

## Recent sleep research breakthroughs

The Witness · 27 Jun 2024 · 7 · DAN DENIS • Dan Denis is the Marie Skłodowska-Curie senior research fellow, University of York (UK).

Twenty-six years. That is roughly how much of our lives are spent asleep. During the past decade, there has been a surge of interest from researchers in the nature and function of sleep. New experimental models coupled with advances in technology and analytics are giving us a deeper look inside the sleeping brain. Here are some of the recent breakthroughs in the science of sleep.

### LUCID DREAMING

No longer on the fringes, the neuroscientific study of dreaming has now become mainstream. U.S. researchers in a 2017 study woke their participants up at regular intervals during the night and asked them what was going through their minds prior to the alarm call. Sometimes participants couldn't recall any dreaming. The study team then looked at what was happening in the participant's brain moments before waking. Participants' recall of dream content was associated with increased activity in the posterior hot zone, an area of the brain closely linked to conscious awareness. Researchers could predict the presence or absence of dream experiences by monitoring this zone in real time.

Another development in the study of dreams is research into lucid dreams, in which you are aware that you are dreaming. A 2021 study established two-way communication between a dreamer and a researcher. In this experiment, participants signalled to the researcher that they were dreaming by moving their eyes in a pre-agreed pattern.

The researcher read out maths problems (what is eight minus six?). The dreamer could respond to this question with eye movements. The dreamers were accurate, indicating they had access to high-level cognitive functions. The researchers used poly-somnography, which monitors bodily functions such as breathing and brain activity during sleep, to confirm that the participants were asleep.

### OUR BRAIN REPLAYS MEMORIES WHILE WE SLEEP

This year marks the centenary of the first demonstration that sleep improves our memory. However, a 2023 review of recent research has shown that memories formed during the day get reactivated while we are sleeping. Researchers discovered this using machine learning techniques to "decode" the contents of the sleeping brain.

A 2021 study found that training algorithms to distinguish between different memories while awake makes it possible to see the same neural patterns re-emerge in the sleeping brain.

Another study, also in 2021, found that the more times these patterns re-emerge during sleep, the greater the benefit to memory. Research has also shown that sleep restructures our memories to form more cohesive narratives and helps us find solutions to problems. Science is showing that sleeping on it really does help.