

Book review: When Brains Dream - Antonio Zadra and Robert Stickgold, 2021

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What goes on in our brains while we dream? This book provides a very comprehensive overview of current, as well as past, research that has provided insights into the dreaming brain, and adds to these a new theory about the function of dreams. It also discusses limitations and ethical concerns in the field of dream research, making the book a holistic reference that can either be read cover to cover or used selectively.

The book opens with the fundamental (and still open!) question of how the brain creates the realistic sensations we experience in dreams. Examples like the dreams of children, who cannot identify their nocturnal experiences as dreams, show how real dreams feel. Chapter 2 takes a trip back in time to dream scientists before Freud. A study by Saint-Denys shows how remarkably dreams were already being studied at that time: Saint-Denys bought a perfume on each journey and found out in experiments that the perfumes, when presented to him unknowingly at night, triggered dreams of the respective places. Just as in some of today's experiments about sleep-dependent memory reactivation! Chapter 3 is a critique of Freud. According to Freud, dream interpretation is inferring the unfulfilled longings. The authors question why Freud's theory, which was speculative and unverifiable, became so famous in the first place. The development of dream research in the 20th century is described in Chapter 4. Huge milestones were the discovery of EEG and REM sleep.

Chapter 5 asks about the function of sleep in general. The authors provide examples showing memory consolidation, e.g., that children learn grammar rules better when they nap than when they do not. Chapter 6 points out what we do not know: The example of a dog moving in its sleep shows that we can assume, but not know for sure, that it is dreaming. Another struggle in dream research is that we can only investigate dream reports, but not the experience itself. Previous approaches to the function of dreams are reviewed in Chapter 7 and the function of dreaming that Zadra and Stickgold propose is explained in Chapter 8: The authors' theory is called NEXTUP: "Network Exploration To Understand Possibilities". It assumes that the function of dream-

ing is to gain new knowledge from existing information by discovering connections that we overlook in waking life. According to them, dreaming brains create "what-if" scenarios, explore potential answers to problems, and wander across weak associations to identify new, previously unseen possibilities.

Chapters 9 and 10 are about dream content. Here we learn that most people dream coherent stories, that we incorporate external stimuli, and that dreams become more bizarre as the night progresses. The authors provide a list of the top 15 typical dreams. Examples of dreams that evoked creative solutions to problems are discussed in Chapter 11, where we are also given a technique for dream incubation that seems worth trying. Chapter 12 is about ways to work with dreams, which can be of clinical and personal use. Chapter 13 deals with nightmares and PTSD. It nicely explains why adrenaline, which is normally blocked during REM, plays a role in the development of PTSD. The authors also address the question of whether nightmares have a function or reflect a breakdown in normal functioning and conclude it can be both.

Chapter 14 is about lucid dreaming. Here, we learn how a pre-determined eye signal has made it possible to demonstrate lucid dreaming in a sleep laboratory, to test the duration of actions in lucid dreams, and also to allow two-way communication between the researcher and the lucid dreamer. We are given techniques to induce lucid dreams and how to maintain lucid dreams. One piece of information is amusing here: dream characters cannot solve simple math problems! I suspect many readers are tempted to try this out.

In the last chapter, which is on telepathic and precognitive dreaming, it becomes clear why it is statistically not so improbable that a dream sometimes coincides with a future event and why this does not mean that the dreamer can perceive the future. The authors implement a perfect example here: A young woman almost fell on a staircase because one of the steps broke when she stepped on it. Shortly before, the woman had dreamed of falling from this very staircase, which made her believe that she had seen the future in her dream. But since in dreams we unconsciously notice details (in this case rotten wood in the stairs) and explore possibilities, it was most likely not a precognitive dream.

What I found particularly interesting while reading the book is how sleep, dreams, memory, and creativity are inter-related. This example is impressive: participants in a study have to solve a maze before and after a nap. Those who recall dreams of the maze during the nap do far better afterward than participants without a dream recall of the maze. This shows that not only sleep-dependent memory consolidation but also dream content has an impact on problem-

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solving. The multitude of tasks that people can perform better after sleep suggests that the underlying mechanism has something to do with finding solutions. The authors' idea that new solutions are created by discovering memory associations that already exist but were previously unseen sounds plausible.

Another thing I also appreciate about the book is that the authors appreciate the research of those who believe otherwise, such as in the chapter on telepathic and precognitive dreams: The research of Montague Ullman and Stanley Krippner on telepathic dreaming is described in detail, even though Zadra and Stickgold consider the existence of telepathic dreams to be very unlikely.

A rather difficult point of argumentation is that NEXTUP works even if we do not remember our dreams. The argument for this is that we only remember about 5% of our dreams and it would be illogical if the other 95% did not have this function. This argument makes sense, but it remains a hypothesis that is not testable: What is remembered upon awakening is not necessarily what happened while we had the dream. It remains impossible to explore the function of unremembered dreams. That is why I find the use of the word "predict" problematic. The authors say that NEXTUP predicts certain outcomes, but the theory can only retrospectively explain findings. Making predictions means that one would have to test hypotheses and see if the predictions come true, which is, unfortunately, not possible.

Despite this small criticism, the book as a whole convinces me very much: The authors have put together a good and large selection of dream research topics. The book is written in a suspenseful, clever, and witty way. "When Brains Dream" was exciting to read because the authors created a narrative with a pleasant mix of scientific studies, personal stories, and anecdotes.