Two-Way Communication Between Dreamers and Experimenters

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Introduction

- A lucid dream is when a dreamers is aware that they are dreaming while still asleep
  - Prearranged signals, such as eye movements, can be detected with PSG during REM sleep, and allow **communication out of dreams** [1]

Created from icons by Natalie Daoud and Vicons design from the Noun Project

- Simple tones and flashing lights have been used to **communicate into dreams**, but transmit minimal information [2]

Created by Arthur Shlain Corner Noun Project

- Some evidence of incorporation of verbal stimuli in lucid dreams [2]

Created by Sergei Demeror Sweetless Noun Project

- By combining these methods, we converse with lucid dreamers in real time

Procedure

1. At their normal morning wake time (cases 1-3, 6) or an hour before their normal bedtime (cases 4-5), participants are wired up with electrodes

2. For 20 minutes before sleep, participants undergo Targeted Lucidity Reactivation training to associate sound and light (cases 2-5) cues with a lucid mindset

3. Cues are presented again during REM sleep every 15-60 seconds to trigger lucid dreams [3]

4. After participant signals lucidity, or after ~15 cues are played without response, questions presented softly

"7–3"

5. If response apparent, participant woken for dream report

"I was dreaming that..."

References

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2. Stumbrys, T., Erlacher, D., Schadlich, M., Schredl, M. (2012). Induction of lucid dreams: a systematic review of evidence. *Consciousness and cognition*, 21(3), 1456-1475.
3. Carr, M., Konkoly, K. Mallett, R., Edwards, C., Appel, K., Blagrove, M. (2020). Combining pre-sleep cognitive training and REM-sleep stimulation in a laboratory morning nap for lucid dream induction. *Psychology of Consciousness: Theory, Research, and Practice*. In press.
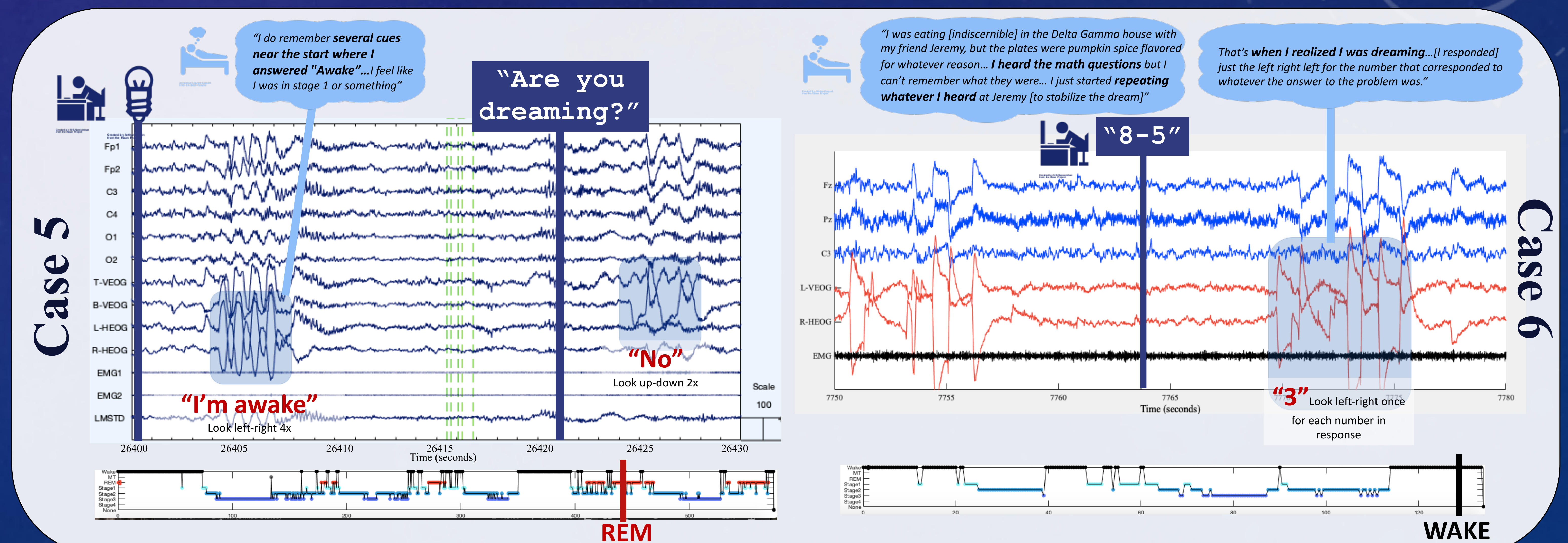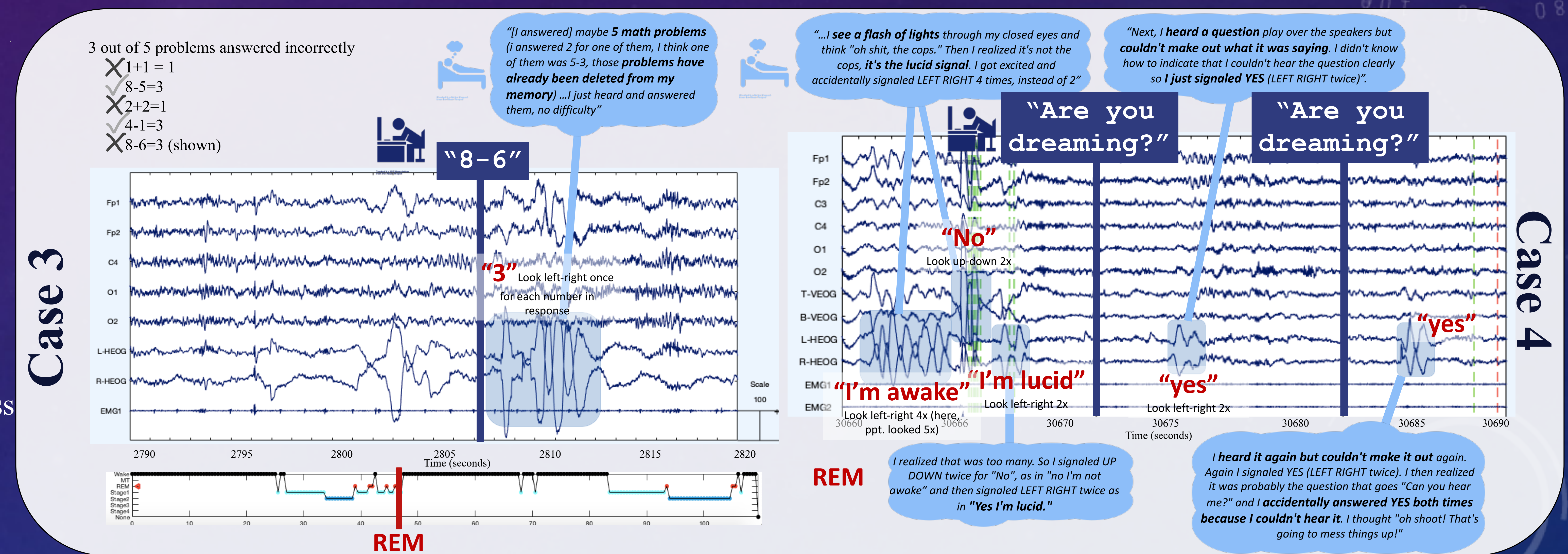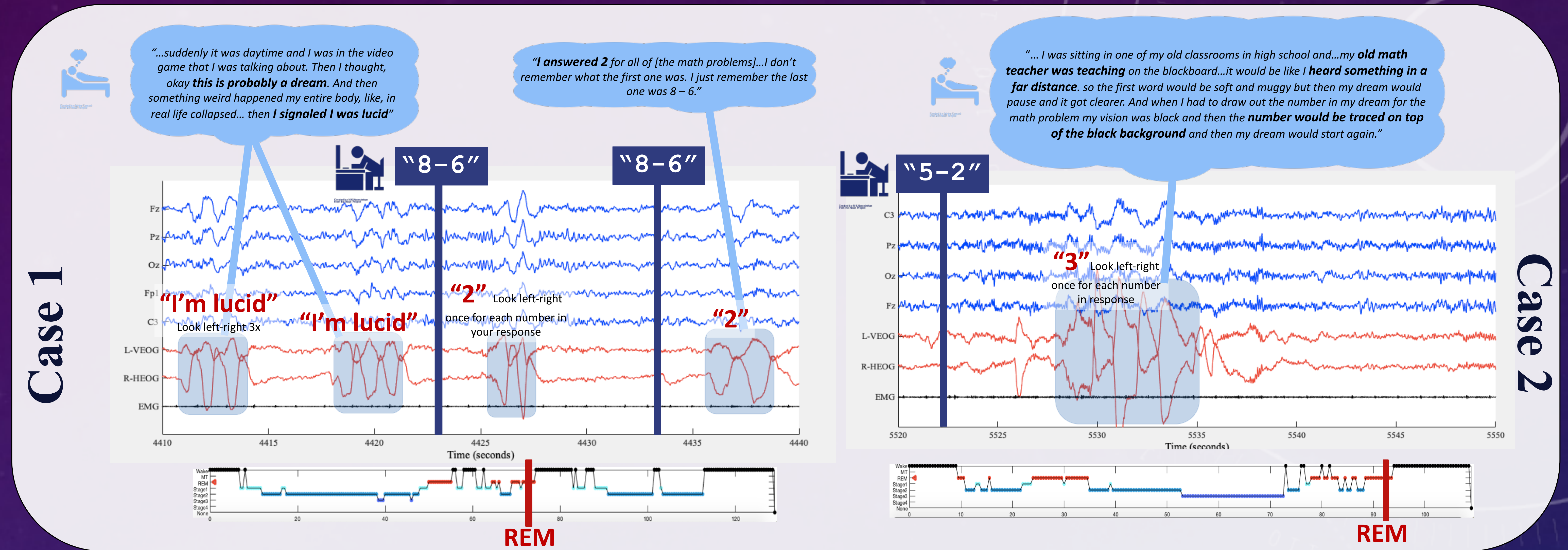
Proof of concept

- Participants can correctly answer math problems during REM sleep
- Veridical perception of external stimuli during sleep
- Sufficient working memory to compute mathematical responses

Two-way (Mis?)-communication

- In case 3, participant answered 3/5 math problems incorrectly during sleep
  - Error in perception or computation
- In case 4, participant did not have the eye-signal vocabulary to express what she needed to say– "never mind!" and "speak up- I can't understand you!"

Misperceptions of sleep and wake

- In case 5, participant was in REM sleep, but communicated that they were awake and not dreaming
- In case 6, participant reported a dream in which she answered lucid signals and math problems, yet according to standard criteria, she was awake