DreamCeption: Towards Understanding the Design of Targeted Lucid Dream Mediation

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ABSTRACT

Lucid dreaming, characterized by an awareness of being in a dream, offers individuals the ability to control dream content, which leads to various benefits such as entertainment, improved mental well-being, reduced concurrent nightmares, skills enhancement, creative inspiration, and problem-solving. However, manipulating dream content can be challenging and even experienced lucid dreamers may encounter difficulties. To address this challenge, we present DreamCeption, an innovative prototype designed to facilitate lucid dream content manipulation. While brain and eye activity sensors detect the lucid dream state, the system provides external stimuli such as visual and auditory stimulation to prime lucid dreamers to the desired content. Our design aims to make the benefits of lucid dreaming more accessible to a broader audience. We anticipate that DreamCeption will not only enhance the lucid dream experience but also attract interest from human-computer interaction researchers who can explore the potential applications of digital lucid dreaming.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**.

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KEYWORDS

Lucid dreaming, dream, sleep, virtual reality, VR, dream control, dream manipulation, content manipulation

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1 INTRODUCTION AND RELATED WORK

Lucid dreaming, defined as the state where individuals are conscious of their dream status, offers a unique realm of experiences where dreamers not only encounter vivid hallucinations but also wield control over their dream content. This distinctive capability has been linked to various benefits, including entertainment, alleviation of recurrent nightmares, and offering a controllable environment for dream experiments [9, 12, 16].

Lucid dreaming is similar to the virtual reality (VR) experience because users for both would immerse themselves in a virtual world but also notice that the experience is just a stimulation [8]. Moreover, we find that lucid dreaming surpasses current VR experience from different perspectives: (1) lucid dreaming can support interoceptive senses, which opens up the possibility of being a "Matrix-like" virtual environment [15]; (2) rather than predetermined by the designers, lucid dreamers can personalize their experiences in real time along with the help from their subconsciousness, which forms a closed-loop neurocentric feedback that enhances the lucid

dreamers' agency among their experiences [13, 14]; and (3) as one of the sleep stages, lucid dreaming still maintains the benefits from sleep itself, such as memory consolidation [1] and recovery [18], while people are having their virtual experiences. Considering these benefits, we posit that lucid dreaming could emerge as the next frontier of VR platforms.

However, lucid dreaming demands substantial practice, posing a huge challenge for most individuals. Despite dedicated practice, even experienced lucid dreamers encounter difficulties in realizing their intended dream content sometimes [10, 11, 17, 19]. To help people experience what lucid dreaming would be like, Kitson et al. introduced Lucid Loop [8], a VR lucid dream simulation with neurofeedback. In contrast to the simulation approach, our objective is to authentically guide people into experiencing lucid dreaming and enabling them to dream about their desired content through interactive technologies. We thus drew insights from prior human-computer interaction (HCI) sleep works. While Horowitz et al. influences the content people see/think during a semi-lucid sleep state by auditory stimulation [5–7], Carr et al. explored the influence of pre-sleep experiences and stimuli during sleep on non-lucid dream content [2, 3]. Motivated by these, we sought to investigate whether similar stimuli could be effectively applied to the context of lucid dreaming. In sum, recognizing the widespread challenge of lucid dream content manipulation, our research focuses on facilitating individuals to shape their dreams with interactive technologies.

2 DREAMCEPTION

We introduce DreamCeption, a novel closed-loop system that detects people's sleep status and provides various external stimuli to prime people to dream of the user-selected topic during lucid dreaming. During sleep, DreamCeption performs Targeted Lucidity Reactivation [4] to induce lucid dreaming. Once the dreamers become lucid, they would move their eyes left to right four times (LR signal [4]) as instructed beforehand to inform their lucidity to the system. As the system receives the LR signal from the eye movement sensors, DreamCeption delivers stimuli tailored to the chosen topic to users' bodies. Here, we illustrate scuba diving as the selected dream topic since lucid dreaming offers a safe space for practicing diving. To help users shape their lucid dream content to scuba diving, DreamCeption provides blue lights, water-flowing sounds, galvanic vestibular stimulation (GVS), and haptic feedback with water and bubbles to simulate ocean diving experience. With the facilitation from DreamCeption, we hypothesize that users would be able to shape their lucid dream content to the underwater diving experience.

3 CONCLUSION

We introduced DreamCeption, a system for targeted lucid dream mediation. With the combination of visual, auditory, haptic, and electrical stimuli, our system aims to guide users in experiencing their desired dream content. Our ultimate goal is to empower individuals to actively design their own lucid dream experiences, fostering a pathway for lucid dreaming as the next frontier VR platform. We anticipate that our efforts will not only contribute to the evolution of lucid dreaming but also inspire researchers in HCI to "dive" in the captivating realm of lucid dreaming.

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