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THE EVOLUTION OF CHATBOT DIGITAL IMAGE DESIGN: THREE STAGES FROM TEXT INTERFACE TO ANTHROPOMORPHIC EXPRESSION

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This study examines the evolution of chatbot digital avatar design, from text-based interfaces to symbolic and anthropomorphic visual designs. Anthropomorphic features, such as human-like expressions and conversational styles, enhance emotional connections, user experience, and trust. However, challenges like the uncanny valley effect and ethical concerns require a balanced approach. Future research should focus on affective computing, cultural adaptability, and dynamic interactions to optimize design and improve user acceptance.

Key words: chatbot, digital avatars, anthropomorphic design, human-computer interaction.

INTRODUCTION

The evolution of chatbot digital avatars reflects advancements in human-computer interaction, progressing from text-based interfaces to symbolic visuals and highly anthropomorphic designs. These changes have enhanced interaction efficiency and user engagement, bridging the gap between machine intelligence and human-like interaction. As chatbot avatars become more expressive, their visual design plays a crucial role in shaping trust and experience. However, challenges like the uncanny valley effect and ethical concerns remain. This study examines the historical development, typologies, and trends in chatbot avatar design, highlighting the balance between technological innovation and user acceptance.

PURPOSE

The purpose of this study is to explore the evolutionary trajectory of chatbot digital image design, tracing its development from text-based interfaces to symbolic representations and ultimately to highly anthropomorphic visual expressions. It further investigates how these design transitions have influenced user experience, interaction efficiency, and trust in human-computer interaction.

RESULTS AND DISCUSSION

Since its inception, the design of digital avatars for chatbots has evolved through three major stages: from pure text interfaces to symbolic expressions, and finally to highly anthropomorphic visual designs. This progression reflects



advancements in human-computer interaction technology and shifting user experience needs.

The early text interface stage (1950-1970s) relied entirely on language interaction, without visual design participation, and focused on information transmission and function realization, such as classic cases such as the Turing test and ELIZA [1]. The design characteristics of this stage are highly abstract, obvious function orientation, and technical limitations make the user experience mainly rely on language processing rather than multimodal support. This pure text mode lays the foundation for human-computer cognitive interaction, and also reveals the potential needs of users for more intuitive and diversified forms of interaction.

From the 1980s to the 1990s, with the advancement of computer graphics, chatbots entered the stage of digital symbol design, and visual elements began to be integrated into the interactive interface. Through symbolic designs such as abstract geometric figures and simple icons, the system strikes a balance between functionality and emotionality. Classic symbolic images such as Microsoft's Clippy have brought people and machines closer through dynamic effects and anthropomorphic features, enhancing users' perception and experience of robots. The academic significance of this stage lies in the introduction of visual design into the field of human-computer interaction and the exploration of the role of simple visual language in improving user experience. However, the limitations of symbolic design are also obvious. Its degree of anthropomorphism is low, and it is difficult to meet the needs of complex emotional expression and high immersion.

Entering the 21st century, chatbot design has entered a highly anthropomorphic stage, with visual design focusing on emotional and personalized expressions. Cartoonization and highly anthropomorphic design have become mainstream styles, serving different scene requirements. Cartoon design enhances user affinity with cute and simplified images, while highly anthropomorphic design enhances interactive immersion and trust through realistic visual expressions [2]. The design of this stage is deeply integrated with technologies such as emotional computing and natural language processing to achieve a higher level of user experience. However, highly anthropomorphic design also brings challenges, such as user discomfort caused by the uncanny valley effect and design ethics issues. These issues have prompted the academic community to pay more attention to the balance between the boundaries of anthropomorphic design and user acceptance.

Throughout this evolution, academic research has increasingly focused on the relationship between design style and user experience. From functional text interfaces to intuitive symbolic designs and emotionally expressive anthropomorphic designs, each stage reflects the interplay of technological progress and user needs[3]. Visual design has not only improved interaction efficiency but also shaped the personalized image of chatbots, fostering user trust and emotional connections.

Going forward, the visual design of chatbots will likely incorporate more emotional computing, cultural sensitivity, and dynamic interaction features [4]. Future research should explore how visual design can enhance user experience, empathy, and adaptability across diverse scenarios, while addressing challenges like the uncanny valley effect, cultural adaptability, and ethical considerations. By



integrating interdisciplinary theories and practices, visual design will continue to play a pivotal role in advancing chatbot development and creating more intelligent and humane human-computer interactions.

CONCLUSIONS

The evolution of chatbot digital avatars reflects the advancement of human-computer interaction, from text-based interfaces to symbolic and highly anthropomorphic designs. These developments have enhanced interaction efficiency, user trust, and emotional engagement. However, challenges like the uncanny valley effect and ethical concerns require careful design balance. Future research should integrate affective computing, cultural adaptability, and dynamic interactions to optimize user experience while addressing psychological and ethical issues. Chatbot visual design will continue to shape intelligent, engaging, and human-centered interactions.

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ЕВОЛЮЦІЯ ДИЗАЙНУ ЦИФРОВИХ ЗОБРАЖЕНЬ ЧАТ-БОТА: ТРИ ЕТАПИ ВІД ТЕКСТОВОГО ІНТЕРФЕЙСУ ДО АНТРОПОМОРФНОГО ВИРАЖЕННЯ

У цьому дослідженні розглядається еволюція дизайну цифрових аватарів чат-ботів до символічних і антропоморфних візуальних особливостей, таких як людиноподібні вирази та стилі розмови, які покращують емоційні зв'язки, досвід користувачів і довіру. Однак деякі етичні проблеми вимагають збалансованого підходу. Майбутнє дослідження має зосередитися на емоційних обчисленнях, культурній адаптованості та динамічній взаємодії дизайну і покращенні сприйняття користувачами.

Ключові слова: чат-бот, цифрові аватари, антропоморфний дизайн, взаємодія людини з комп'ютером.