

—CHAPTER 1—
DREAMING &
SLEEPING

Everyone dreams, including those who think they are not dreaming. Even birds and mammals are likely to dream. Although it has been researched for hundreds of years, it is still not known what exactly dreams are and what their function is. Fortunately, we slowly know more and more.

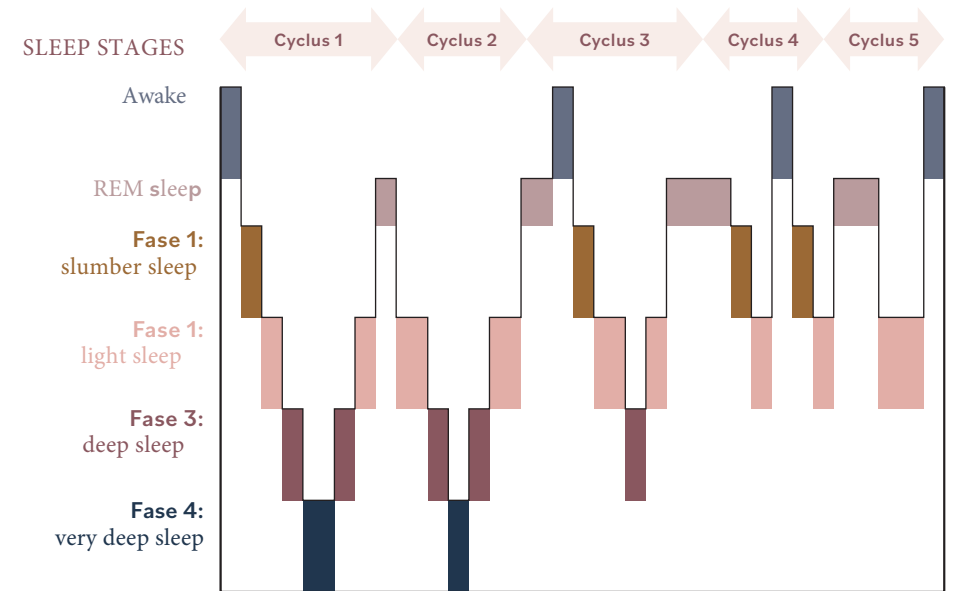
You dream while you sleep, and dreams mainly occur during rapid eye movement (REM) sleep, when the eyes move back and forth behind the closed eyelids quickly. REM sleep is part of your sleep cycle. During a sleep cycle you go through different stages. Each stage has its own brain activity, which is characterized by so-called brain waves. During a good night's sleep, you go through about 5 of these sleep cycles. A full sleep cycle takes between 90 and 110 minutes. The length of each cycle is the same, but the duration of each stage is not. Deep sleep is getting shorter and shorter REM sleep longer and longer.

SLEEPSTAGES

The first stage of sleep is - not surprisingly - called sleep stage one. The brainwaves are still busy and restless. In sleep stage two, the brainwaves become slower and deeper, but there are still occasional bursts of activity. After about ten to

fifteen minutes begins sleep stage three: you are sound asleep and difficult to wake up. The brain waves are slow. There is little activity. When you've reached sleep stage four, usually after twenty-five minutes, more than half of all your brain waves are these deep brain waves. The body recovers, and the brain also rests. This is the deepest sleep. After this deepest stage, you move up stage by stage until you are finally back in stage one. Although you do not wake up, the brain is active. This is REM sleep. Your eyes dart back and forth behind your eyelids (Rapid Eye Movement). This is the stage where we dream the most. In other stages we sometimes also dream, but less intensely. Thus, a sleep cycle goes from sleep stage 1-2-3-4, and then back to 3-2-1 through REM sleep. In the beginning

Deep sleep lasts the longest in the beginning of your sleep, during the first sleep cycle. At the end of the night, at cycle 5 for example, that stage is no longer reached. Your REM sleep, on the other hand, gets longer as the night progresses. In sleep stage 5, REM sleep can last up to an hour. Sometimes the sleep stages skip a step, sometimes suddenly a step back, but in general this is what our sleep looks like:



Example of the different stages at eight hours of sleep Victor Spoormaker, released in the public domain. Source: knowledge link.



from the later cycles you wake up for a moment. Your body checks if everything is okay, no pain? Don't you have to pee? Everything safe? Check, check, double check and you fall back to sleep to start the next sleep cycle. You are usually awake too short to remember the next day.

A sleep cycle lasts about ninety to 100 minutes, so if you sleep for eight hours, you have five a night. At the beginning of your sleep, stage four, the stage where you rest the most, lasts the longest. But just before you wake up, that stage is often not reached. Your REM sleep, on the other hand, gets longer the longer your sleep lasts. So the longer you sleep, the more dreams you have. And especially at the end of your sleep, so often in the morning. In the last sleep cycle, just before you wake up, REM sleep can last more than 60 minutes. One REM sleep is good for one dream. Did you have a good night's sleep then you have

had about five dreams, from very short ones at the beginning of the night to very long ones at the end of your sleep, maybe your last dream lasted an hour!

SLEEP PARALYSIS

Your body is paralyzed during sleep. That's a good thing, otherwise you would run, kick or try to fly in real life. We call this "sleep paralysis" and it therefore has an important function. As soon as you fall asleep, your brain gets a signal to 'turn off' your body and as soon as you wake up, your body "on" again. Sometimes the timing is not quite right and you are already awake while your body is still "off". It looks like you are paralyzed, and that can be pretty scary. After a few seconds, your brain realizes it has been sleeping and turns your body back on.

SLEEPWALKING

Something completely different is sleepwalking. The exact cause is still unknown.

It usually happens shortly after falling asleep, so during the first sleep cycle. As you can read before, with a normal course of a sleep cycle, you are first light asleep, then deeply asleep, then you go back to lighter sleep and then REM sleep follows. Sleepwalking occurs during the deep non-REM phase, so the phases before REM sleep starts. So it is not the case that you dream when you sleepwalking.

VISUAL STIMULI

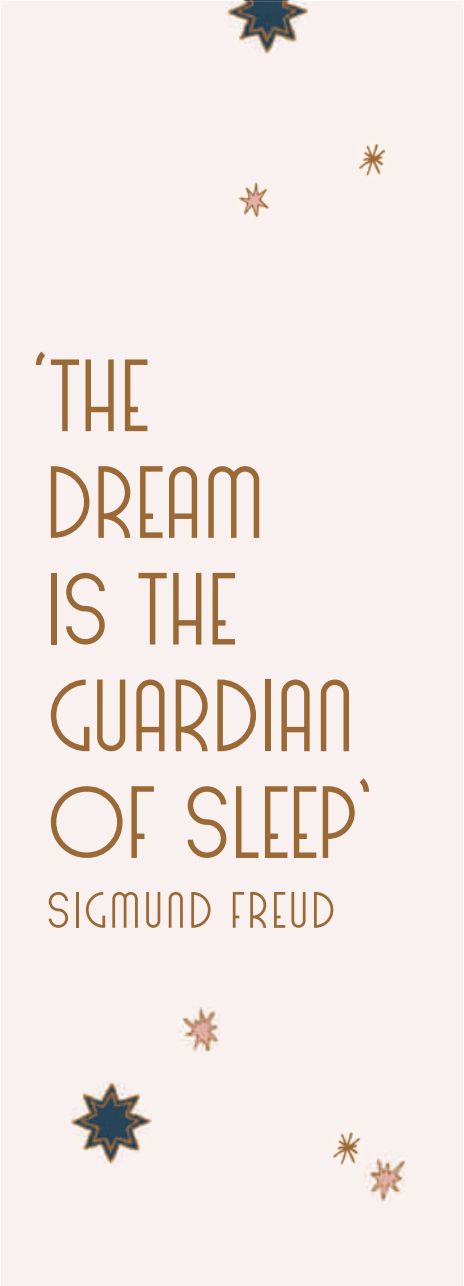
During REM sleep, your body is at rest, but the brain is active. Even the areas of the brain that process visual information are busy. And that while your eyes are closed and therefore no visual stimuli come from outside. Also your smell and sense of touch work less hard than during the day and therefore hardly any stimuli come in. We receive information from our brains from within. That is why scientists assume that dreams are images that come from your own memory.

INCORPORATION

Although your eyes, sense of smell and hearing hardly transmit information, external stimuli can come through when you are dreaming. These stimuli are integrated in the dream with which they merge into a kind of logical whole. This phenomenon is known as "incorporation of the dream."

Dream researcher Ann Faraday put the hand of a sleeping test subject in a bowl of water. When the subject was awakened, she said that she had a dream that she reached out of the car window to feel the rain.

Another well-known one is the alarm clock that rings in real life and, for example, appears as a school bell in the dream.



THE
DREAM
IS THE
GUARDIAN
OF SLEEP'
SIGMUND FREUD

PREFRONTAL CORTEX

By placing electrodes on the heads of test subjects, researchers have been able to see roughly how dreaming works. During REM sleep, a lot of brain activity can first be seen in the areas that go over "seeing". Then activity can be seen in the "belong" areas, and finally part of the limbic system becomes active, which is about emotions. The prefrontal cortex - at the front of your brain - becomes less active. This area is involved in many skills. For example, it ensures that you can plan tasks, think about how you can do something step by step, it ensures concentration, brief remembrance of things and slows down undesirable behavior. Because the prefrontal cortex is at rest at night, these cognitive skills do not work during your dream. Hence, in your dream you often only deal with one task at a time and forget what you were doing a few minutes ago. Because of the absent prefrontal cortex

a relatively large amount of impulsive behavior occurs in dreams, such as aggression and sex.

LOGIC

The back part of your brain, the brainstem, sends images in random order to the optical center. And then you see images before you, like a projection of a film. Your brain is trying to make sense of that film et voilà: you have a dream with a beginning, middle and an end. Well, it is not true that there is real logic in your dream movie. You can fly, to be in Cairo from one moment to the next, and jump off a skyscraper there. During your dream you find all this very logical.

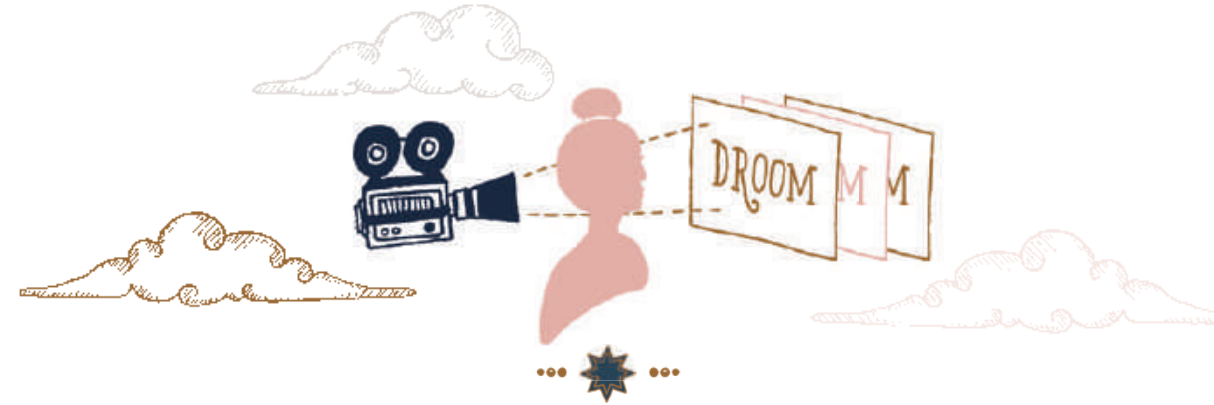
SOLUTIONS

Your dream story often starts with what researchers call "day rest": situations that you have experienced in recent days. In your dreams, those things often return in distorted form. For example, you may have problems in your dreams

solves what you couldn't solve during the day. For example, the sewing machine was conceived during a dream. The creator Elias Howe dreamed about Indians who had a spear with a hole at the top. That was exactly the model he was looking for for the needle in his sewing machine. There are more examples like this. Larry Page got the idea for Google in a dream, James Watson invented the spiral helix of DNA and Dimitri Mendeleev the periodic table, all after a dream.

CREATIVE

So sometimes you are super creative during your dreams. Your brain connects new and old things in an associative way and not linear and logical like during the day. Science-press investigated the link between REM sleep and creativity. It turned out that subjects with enough REM sleep were better at solving problems than subjects who had barely had REM sleep. And



COLOR OR BLACK AND WHITE?

It used to be thought that people always dreamed in color. Aristotle and Descartes, for example, dreamed in color. At the beginning of the last century people claimed to dream in black and white, but in this century people said to dream in color again. The cause of this can lie in photography, film and TV. At the beginning of the last century it was all black and white. When people thought back to their dream, they thought it was also in black and white. Later, when color television had entered and there were color films and photography, people thought to dream in color

According to psychologist Eric Schwitzgebel you dream color neutral. You don't read a novel in color unless the writer calls for a color. Otherwise you will not have the time to come up with a color. It is the same with dreams: they go too fast to come up with a color.

if you then know that your REM sleep is longest before you wake up (after a normal night's sleep), it means that you are most creative when you just woke up. A 90-minute power nap at the end of the afternoon, so that you can go through an entire sleep cycle with all sleep stages, can therefore also help you function more creatively at that time.

TIME

Just like in a movie, you can bridge or skip time during a dream. You assemble your own film, as it were. This way you can be in a different place or in a different country from one moment to the next, without having dreamed that you were traveling. Oh, you suddenly went back in time ten years. It is not that you can "thicken" time in a dream. Something that takes two minutes in real life also lasts two minutes in a dream. So you can dream that you are doing the dishes and it will take you just as long as in real life. An average dream lasts much longer

than do some washing up. The first REM sleep is about ten minutes, your last REM sleep, before you wake up, can take up to an hour, and so is your dream. On average, you have about two hours of REM sleep per night and about five dreams.

FUNCTION OF DREAMS

But why are you dreaming? What is its function? Despite all the scientific research, we still don't really know. But there is no question that dreaming is important. Laboratory rats that kept waking up during their REM sleep (as you know the sleep stage in which you dream the most) died after 4 to 6 weeks. Experiments have also been done with humans. Subjects were always awakened as soon as they entered their REM sleep. These people became very tired, irritable and could hardly concentrate.

BETTER LEARNING

REM sleep can help with learning

new skills. Subjects who were learning certain tasks performed better after sleeping than subjects who did not sleep between learning and performing the tasks. Studies show that what is learned appears to be repeated during sleep. A PET scanner can show quite accurately which areas of the brain are active. Brain scans showed specific activity in the brain when subjects were learning. The same activity can also be seen when those subjects were in REM sleep. So it appears that the brain "repeats" during REM sleep. Yet there is also a lot of criticism of the theory that REM sleep promotes learning. So many other aspects could cause people without sleep to perform worse than people with adequate sleep. In addition, there are people who can no longer get REM sleep for all kinds of reasons, but can still learn well. Hopefully it will deliver further

research more clarity on.

PROCESSING MEMORIES

Most dream researchers assume that during REM sleep memories of that day are processed. Acquired experiences are organized and archived, emotional events processed. This creates room for new experiences and your brain capacity increases. The fact that we cannot remember many dreams at all would also prove this theory. But before that also a physical explanation: when we dream, the short-term memory does not work or hardly works. That is why we cannot or sometimes only remember our dreams for a moment. We only remember the dreams that make a deep impression. Further research should shed more light on relationship dreams and how memory works. Which form of memory - long-term or short-term - benefits most from REM sleep and at what stage of sleep does it so occur?

called memory consolidation - the storage of memories.

VIRTUAL REALITY PRACTICE

The American dream scientist J. Allan Hobson sees dreams as a kind of virtual reality exercise for everyday life. The brain prepares for the problems and challenges it may face during the day. The content of dreams is just a by-product of REM sleep. The main product of REM sleep is the development of basic brain functions such as self-awareness and basic emotional responses. This theory is also based on the knowledge that a fetus only knows REM sleep, a newborn baby is in REM sleep 80 percent of its sleep, an adolescent about 22% and an adult only 20 percent. And in the elderly (70+), only 14% of sleep consists of REM sleep.

UNLEARN THINGS

And finally there is the theory of it



NO FABRICATIONS

As weird and strange as people can be in our dreams, we have seen them once, if only for a moment. The brain itself does not make up new faces. Objects are never completely new either. They are often a composition of objects that you already know, or a deconstruction of existing things.

assumes that dreams are not intended to learn new things, but rather to learn things. Neurons in your brain communicate with each other through a complex system of electrical and chemical signals. During REM sleep, the brain cells are very busy "talking to each other", patterns are compared with each other and new connections are made. In such a neural network, such as our brain, information can "feedback". And because of that, the brain cannot function properly. Dreams would "reset" and optimize the brain for a new day.

'DREAMS
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TRATIONS
FROM
THE BOOK
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UNKNOWN