Noetic Dream: A Personalized VR and Meditation System for Lucid Dream Training

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Figure 1: Dreamlike VR environment with floating objects and interactive cues for lucid dreaming training.

Abstract

Lucid dreaming relies on a high level of metacognition and requires significant time and effort to master induction techniques, presenting obstacles for those seeking such experiences. This study proposes a personalized lucid dreaming training system *Noetic Dream* that combines virtual reality (VR) with open-monitoring(OM) meditation, acting on the mechanism of "dream awareness" through both external and internal pathways. VR provides immersive dream-based games to help users practice identifying unrealistic states, while OM meditation stabilizes internal focus and implants lucid intent. The training cycle uses multimodal cues to help users establish dream recognition mechanisms, thereby increasing the likelihood of lucid dreaming. The contributions of this study include: applying generative language models (LLMs) to construct dream VR scenarios, designing dream anomaly detection game mechanisms to stimulate dream awareness, and integrating OM meditation to achieve a non-invasive lucid dreaming training pathway, thereby effectively increasing the probability of spontaneous lucid dreaming.

CCS Concepts

• **Human-centered computing** → **Virtual reality**; • **Computing methodologies** → *Cognitive science*; Interactive simulation.

Keywords

Lucid dreaming, VR meditation, personalized simulation, LLM-generated environment, human awareness

ACM Reference Format:
Qiaoran Wang and Yichen Yu. 2025. *Noetic Dream*: A Personalized VR and Meditation System for Lucid Dream Training. In *The 38th Annual ACM Symposium on User Interface Software and Technology (UIST Adjunct '25), September 28-October 1, 2025, Busan, Republic of Korea.* ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3746058.3758424

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UIST Adjunct '25, Busan, Republic of Korea

ACM ISBN 979-8-4007-2036-9/2025/09
https://doi.org/10.1145/3746058.3758424

1 INTRODUCTION

During dreaming, people generally do not engage in metacognitive reflection on their current mental state. However, lucid dreaming is an exception. It is a state of consciousness during sleep in which cognitively modulated abilities(self-reflection, critical analysis, and introspective insight) are abnormally restored and manifested within

the dream [16, 18]. In simple terms, lucid dreamers can manipulate dream content, thereby gaining the opportunity to experience what they desire. Lucid dreaming has been proven to be not only pleasurable but also beneficial in alleviating recurring nightmares, solving problems, developing skills, stimulating creativity, fulfilling desires, and healing the mind and body [8].

However, lucid dreaming is relatively rare under normal circumstances and rarely occurs naturally; therefore, many studies employ various strategies to increase its frequency, typically categorized into four main methods: cognitive techniques, substance interventions, cortical stimulation, and external stimulation [13]. Classic lucid dreaming training involves critically questioning one's own reality, especially in dream-like or surreal situations. Frequently asking oneself, "Am I dreaming?" while awake may become a habitual cognitive process and be randomly reactivated during dreaming [15]. Practicing these cognitive techniques requires a significant amount of time and effort and can be tedious, making it difficult to sustain [3]. Another lower-cost, more efficient method is the "wake-back-to-bed" (WBTB) technique, which involves waking up in the middle of the night and returning to sleep after a brief period. While studies indicate that WBTB does not negatively impact sleep quality, it can nonetheless disrupt natural sleep patterns [14].

Recent research has explored the use of virtual reality (VR) as a novel means of supporting lucid dream induction. VR environments can enhance the authenticity and surrealism of dream-like experiences, thus promoting critical reflection and metacognitive engagement [9, 12]. Picard-Deland et al. found that VR flying tasks can trigger more flight- and gravity-related themes in subsequent dreams. Similarly, Gott et al. experimentally demonstrated that VR-assisted lucid dream training improved dream lucidity, suggesting that immersive environments can help users practice "maintaining awareness in the unreal" [5].

In parallel, research in meditation has also highlighted its potential to support lucid dreaming. Gackenbach et al. observed that frequent meditators, particularly those practicing transcendental or OM meditation, reported a higher frequency of lucid dreams [4, 11]. Meditation techniques help cultivate key psychological capabilities such as attention stability and metacognitive awareness. Among various approaches, OM meditation has proven especially effective in reinforcing metacognitive skills that may transfer into the dreaming state [1].

Building on these findings, this study proposes a new multimodal lucid dream training paradigm *Noetic Dream*, which integrates "LLM-assisted self-dream reconstruction," "personalized VR dream gamification training," and "OM meditation" into a unified system [6, 10]. Unlike previous approaches based on predefined scenarios or passive suggestion, this system first guides users to describe their real or recurring dream experiences using "natural language."

2 *NOETIC DREAM* WALKTHROUGH

Noetic Dream is designed for users who wish to increase the frequency of lucid dreaming. It aims to provide personalized, non-invasive lucid dream training based on the individual's actual dreams. The system is developed using Unity 3D and Meta Quest 3, and its overall design includes four main components: dream description collection, scene generation, gamified reality detection, and meditation guidance. It leverages multi-modal interaction and adaptive feedback mechanisms to create a complete training loop.

2.1 Dream Replay

At the start of each training session, users describe recent or recurring dreams using natural language. The system guides users to recall dream scenes, characters, and emotions, and uses language models to extract keywords and spatial structures to construct a "dream scene map." For example, "I am in a huge library where bookshelves float in the air. I am constantly searching for a book with no name, and the staircase seems to have no end." The system can identify abnormal elements and behavioral clues.

Subsequently, the system uses a 3D engine to translate the scene map into a VR environment, highly reproducing the user's subjective dream experience, and embeds multiple "surreal anomalies," such as mirrors that cannot reflect one's own image or floating bookshelves. These anomalies are designed based on common features of lucid dreams, aiming to stimulate awareness and maintain interactive engagement. The system also dynamically adjusts anomaly content based on the user's historical performance, achieving personalized dream recreation [17].

2.2 Cognitive Awareness Through LARP-Based Interactions

Users immerse themselves in the generated dreamscape from a first-person perspective, assuming the role of a "dream detective," actively identifying potential anomalies during exploration. When a user taps a suspected anomaly with a gesture, the system displays prompts such as "Something's off!" or "This is a dream!" and guides the user to click the "Confirm" button to complete a reality detection operation. If the identification is correct, the system provides immediate feedback through controller vibration and records the score. All operational behaviors, detection results, and response durations during the interaction process are automatically recorded by the system for subsequent longitudinal modeling and evaluation of the user's dream awareness capabilities. This module not only enhances user engagement but also establishes a direct connection between behavioral data and lucid dreaming abilities [2].

2.3 Self-Awareness Guidance

Once all tasks are completed, the system gradually transitions the virtual environment into a calm and peaceful meditation space, guiding users into a relaxation and intent reinforcement phase. During meditation, users see slowly fluctuating halos and hear low-frequency OM sounds synchronized with breathing rhythms. The system uses multi-modal resonance effects through visual, auditory, and tactile stimuli to guide users to focus on their current bodily sensations and breathing rhythms. In the final stage of meditation, the system guides users to implant lucid dreaming intent: "Please silently repeat in your mind, 'I will be aware that I am dreaming in my next dream.' " Users can choose to repeat silently or aloud, and the system can automatically recognize and confirm the operation. This meditation session aims to reinforce dream awareness intent through multi-sensory stimulation, laying the foundation for achieving lucidity in nighttime dreams [7].

3 FUTURE WORK

In the future, we plan to conduct systematic user research on the *Noetic Dream* system with a larger sample size and over a longer period of time to further validate its long-term effectiveness in increasing lucid dreaming frequency and dream awareness. At the same time, we will explore how to combine physiological signal collection to further optimize the individualized feedback mechanism. We will also consider expanding *Noetic Dream* to broader application scenarios, such as multi-user collaborative mental health promotion, to provide more possibilities for the deep integration of digital meditation and dream cognition.

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