphized generative AI, both with and without, improved their performance and saved time to measure productivity (Noy & Zhang, 2023). The results indicate that employing emotional language significantly enhances productivity compared to not using emotional language ($M_{\text{emotional language}} = 4.994$, $M_{\text{non-emotional language}} = 4.485$, $p < .01$). Contrary to previous literature, anthropomorphism of generative AI does not significantly enhance users' productivity toward emotional language of generative AI ($\beta = -.415$, $SE = .308$, $p > .1$). However, in separate analysis of the group with and without experience using generative AI, such as ChatGPT, Bard, or Bing, the interactions turn out significant and opposite in the direction: (1) when analyzing the group with experience using generative AI ($N = 258$), the impact of emotional language is greater when generative AI is shown in text-based, not anthropomorphized ($\beta = -.733$, $SE = .336$, $p < .05$), (2) contrarily, when analyzing the group without experience using generative AI ($N = 71$), the impact of emotional language is greater when generative AI is anthropomorphized but statistically insignificant ($\beta = 1.013$, $SE = .72$, $p > .1$) (Figure 1).

Figure 1. Productivity levels within distinct groups exposed to emotional language expressed by generative AI, which is either anthropomorphized or non-anthropomorphized



(a) A group with experience using Generative AI (b) A group without experience using Generative AI

Next, we tested the mediating effect of trust and engagement on the relationship between emotional language of generative AI and user productivity. The results show that both of the indirect effects of trust and engagement on productivity is positive and statistically significant: (1) the influence of emotional language of generative AI on trust (β

=.547, p = < .05) and the influence of trust on productivity is significant and positive (β = .840, p = < .01), (2) the influence of emotional language of generative AI on engagement (β =.600, p = < .01) and the influence of engagement on productivity is significant and positive (β = .931, p = < .01). Given that both direct effects of emotional language of generative AI on productivity are insignificant, trust and engagement fully and positively mediate the relationship between emotional language of generative AI and users' productivity.

Study 2 plans to extend the effect by examining additional emotional language (i.e., empathy) and context (i.e., medical consultation) for generalizability, and provide evidence that the effect is mediated by engagement and trust. We examine the impact of anthropomorphism that positively strengthens the main effect and moderates the mediated effect. In Study 3, the intention is to tailor users' expectations during the pre-interaction phase by allowing them to define the persona and emotional language style of the generative AI. The study aims to evaluate whether the net effects described in H1 and H2 would be magnified when users pre-specify their individual requirements for the AI interaction. Generative AI can meet the specific needs and interests of the users, providing a more tailored conversation. Accordingly, a customized generative AI in terms of emotional language and appearance may boost the effect of generative AI on productivity. In Study 4, we plan to examine whether students exhibit higher productivity when generative AI elicits emotional language in a field experiment, by collaborating with online tutoring platform where students interact with computer-generated teachers operated by generative AI. The digitization of education service, such as using digital devices in classrooms, incurs greater improvements in academic performance for low-achieving students (Lee, Lee, & Jeong, 2023), thus research regarding the efficacy of different technological applications using generative AI with emotional language can enrich the comprehension of creating and executing a curriculum suited for individuals accustomed to digital interfaces.

4. General Discussion

This research offers several contributions. First, our works reveal that fundamental impacts exist in emotional language of generative AI. Although generative AI cannot inherently possess emotions, the use of emotional language leads consumers to greater engagement and trust, enhancing the productivity. Second, to the best of our knowledge, this is the first attempt to reveal the effect of anthropomorphized generative AI and to examine its influence on consumer productivity in the interactive business. Third, the results will provide marketing managers with insights into how language and human-like attributes can be managed to improve productivity.

References

Bharadwaj, N., Ballings, M., Naik, P. A., Moore, M., & Arat, M. M. (2022). A New Livestream Retail Analytics Framework to Assess the Sales Impact of Emotional Displays. *Journal of Marketing*, 86(1), 27–47.

Bickmore, T. W., & Picard, R. W. (2005). Establishing and maintaining long-term human-computer relationships. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 12(2), 293-327.

Brand, J., Israeli, A., & Ngwe, D. (2023). Using GPT for market research. Available at SSRN 4395751.

Gurcan, F., Cagiltay, N. E., & Cagiltay, K. (2021). Mapping Human–Computer Interaction Research Themes and Trends from Its Existence to Today: A Topic Modeling-Based Review of past 60 Years. *International Journal of Human-Computer Interaction*, 37(3), 267–280.

Karra, S. R., Nguyen, S. T., & Tulabandhula, T. (2022). Estimating the Personality of White-Box Language Models. arXiv preprint arXiv:2204.12000.

Lee, S., Lee, J. H., & Jeong, Y. (2023). The Effects of Digital Textbooks on Students' Academic Performance, Academic Interest, and Learning Skills. *Journal of Marketing Research*, 60(4), 792–811.

Liao, T., & Yan, B. (2022). Are You Feeling Happy? the Effect of Emotions on People's Interaction Experience Toward Empathetic Chatbots. *In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 86236). American Society of Mechanical Engineers.

Lombard, M., & Xu, K. (2021). Social Responses to Media Technologies in the 21st Century: The Media Are Social Actors Paradigm. *Human-Machine Communication*, 2(1), 29–55.

Miao, F., Kozlenkova, I. V., Wang, H., Xie, T., & Palmatier, R. W. (2022). An Emerging Theory of Avatar Marketing. *Journal of Marketing*, 86(1), 67–90.

Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Available at SSRN 4375283*.

Peng, S., Kalliamvakou, E., Cihon, P., & Demirer, M. (2023). The impact of AI on developer productivity: Evidence from GitHub Copilot. arXiv preprint arXiv:2302.06590.

Sah, Y. J., & Peng, W. (2015). Effects of visual and linguistic anthropomorphic cues on social perception, self-awareness, and information disclosure in a health website. *Computers in Human Behavior*, 45, 392–401.

Shanbhogue, Rachana. (November 13, 2023). Generative AI holds much promise for businesses. *Economist*. Retrieved from https://www.economist.com/the-world-ahead/2023/11/13/generative-ai-holds-much-promise-for-businesses (Last accessed: December 3, 2023).

Staw, B. M., Sutton, R. I., & Pelled, L. H. (1994). Employee positive emotion and favorable outcomes at the workplace. *Organization Science*, 5(1), 51-71.

Waytz, A., Heafner, J., & Epley, N. (2014). The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle. *Journal of Experimental Social Psychology*, 52, 113-117.

Xu, K. (2020). Language, modality, and mobile media use experiences: Social responses to smartphone cues in a task-oriented context. *Telematics and Informatics*, 48, 101344.

Yalcin, G., & Puntoni, S. (September – October 2023). How AI Affects Our Sense of Self. *Harvard Business Review*. Retrieved from https://hbr.org/2023/09/how-ai-affects-our-sense-of-self. (Last accessed: December 3, 2023).

Yu, A., Berg, J. M., & Zlatev, J. J. (2021). Emotional acknowledgment: How verbalizing others' emotions fosters interpersonal trust. *Organizational Behavior and Human Decision Processes*, 164(May 2021), 116–135.