A Systematic Review of the Predictors, Mediators and Moderators of the Uncanny Valley Effect in Human-Embodied Conversational Agent Interaction

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Abstract : Background: Embodied Conversational Agents (ECAs) are revolutionizing education and healthcare by offering cost-effective, adaptable, and portable solutions. Research on the Uncanny Valley effect (UVE) involves various embodied agents, including ECAs. Achieving the optimal level of anthropomorphism, no consensus on how to overcome the uncanniness problem. Objectives: This systematic review aims to identify the user characteristics, agent features, and context factors that influence the UVE. Additionally, this review provides recommendations for creating effective ECAs and conducting proper experimental studies. Methods: We conducted a systematic review following the PRISMA 2020 guidelines. We included quantitative, peer-reviewed studies that examined human-ECA interaction. We identified 17,122 relevant records from ACM Digital Library, IEE Explore, Scopus, ProQuest, and Web of Science. The quality of the predictors, mediators, and moderators adheres to the guidelines set by prior systematic reviews. Results: Based on the included studies, it can be concluded that females and younger people perceive the ECA as more attractive. However, inconsistent findings exist in the literature. ECAs characterized by extraversion, emotional stability, and agreeableness are considered more attractive. Facial expressions also play a role in the UVE, with some studies indicating that ECAs with more facial expressions are considered more attractive, although this effect is not consistent across all studies. Few studies have explored contextual factors, but they are nonetheless crucial. The interaction scenario and exposure time are important circumstances in human-ECA interaction. Conclusions: The findings highlight a growing interest in ECAs, which have seen significant developments in recent years. Given this evolving landscape, investigating the risk of the UVE can be a promising line of research.

Keywords : human-computer interaction, uncanny valley effect, embodied conversational agent, systematic review

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