

## Neurophysiology of Dreams

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The reason behind dreaming has been an intriguing research topic for numbers of years. Even with the modern technology that exists in this generation, there are still many questions that have yet to be answered. Is dreaming a psychological happening or merely a physiological response from the brain? What part of the brain is activated during dreaming? Does that dream you had about your dog taking over the world really have a deeper meaning?

To begin to explore possible answers to these questions, it is useful to learn about when the body begins to physically become capable of forming dreams. Dreaming can only occur during REM (rapid eye movement) sleep, which consists of about 20-25% of an adult's night's sleep. It is characterized by a rapid, low voltage EEG, irregular heart rate, breathing rate and body temperature. The release of certain neurotransmitters is completely shut down during REM, causing low muscle tone. REM is essential to our health, and is especially important to the developing brain because it provides neural stimulation necessary for newborns to form mature neural connections. It also helps in CNS development. During REM sleep, it is said that memories are "filtered", meaning relevant memories are strengthened and "weaker" memories are disregarded. This state where the muscles do not move because the motor neurons are not stimulated is referred to as REM atonia and if lacking in this, can cause REM Behavior Disorder. This condition causes the sufferers to physically act out the movements during dreams.

Though there has yet to be a universal biological definition of dreams, it has been scientifically proven that brain activity is most like wakefulness. One intriguing topic in dream research is lucid

dreams. This is a case where a dreamer becomes aware that he or she is dreaming and can actively participate and manipulate the dream. This dream recognition takes place in the dorsolateral prefrontal cortex of the brain, which is one of the few areas deactivated during REM sleep. This is also the area in the brain where working memory occurs. When this area is activated, the

dreamer has to be cautious to allow the dream to continue, but still be conscious enough to recognize the dreaming. This kind of maintaining balance needs the pons and the parieto-occipital junction to stay active and the amygdala and parahippocampal cortex to be less intensely activated.

One of the most mysterious things about dreams is the purpose of them. Freud's theory is that our dreams are unconscious or repressed desires

that are expressed when asleep, meaning they are psychological. However, a scientist named Allan Hobson recently proposed a new dream theory stating that dreams are purely a random physiological occurrence. He claims that during REM, the brain stem sends random signals to parts of the forebrain that control emotions, movement, vision and hearing and the higher brain cells work to form a story from the electrical input. In other words, we only dream because our brains are still activated when we sleep and they are essentially "meaningless".

### References

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