Real-Time Dialogue between Experimenters and Dreamers During REM Sleep

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Abstract

Dreams take us to a different reality, a hallucinatory world that feels as real as any waking experience. These often-bizarre episodes are emblematic of human sleep but have yet to be adequately explained. Retrospective dream reports are subject to distortion and forgetting, presenting a fundamental challenge for neuroscientific studies of dreaming. Here we show that individuals in the midst of a dream can perceive questions from an experimenter and provide answers using covert physiological signals. We implemented procedures for two-way-communication during polysomnographically verified Rapid-Eye-Movement (REM) sleep in multiple individuals. During REM sleep, these individuals exhibited various capabilities, including performing veridical perceptual analysis of novel information, maintaining information in working memory, computing simple answers, and expressing volitional replies. Their responses included distinctive eye movements, selective facial muscle contractions, and modulated breathing. These observations of interactive dreaming, repeatedly documented by five independent laboratory groups, demonstrate that phenomenological and cognitive characteristics of dreaming can be interrogated in real-time. This relatively unexplored communication channel can enable a variety of practical applications and a new strategy for empirical explorations of dreams.

Keywords: sleep, REM sleep, dreams, lucid dreaming, sleep learning

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