

Technical Writing Project: Oneirology (Study of Dreams)

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Intended for general audiences

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Technical Process Scope & Description

If you're reading this, it's because you're on the journey of exploring your subconscious and the intricacies of its energy. In layman's terms? Dreams while you sleep, and what your brain does while you do it! Dreaming is very complex and can be an explorative hobby to take up, in terms of analyzing and even gaining control of them. However, this will be an explanation regarding the scientific study of dreams; oneirology. Process descriptions on dreaming and its analysis will be described. This information may be helpful for those curious as to why some are able to remember theirs after they wake up.

The intended audience for this process description is general with an interest in brain functionality and research. The targeted reader would have a high school education or above, and will learn about the brain in its dream state. Furthermore, methods to analyze these brain patterns will also be described. A basic knowledge of biology and anatomy is also helpful for this reader.

Technical Process Introduction

Dreaming is **not** simply resorted to the processes in which scientists used to think happens to the mind during sleep; simply coping with traumatic experiences and purely reacting to emotional experiences. **Dreaming**, a combination of many psychiatric thought, are the visuals and feelings experienced during various brain activity, usually during REM (rapid eye movement) sleep.



Figure 1. Sleeping Beauty & 7 Dwarves by Franz Schrotzberg

The Process

1) Sleep

This is generally the first step in achieving the goal of having a dream. All mammals are able to dream, and their brains control the process. During sleep,

various functions (like swallowing/saliva production and bladder) are temporarily shut down.

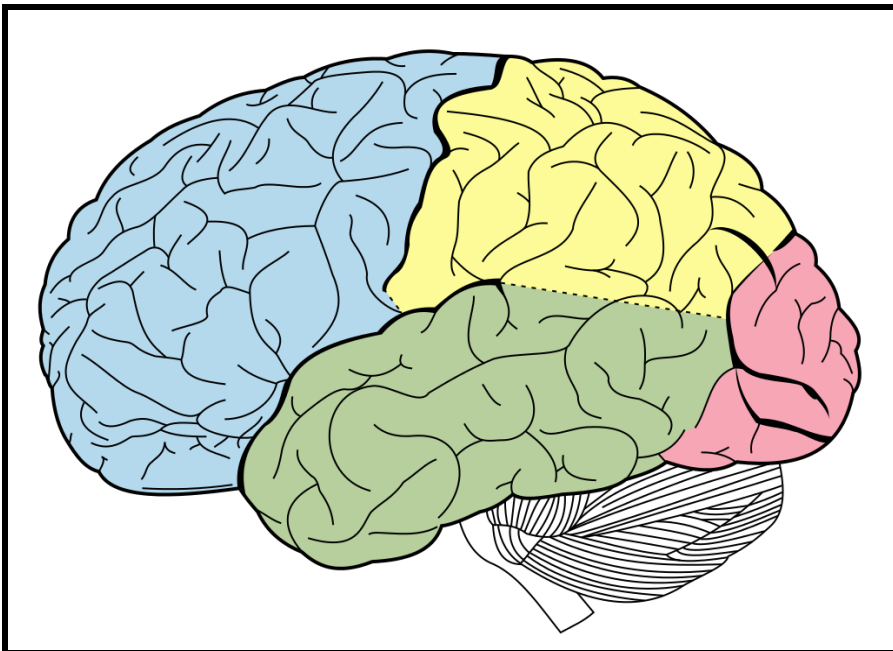
2) REM Sleep & the Brain

Since REM sleep occurs about **every 90 to 120 minutes**, and the brain activity being **most similar** to that of the awakened state, this is generally the phase in which many dreams can be recalled. During this stage of sleep, the muscles are relaxed, aside from any dreamer's muscle movement(ex. twitching), the body temperature fluctuates, and the heart rate increases.

For some sleepers (sometimes unbeknownst to them), this stage is also prime for arousal, so the genitalia may be erect.

Rapid eye movement. It's simple and named appropriately, as the eyes are moving at an increased rate, due to **visual cortex neurons** in the eye. Although reasons for why this occurs (either the dreamer's dream, or biological links to the other symptoms of excitement during this stage) aren't confirmed and conflict.

It is the **thalamus**, a section within the brain, that contains areas responsible for the visual imagery. This imagery can be analyzed via MRI and assigning various patterns for interpretation.



The area in **red** is the **occipital lobe** of the brain. The white elongated half (**the brainstem**), and bulged gray half (**cerebellum**) are part of the thalamus and **lateral geniculate** portions of the brain.

These two sections combined are referred to as the **pons-thalamus-occipital cortex**, or **pons-thalamus cortex (PTO)**.

The PTO activates when the pons-lateral geniculate, sends waves from the **pons**, to the geniculate section, and through the thalamus.

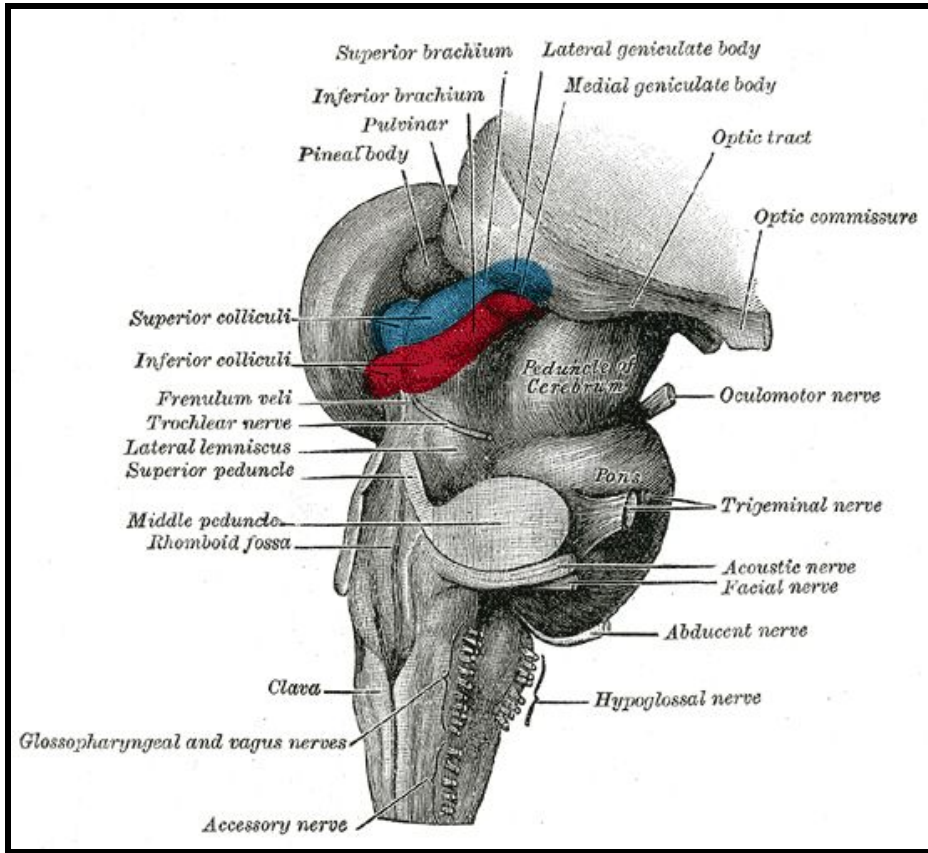


Figure 3. Pons (exterior)



Figure 4. Thalamus

So let's **review** this stage:

- Your eyes are moving really fast
- Your muscles are relaxed (near paralysis)
- Your heart rate is increased
- Your body temperature fluctuates (so sometimes that blanket is needed or thrown off to the side)
- Your body will physically react in other ways (but whether or not something is actually exciting is not always so)
- Your thalamus begins to produce various patterns that form images
- These images come from PTO section, up the occipital lobe and through thalamus

Now that you're aware of the brain activity that creates the opportunity for dreams, we can move on to an explanation as **how** one can visually analyze these brain waves, and essentially the images being produced. Many studies, such as tracking and MRI functions have shown that, brain activity during the non-REM and REM stages (so the first few minutes, to later 90 minutes), can be analyzed due to the dreamer's recollection.

Process Analyzed

Research conducted by a team with senior researcher, Yukiyasu Kamitani of ATRII (Advanced Telecommunications Research Institute International), recorded various brain activity of three adult males during a voluntary sleep study.

The sleep study was conducted in the following manner:

- The volunteers fell asleep
- The volunteers were awakened (sleep cycle interrupted) during the early stages of sleep (about the beginning of REM cycle)
- The volunteers were told to recall the images they saw while sleeping

An MRI scan is **magnetic resonance imaging**, a technique that combines magnetic and radio waves to **imprint** on parts of the human body, as the subject. The researchers were able to do the same by scanning the brain tissue of the subjects in the study during and when awakened from their dreams.

The procedure is performed with an **MRI machine**, and the volunteers, most likely were told to be hydrated before the tests began. Most MRIs are done after the patient has gone 4 to 6 hours without eating or drinking, but in this case, sleep deprivation is sort of involved (sleep was interrupted over 200 times!) and dehydration would have affected the results.

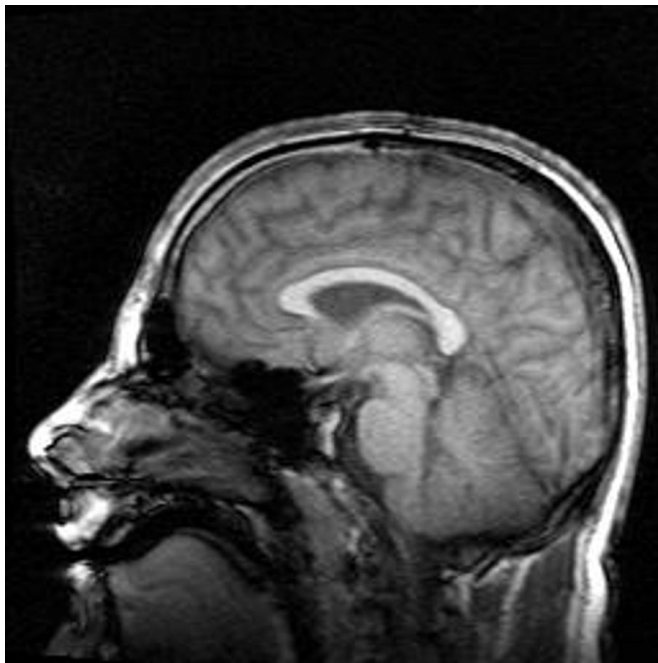


Figure 5. MRI Scan



Figure 6. MRI Machine

After each patient was awakened, the researchers immediately asked for a recall of the various images they saw in their dreams. Some saw people, parts of a building, furniture and some in black and white.

In preparation for the results the researchers:

- Divided the objects into various categories (such as street, furniture, girl)
- The volunteers entered the MRI machine once more
- **Algorithms** (rules or commands) within the computer paired each pattern that appeared in the subject, with the objects recollected
- Each object pattern would match with various patterns found during the dreaming stage

For a majority of people, the average sleep cycle is about 7 hours or less, and this single uninterrupted cycle can lead to various dream segments momentarily paused before the next one occurs. The reason why some dreamers are able to remember their dreams without external prompting, may lie in part of their own brain chemistry; the more creative a person is, the more vivid their dreams and longer they can recall. Each recollection has a window of 20 seconds to a minute before the dream falls away from the person's memory.

Conclusion

In the case of this process, the dreaming stage is a product of brain waves that can be analyzed for future studies and imagery analysis.

The analysis process uses magnetic and radio waves to imprint on the brain and its waves, to produce the scan.

If you are curious about being able to see your dreams outside of your dreams, you don't need an MRI machine to do it! Plenty of dreamers have painted, drawn, or written about their dreams. Photography also has its surrealist capabilities due to modern technology. And due to the latter, oneirology research is only becoming more of a fruitful and intricate process for those curious on the brain and its dreaming state.

Works Cited

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MRI Machine By U.S. Navy photo [Public domain], via Wikimedia Commons

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