

To what extent do sleep and psychological treatment of Lucid Dream Therapy play an effective role in mental disorders?

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Abstract: Sleep is such a complex and dynamic process and dream that it still is a scientific enigma. Over more than a century of research has established a wide range of dream-relevant theories, whereas, no one has yet reached an accurate conclusion about the function and meaning of dreams. So, in this project, I desire to review the relationship between sleep and dream and illustrate what is the function of sleep and dream. Firstly, is to state the specific processes of sleep. Humans undergo REM (Rapid Eye Movement) and NREM (non-rapid-eye-movement) during sleep. Additionally, there are various functions of REM, NREM sleep, and dreams which remain controversial. The third ambition of this project is to discuss whether dreams can act as a kind of therapy for mental disorders. And evaluate the effectiveness of lucid dreaming therapy (LDT) in patients suffering from mental disorders.

Keywords: Sleep(REM&NREM); Dream; Lucid Dream; Psychoanalysis; Neuroscientific; Mental Disorders; Psychology

1. Introduction

According to this topic, several specific questions can be extended. What is the dream? Why do we dream? During dreaming, what processes we will undergo? Dream, a kind of common phenomenon, has the characteristic of reality and unreal. Sleep is an essential part of life, especially occurring in sleep. Perhaps many people are confused about why we dream and why we tend to forget the details happening in dreaming. Sometimes we can build up a bridge between dreams and reality, for example, according to a survey, two-thirds of adults have had a dream about something similar occurring in real life. In this paper, we are going to discuss whether sleep and dreams play the role of healing. The following sections are a brief overview of sleep and dreams.

Are dreams the refashioned fulfillment of repressed desires or the revelation of the subconscious? These problems have not been accurately explained so far, and still need to be probed. Through the ages, many scholars have made excellent interpretations of dreams. For instance, the first person to define a dream, Aristotle, pointed out that dreams are defined as the mental activity of the sleeper while he is asleep. Freud considered dreams to be completely meaningful mental phenomena, which could be regarded as a continuation of mental activity in a waking state. Jung, who broke away from the classical way of psychoanalysis, believed that dreams were the collective unconscious response of human beings and "letters from primitive people". Changes in brain rhythm caused by dreaming prove objectively that science knows that we will dream. And recently, some experts have pointed out that dreams are conscious activities. And the

discovery of the brain network and the Rapid Eye Movement (REM) sleep experiment have provided further insights into the functional localization of dreams and the content of dreams. However, science communities have not sought why we dream and what is the distinctive and clear definition of dreaming so far. As is no conclusion of what the real meaning of the dream is, we can summarize and study the above theory, which will have a certain significance.

Additionally, we can treat psychological diseases by studying the predictive properties of dreams. Treated with dreams can recognize the specific mental problems and suit the remedy to the case to achieve positive therapeutic effects.

The reason why I mainly choose the topic which is about dreams and health is that not only I am very curious and interested to figure out the relation between dreams and reality, but also the science community has not found a concrete definition and conclusion about dreams so far, thus it is worth studying. By writing this paper, we can summarize and figure out the conclusions of predecessors and provide references for those who study this topic later. This paper will separate into four parts to demonstrate the relationship between sleep, dreams, and reality.

1. Why and when do people sleep.
2. The differences between REM and NREM. (Brain and Body)
3. The cause of the dream.
4. The meaning of dreams.
5. Dream therapy. (Dream application).

2. Research review

2.1. The definition of sleep

A natural, reversible condition of decreased receptivity to external stimuli and relative inactivity that is followed by a loss of consciousness is called sleep[1]. During sleep, most of the body's systems are in an anabolic state, contributing to the muscular system, the skeletal system, the nervous system, and the recovery immune system[2]. These are important processes that maintain emotion, memory, and cognitive functions, and also play a significant role in the function of the endocrine systems[3].

2.2. The five stages of sleep

Transitional stage 1: As one drifts in and out of awareness, a light slumber eventually results from this period of lethargy.

Light sleep stage 2: The body's core temperature drops, the heart rate starts to slow down, and the brain waves slow down except for brief pulses known as sleep spindles.

Deep sleep stages 3&4: the deepest sleep that your body enters throughout the night, the brain waves become slow delta waves.

Rapid eye movement (REM): Most dreaming occurs in the REM stages, when the eyes move in different directions. Muscles are relaxed while other bodily functions are functioning during REM sleep, which is also frequently referred to as paradoxical sleep. As a result, awakening while in REM sleep might result in sleep paralysis since you are awake but still have movement in your limbs.

During a typical 8-hour sleep cycle, we often undergo 3-4 cycles including NREM stages and REM stages. As you cycle into REM sleep, the eyes move rapidly with your eyelids closed, and brain waves are similar to those during wakefulness. During REM sleep, many of the muscles of the sleep animals especially the necks and heads are more relaxed than in the NREM sleep[4].

2.2.1. For physical health

According to relevant research, it shows that sleep is as essential for good health as diet and exercise. For most adults, at least seven hours of sleep per night is required for normal cognitive and behavioral function[5]. Sleep deprivation can have serious consequences, which predisposes people to poor concentration, cognitive decline, delayed reactions, and mood changes. Hence, quality sleep can build up your brain performance, mood, and health effectively.

“While you sleep, your brain is working. For example, sleep help prepare your brain to learn, remember, and create.[6]” Everything from blood vessels to the immune system uses sleep as a time for repair, says Dr. Kenneth Wright. “There are certain repair processes that occur in the body mostly, or most effectively, during sleep,” he explains. “If you don’t get enough sleep, those processes are going to be disturbed.[7]”

2.2.2. For mental health

Anxiety, sadness, bipolar disorder, and schizophrenia are just a few of the many mental illnesses for which sleep deprivation is a known risk factor and characteristic. Insomnia, for instance, was linked to a four times increased risk of depression three years later, according to a study of 979 young adults in Michigan. Plus, insomnia will also increase the risk of suicide[8]. The reason why people with depression have different sleep quality and characteristics than people without depression is that normal people process emotional memories during healthy REM sleep to help them learn from fearful or painful experiences. However, the normal emotional processing patterns that occur during REM sleep break down in people with depression, instead of helping them get rid of the negative associations. The memories somehow became consolidated during their REM sleep, which leads to an increasingly bleak mindset. Therefore, anxiety disorders will make patients for a long-time mental restlessness and mental tension. It’s easy to affect the quality of daily sleep and make it difficult for patients to fall asleep. To a serious degree, it will also cause malaise and mental disorders, and other complications.

2.3. What is dream?

2.3.1. Freud’s dream theory

According to Freud, the unconscious (id) uses dreams to express itself in order to deal with suppressed or undesired emotions, experiences, and aggressive impulses. Sigmund Freud developed his dream theories based on a number of presumptions.

Dreams are fleeting.

Dreams are brief, like fireworks, and are recollections of the previous day's activities.

Dreams are desire fulfillment, Freud's most famous theory, holds that when desires cannot or will not be realized in our waking lives, they are realized in dreams.

Dreams contain sexual imagery. He thought that the number three, as well as extended things like umbrellas, branches, sticks, and tall monuments, are symbols for the penis. Trunks, shoes, pits, caves, and the mouth are examples of objects that can mimic female genitalia since they have empty spaces that need to be filled. Some fruits, such apples and pears, signify the breasts, whereas wooden or paper things are supposed to represent all women. A therapist should examine your dreams. Freud thought that therapy is useful for assisting people in overcoming a variety of challenges, including unpleasant dreams. And he believed that the analyst was the key to properly understanding the symbols and visuals in dreams.[9].

3. Discussion/development

3.1. Why do we need to sleep

3.1.1. Sleep for body repair

People who work the night shift or have irregular schedules can find getting quality sleep extra challenging, especially in times of great stress. For example, currently, during a critical time in Covid-19, many people feel greater financial strain, work, and house mortgages. These kinds of stress highly disrupt our normal sleep routines.

The secretions in our bodies are excreted through the recycle of lymphatic. However, our brain doesn't have lymphatic system. We just have Cerebrospinal fluid (CSF). The function of Cerebrospinal fluid (CSF) is to protect and buffer our brain, also it can excrete our secretions such as amyloid protein, a kind of toxic waste of brain nerves. When people are awake, the brain does not stop working. Also, during that period, the cells will expand. However, during sleep, brain cells reduce to 60% of their original volume, thus releasing a lot of space. Meanwhile, the Cerebrospinal fluid (CSF) flows twice as fast in the brain than when you are awake. These flows can remove metabolic waste from the depths of the brain. Hence, if we don't sleep regularly, the secretions especially the amyloid protein presumably will not be cleared in time. The content of amyloid protein in people who suffer from Alzheimer's disease is higher than in ordinary people. Magnetic resonance scans of 60-year-old Alzheimer's patients show that their brains have undergone obvious atrophy and look like the brains of 90-year-olds. Alzheimer's disease may occur because of premature brain failure.

Also, if you sleep around 5 hours or less every night, then you will likely 50% to be overweight. Sleep loss will release ghrelin, which is the hunger hormone, then the brain will seek out carbohydrates, especially sugar, thus, it's easier to get obese.

3.1.2. Sleep and DNA repair.

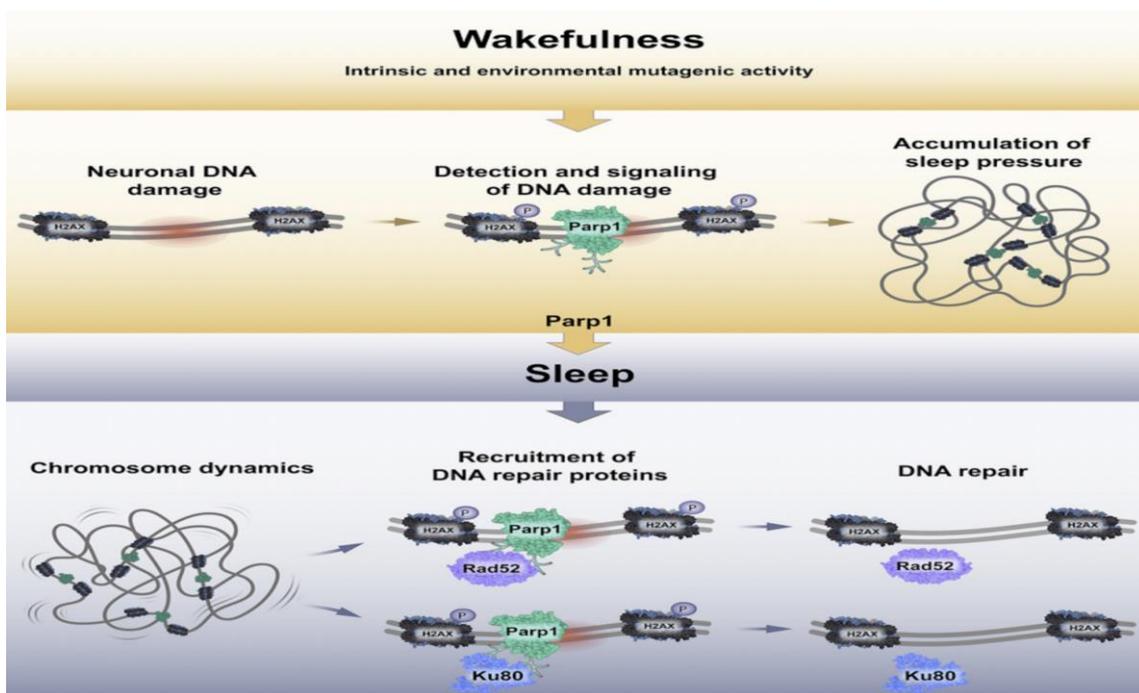


Figure 1: The process of sleep repair DNA[11].

It is undefined that the feature of the sleep drivers and the mechanisms of sleep relieves the cellular homeostatic pressure. Previously, a research group illustrated that DNA-damaged states rise during the period of wakefulness and decline during sleeping. They observed that fruit flies and mice 's wakefulness and neuronal activity can induce the occurrence of DNA double-strand breaks (DSBS).

3.1.3. Brain processing and memory integration

Sleep and memory consolidation is very important. There is a learning theory that you should memorize words before going to bed and even read before going to bed. Some studies believe that sleep is an important process of memory formation and consolidation. During slow-wave sleep, hippocampal cells will recall the learning process and they can convert short-term memory into long-term memory. To prove it, there was a study in the United States that invited right-handed people to try left-handed typing. Generally, after a few minutes of training, their level will be improved to a certain extent, and then they will enter an unchanged period. If the experiment is conducted in the morning and retested after 12 hours, their accuracy will not be greatly improved. If they are trained at night and tested after getting up, their speed will increase by 15%-20%, and their accuracy will be increased by 30%-40% [12].

Sleep is also good for establishing and strengthening our ability of learning. Researchers at the University of Pittsburgh, in the US, studied 14-18 teenagers and found that students who sleep poorly do less well in math. Students with better sleep quality are likely to get better English scores. Additionally, the researchers found that staying up all night may affect the ability to memorize. So why sleeping plays such a significant role in abstract thought. That is because we still have brainwave activity during sleep. Our brain does not rest during sleep, and it is still a highly active brain activity. For example, Mendeleev took a nap after work and woke up to find himself solving the problem of how chemical elements are arranged and grouped in a certain way. This is related to the blood flow and neuronal cell activity. During sleep, the potential of nerve cells in the brain reflects the thinking activity of the human brain. It shows that there is still electrical activity in the brain, also, the cerebral blood flow to the brain was reduced by only 20 %.

These experiments illustrate that sleep can recover our systems and improve our productivity and efficiency. When you are tired, you have poor memory, poor productivity, you have increasing impulsions, and you will have a poor judgment. So, we should take sleep seriously.

3.1.4. The difference between REM sleep and NREM sleep

The brain and body can get rest and recovery when sleeping. Scientists use a device called electroencephalograph (EEG) to record brain activity during sleep. The EEG shows two basic patterns of activities: rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep. These two types of sleep are necessary for optimal health.

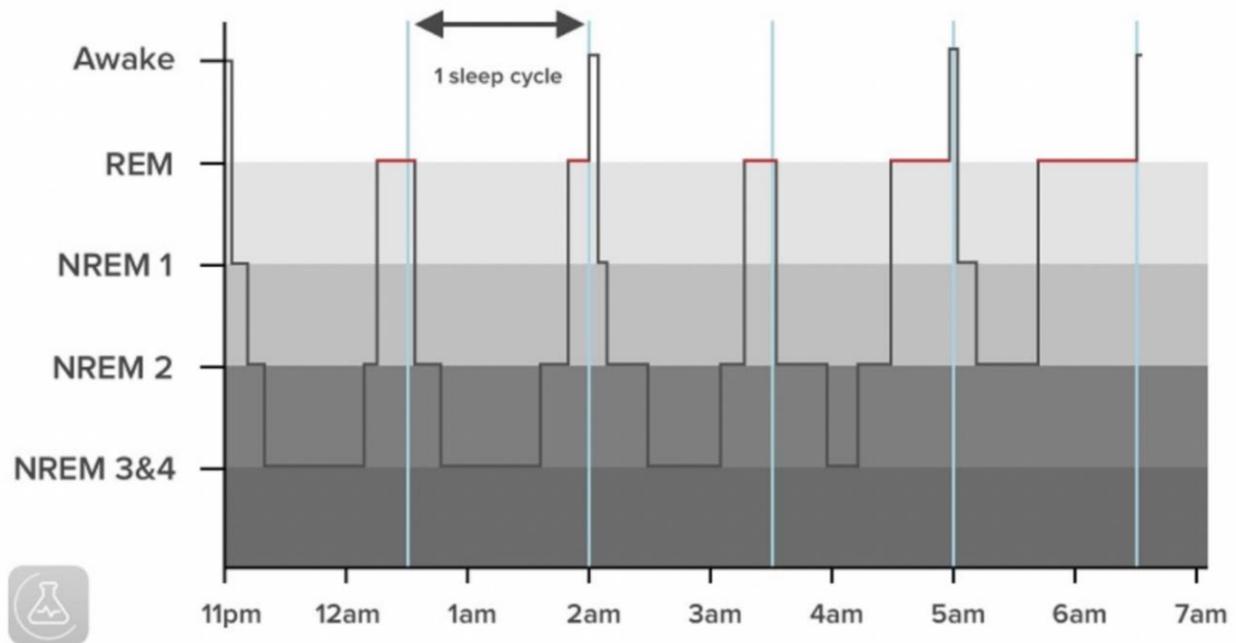


Figure 2: The process of sleep[13]

3.1.5. Repair function of sleep

There are two aspects (mental and physical) for REM and NREM sleep to repair our body and brain. It is thought that the brain is rejuvenated and rested during REM sleep, and the body repairs and regenerates tissue and builds bone and muscle during NREM sleep. People who don't get enough REM sleep tend to become confused, depressed, or irritable. People who don't get enough NREM sleep are likely to become tired, listless, and have a reduced immune response. Hence, REM and NREM sleep work together to repair our bodies and restore our emotions.

REM sleep acts as a character of recovery and plays a critical role in dreaming, memory, healthy brain development, and recovery. During REM sleep, your brain processes new knowledge or motor skills learned during the day, enables to help commit some of them to memory. Recovery during sleep is promoted by releasing hormones, such as growth hormone, which aids in muscle building, muscle repair, and bone growth. The hormone melatonin, which is boosted by darkness and released at night, has several antioxidant qualities that may have an impact on healing and well-being[14].

According to research, athletes frequently don't get enough good sleep. Olympic athletes (n=47) had significantly less sleep than a non-athlete control group (n=20), both in terms of quantity and quality (how many cycles of REM sleep they were able to have each night) [15]. Additionally, nearly a third of the 632 German athletes polled said they frequently woke up during the night, and nearly 80% said they had trouble getting asleep the night before a competition, which made them feel more exhausted the next day[16]. In a sample of South African athletes, 41% of participants said they had trouble going asleep, while 60% said they had trouble waking up[17]. Athletes struggle commonly with achieving the recommended sleep quality and sleep volume to aid in recovery and performance.

Researchers believe that REM is occurring in memory consolidation. Adult-born neurons (ABNs) in the hippocampus, a region of the brain associated with memory consolidation, are active during REM[18].

Scientists believe that these talents are strengthened by sleep, particularly REM sleep, as a result of research. In one study, researchers looked at how REM sleep affected the capacity for anagram-solving, which calls for high creative thinking and problem-solving abilities (word scrambles like "EOUSM" for "MOUSE")[19].

Participants in the study completed a few anagram puzzles before going to bed in a sleep lab with electrodes on their heads. Two times during REM sleep and two times during NREM sleep, the patients were awakened four times during the night to answer anagram puzzles. The researchers discovered that participants could solve 15 to 35 percent more puzzles when awakened from REM sleep than when awakened from NREM sleep. Additionally, their performance was 15 to 35% higher than it was during the day[20]. It appears that REM sleep is important for enhancing our capacity to solve complicated problems.

3.1.6. What is NREM sleep

Non-rapid eye movement (NREM) sleep refers to specific parts of the sleep cycle and is a good opportunity for our brain and body to relax, which occurs during three progressive stages. Three stages of NREM sleep occur multiple times during the night.

Table 1: Three stages of NREM[21].

Stage 1	Stage 2	Stage 3
Relaxed alpha waves turn into slow theta waves as we feel ourselves drift off. Muscles relax and slow down the heart rate, breathing, and eye movement. It last for 5-10 minutes.	The theta waves become slower, and we become fully asleep. The heart rate continues slowing down. Muscles become to relax. Eye movement stops. Body temperature drops. It lasts about 10-25 minutes.	This is the deep sleep stage. The theta waves are replaced by long slow delta waves as we enter deep sleep. Heart rate, breathing, and brainwave activity are all at a minimum. Muscles relax as much as possible.

Additionally, the amount of NREM sleep people need will decrease with age.

Table 2: Hours of sleep recommended for each group[22].

Age and condition	Sleep needs/h
Newborns(0-3months)	14-17
Infants (4-11 months)	12-15
Toddlers (1-2 years old)	11-14
Preschoolers (3-5 years old)	10-13
School-age children (6-13 years)	9-11
Teenagers (14-17 years old)	8-10
Adults (18-64 years old)	7-9
Older adult (≥ 65 years old)	7-8

It is believed that deep sleep helps the body recover and reset. During NREM sleep, the body works to heal damaged tissue and build stronger muscles. Younger people thus experience longer deep sleep stages than older individuals. As you become older, you will sleep more lightly and get less deep sleep. Therefore, deep sleep is vital for growth. Childhood and puberty are significant times of growth

in a person's life. Aging tends to get shorter periods of sleep, even if the data shows that aging still requires sleep as much as the youth.

3.1.7. The function of NREM sleep

1. Strengthens the immune system.

If you don't get enough sleep, your immune system won't function correctly, making you more susceptible to illness. To aid in the battle against infection, various immune responses may increase during NREM sleep and subsequently decrease during REM sleep. These anti-infectious reflexes could be telling the brain to have more deep slumber. Lack of sleep may cause an overabundance of sympathetic activity. The immune system may be affected, resulting in a decrease in the quantity and efficiency that certain immune cells.

2. For removing brain waste.

Due to brain activity, it has certain substances accumulate in the brain during the day. NREM sleep can achieve a natural process of removing waste from the brain.

3. Learning and memory.

New information and experience details form memories while you sleep.

Researchers found that NREM sleep is essential for two complementary processes that support the consolidation of human motor memory, including the restoration and restructuring of freshly learned information while we sleep[23].

3.2. The cause of the dream

Dreams are basically images and stories created by our mind while we sleep which can be vivid, and also can let you get a wide range of emotions, such as happy, sad, or scared, and even likely seem perfectly or confusing rational. The study of the cause or mechanism of dreams has made great progress under the intervention of multi-guide sleep detector (PSG), brain CT, nuclear magnetic resonance (MRI), positron emission tomography (PET), and local cerebral blood flow (RCBF), imaging, physiology and psychology[24].

Dreams can occur at any time during sleep. However, your most vivid dreams occur during a stage of sleep known as REM (rapid eye movement), when your brain is most active. [25].

Sigmund Freud said that we need dreams for our mental, emotional, and physical health. The dream process is the residual memory of the biological nervous system in the process of entering or exiting dormancy. It is a complex biological nervous system that naturally controls the sleep activities of biological individuals. Because of different ages, genders, and hormone levels, there will be residues of dreamy memory of sexual activity. Also, the nervous system will feel differently due to extreme fatigue in a certain part of the body or the accumulation of residues at the level of lax cell metabolism. In addition, during sleep, due to different feelings such as ambient noise, noise, temperature change, bed vibration, etc., the memory residue of the nervous system will be different. Most of the sleep has dreams, but it is forgotten by us. Some ancient explorers said that dreams are not riddles to be translated[26], and “the manifest dream is the real dream” [27]; thus, Freud's dream work does not exist according to this point of view.

3.2.1. The psychoanalysis of dream

Sigmund Freud, the founder of psychoanalysis, built up a foundation for our current thinking about the mind. Freud theorized in “Dreams” about the conscious and unconscious gave labels to the ethereal parts of the mind which made us human. The main point in Freud’s theory is that the sources of dreams include stimuli from the external world, subjective experiences, organic stimuli within the body, and mental activities during sleep. He found that dream content is derived from but

not identical to real life. Freud, therefore, argued that these elements must be transformed and connected in some way. He argued that these linkages are not accidental but rather are governed by an individual's unconscious wishes. For example, he said that dreams are the realization of an individual's unmet desires in reality. It's kind of a continuation of a waking state of mental activity. He used experiments to draw out dreams at will. For example, Freud said that he normally has well quality sleep at night and is not easily to disturbed by physical needs, but if he ate very idle food that night, he would wake up because of thirst at night. But before really waking up, there was a dream of the same content, that is, he is drinking water and his throat feels moistened. Then he would wake up and find that he wants to drink water. Freud believes that the reason for this dream is the thirst he feels when he wakes up. This feeling triggered the desire to drink water, and the dream told him that it had made it come true. So, dreams do have the function of satisfying wishes.

3.2.2. The neuroscientific of dream

Ivan Petrovich Pavlov, a world-renowned physiologist, explained why people dream from the perspective of physiological mechanisms. Pavlov believed that a dream is an excitatory activity of the brain during sleep. When a person enters sleep, diffuse inhibition occurs in the cerebral cortex. During another stage of sleep, diffuse inhibition occupies the whole area of the cerebral cortex and the deeper part of the cortex. There will be no dreaming during this period, and psychological activity is submerged by a powerful inhibition process. During light sleep, we have weak and uneven levels of inhibition in our cerebral cortex, which provides a suitable condition for dreaming. Scientists experimented to inject acetylcholine into the cat's brain stem when the cat's eye moves quickly and goes to sleep. After research, when a neuron in the brain stem releases acetylcholine to communicate, another neuron stops releasing adrenaline and serotonin. The former neuron transmits information to the cerebral cortex, the advanced thinking and visual center of the cortex, explains and weaves into a story with the help of the existing information, and dreams come out. The reason why we just only see the scenes in dreams but can't taste five flavors or smell badly is that optic neurons are emitted during rapid eye movement, not taste and olfactory neurons.

3.3. The meanings and the functions of dream

Sigmund Freud stated that dreams are a window into our subconscious and reflect a person's unconscious wants, thoughts, and intentions. The occurrence of dreams occupies approximately one-fifth of the time in human sleep. At the same time, dreams can reflect some crucial psychological changes. The scientific research of dreams can not only understand the interaction between the spirit and the body but also provide a model for the study of emotional diseases, which is a systematic connection between dreams and awakening thinking. Dreaming is an essential physiological need of the healthy human body.

- Dreaming accelerate and strengthen brain function.

Studies have shown that dreams trigger neurobiochemical reactions in the brain that promote the synthesis and renewal of proteins in brain cells. Dream REM sleep and dreamless non-REM sleep can regulate the excitement and inhibition of the cerebral cortex, which enables to stabilize body. However, if the frequency and duration of REM sleep are abnormal, or the ratio of REM sleep and NREM sleep is different, it needs to be related to the occurrence and treatment of mental diseases[24].

- Dreams can regulate mental balance and stabilize mental mood.

3.3.1. Dreams and Psychological illness

Researchers set up two groups of experiments to explore whether the dream content of schizophrenia and ordinary people will be very different. A total of 72 individuals who were included in the stable phase with the age range of 20-45 years were selected and placed in four groups. The power of sample size for the variables was 80%, and the confidence level is 95% [28].

Characteristics	Schizophrenia	Non-schizophrenia	Siblings	Controls	P-value between groups
Familiar characters	83.3% (15)	75% (12)	66.7% (12)	90% (18)	0.323
Friends	27.8% (5)	37.5% (6)	61.1% (11)	85 (17)%	0.002 ±
Family	72.2% (13)	62.5% (10)	50% (9)	75% (15)	0.373
Unfamiliar characters	44.4% (8)	43.8% (7)	55.6% (10)	50% (10)	0.887
Male	77.8% (14)	93.8% (15)	50% (9)	80% (16)	0.074
Female	83.3% (15)	81.3% (13)	50% (9)	80% (16)	0.025 ±
Aggression and violence elements	33.3% (6)	37.5% (6)	38.9% (7)	50% (10)	0.75
Enjoyable elements	61.1% (11)	68.8% (11)	38.9% (7)	75% (15)	0.124
Unpleasant elements	44.4% (8)	43.8% (7)	61.1% (11)	60% (12)	0.584
Colorful dreams	61.1% (11)	100% (16)	50% (9)	80% (13)	0.006 ±
Sadness elements	50% (9)	50% (8)	72.2% (13)	65% (13)	0.432
Happiness elements	50% (9)	56.3% (9)	27.8% (5)	65% (13)	0.132
Bizarre elements	33.3% (6)	43.8% (7)	61.1% (11)	65% (13)	0.180
Coherency between dream elements	88.9% (16)	87.5% (14)	61.1% (11)	65% (13)	0.107
Incoherency between dream elements	11.1% (2)	75% (12)	38.9% (7)	35% (7)	0.107
Sudden waking from sleep because of fearful elements	33.3% (6)	37.5% (6)	55.6% (10)	35% (7)	0.208

*P<0.05

Figure 3: Dream reports parameters in patients with schizophrenia, patients with other mental disorders, first-degree relatives of patients with schizophrenia, and community controls [28].

According to the study's findings, schizophrenia patients had less unusual content in their dreams than the other groups, especially the two mentally well groups. This is perhaps because people with schizophrenia think a little more simplistic thinking and have a lower level of abstraction than normal people. In general, there were substantial differences in dream content between groups in three areas, and there was insufficient evidence to prove that the dreams of patients with schizophrenia contained more enjoyable components and lesser innocuous components in comparison with other groups [28].

3.3.2. Sleep and Dreaming work together to treat mental disorders

Dreams can reflect some crucial psychological changes. The scientific research of dreams can not only understand the interaction between the spirit and the body but also provide a model for the study of emotional diseases, which is a systematic connection between dreams and awakening thinking.

Dreams bring us to a different reality, a hallucinatory world as real as any waking experience. These types of strange phenomena are emblematic of human sleep but have yet to be fully explained. For the general means of dream analysis, it is to describe their dreams after waking up, but it is often easy to exclude some insignificant details. However, retrospective dream report is subjected to be distorted and forgotten, which poses a fundamental challenge to dreaming neuroscience research. Despite patients trying their best to recall the memories, a certain resistance which is holding a mental block against remembering or accepting memories will prevent them from the most painful memories [29].

Lucid Dream (LD) is a type of dream in which the dreamers are aware that they are dreaming consciously and have the ability to control the content of dreams[30]. Psychological research has pointed to ways in which this form of dreaming may be utilized as a form of sleep therapy[31]. There are three on lucid dreaming.

Experiment 1

Lucid Dreaming (LD) Therapy as a cognitive-restructuring method can be applied to treating mental disorders since the researchers found when people experience lucid dreaming, they can interact with the real world. There had an experiment was done [32] which is the pathway to communicate with the patients through some basic questions like yes-no questions during the REM sleep period. Konkoly implemented their producers for two-way communication during polysomnographic ally-verified REM sleep in 36 individuals who has undergone lucid dream. During lucid dreaming, which is under the extraneous variables stably, researchers asked some questions to the patients and record their responses by recording their facial muscles and distinctive eye movements.

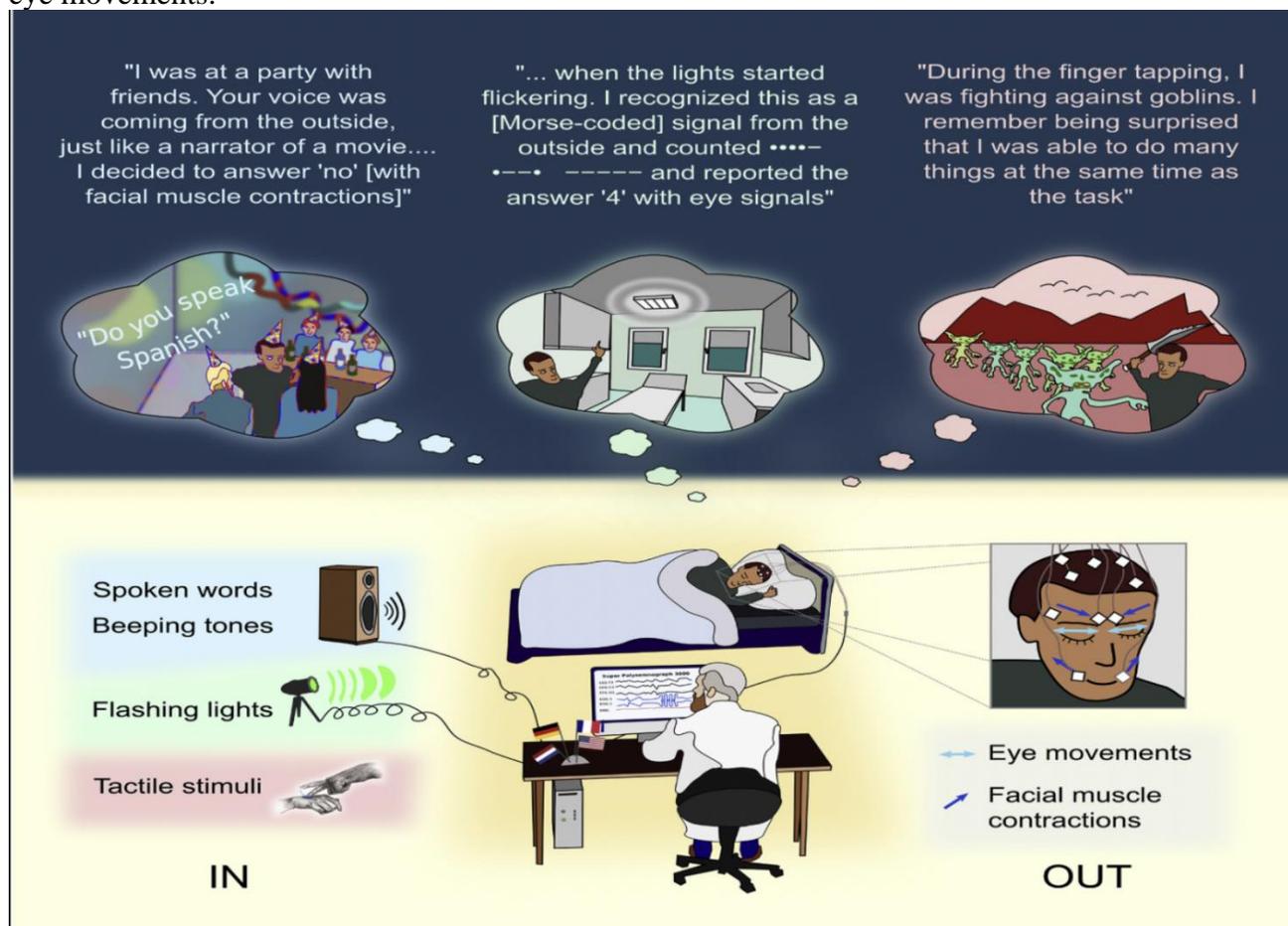


Figure 4: the overview of the experiment setting.[32] (Note: <https://doi.org/10.1016/j.cub.2021.01.026>)

After four groups of research, there are generally 6 of the participants answered the questions correctly on 29 occasions. The findings show that phenomenological and cognitive aspects of dreaming can be investigated in real-time. Hence, during the lucid dream, the participants will realize that they are dreaming and can control the content of the dream. This characteristic probably can open a pathway for those patients who suffer from nightmare disorder to know that they are

dreaming and control the content of their dreams by reinterpreting the dream scene, which ensures a return to ordinary sleep. However, it does not have sufficient evidence to prove that lucid dreaming can cure nightmares because there is a small amount of literature available and only a small number of experiments on this topic.

Experiment 2

Nightmares are vivid, anxious or frightening dream experiences that often happen during rapid eye movement (REM) sleep[33]. During stressful times, nightmares are more common and might develop in connection with traumatic events, as in posttraumatic stress disorder. Approximately 80% of people with posttraumatic stress disorder (PTSD) experience dreams, which are frequently emotionally connected to the initial event[34].

An experiment including a total sample (N = 31), 18 females and 13 males between 27 and 59 years (M age = 41.58 years) who were suffering from nightmares was tested for 6 weeks. All 31 participants were separated into the Training group which filled out a series of questionnaires after six weeks of treatment and the Control group which did not receive any treatment but was required to keep a sleep diary for 6 weeks[35].



Figure 5: Study design for treatment group and controls[35].

Measure	n	Baseline		End of therapy		p
		M	SD	M	SD	
Pittsburgh Sleep Quality Index (PSQI)	12	11.33	3.33	8.79	3.93	0.149
Epworth Sleepiness Scale (ESS)	4	10.63	4.62	7.00	4.49	0.109
Perceived Stress Scale (PSS)	8	22.00	12.91	25.38	11.81	0.465
Symptom Checklist 90-Revised (SCL-90-R)	12	73.12	9.30	72.83	9.60	0.225
Impact of Events Scale (IE-S)	6	48.31	14.69	39.29	21.48	0.728
Self-rating Anxiety Scale (SAS)	12	46.56	9.59	41.42	9.56	0.012
Self-Rating Depression Scale (SDS)	12	50.93	8.71	45.08	10.92	0.043
Multicultural Quality of Life Index (MQLI)	11	5.07	1.63	5.73	1.85	0.401
Quality of life	12	60.50	30.18	48.63	21.70	0.091
Daily functioning	12	65.00	28.76	63.42	21.38	0.116
Nightmare frequency	13	Several/Month		Several/Month		0.865

Figure 6: The results of the questionnaires.[35]

There were no significant differences regarding the parameters listed in Fig.6 between the LDT group and controls. The levels of anxiety (p = 0.012) and depression (p = 0.043) in the LDT group

decreased significantly at the beginning and end of treatment, manifested in lower SAS and SDS scores. However, there is no hypothetical confirmation of the effectiveness of LDT. By comparing the frequency of nightmares at the beginning and end of treatment, there is no obvious decrease in nightmares. The extent to which nightmares interfere with the quality of life and daily functions has not changed. Additionally, no changes were found in the PTSD profile.

4. Conclusions

There have been many scholars carrying out in-depth research and exploration of dreams, but it has been no specific conclusion so far about the meanings of dreams. This article aims at researching and summarizing the origin of dreams, the causes of dream, and how dreams play a role in healing. During sleep, the brain is rejuvenated and rested, and the body can repair and regenerate tissue and build bone and muscle. Dreams are associated with sleep, especially occur automatically in the REM stage of sleep, which is a crucial and essential stage for restoring the body and regulating emotion. Then analyze dreams from two different dimensions that are Psychoanalysis and neuroscience. In Freud's psychoanalysis, he interprets dreams as a means of psychotherapy for his patients. Hence, we estimate that another dream therapy such as lucid dream can have the same function, which can be seen as a form of therapy. Our speculative hypothesis is that perhaps we can treat mental disorders by hinting at and refracting the content of the subconscious. However, there is no hypothetical confirmation of the effectiveness of lucid dream.

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