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PHILOSOPHY AND SCIENCE OF DREAMS:  
THE INTERFACE BETWEEN TWO SEEMINGLY ANTITHETICAL APPROACHES

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# Abstract

The primary focus of this paper is to attempt to unravel the mysteriousness behind dreams. This thesis first focuses on ancient theories from civilizations such as Greek, Egyptian, and Indian. Monotheistic religious thoughts on dream occurrence and interpretation will then be discussed, examining the intersections within each of these religions. Following this, the thesis will examine what major philosophers and psychologists, such as Descartes, Freud, and Jung, propose regarding the cause and purpose of dreams. Introduced in this chapter will be the Oedipus Rex complex, the unconscious versus the conscious mind, and the superego versus the id. The next major portion will focus on modern *oneirology*-- the scientific study of dreams focusing on brain signals and activity. Among the neuro-scientific theories in discussion are reverse learning, activation synthesis, and memory consolidation. The final chapter will first make evident the downfalls of established scientific beliefs on dream work, with emphasis on the activation synthesis theory. The final chapter will also attempt to bridge philosophy and science with respect to dream studies by re-examining Freudian dream theories and the latest neuroscientific studies on dreams.

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## Author's Note

My initial fascination with dreams stems from childhood experiences: I recall having vivid, recurring dreams that consisted of not only the same “dreamland” but also the same posse of friends with whom I shared a strong camaraderie. Were these images merely byproducts of a delusional mind or figments of my imagination? For a short while, I began writing down dreams in hopes of validating the images that were taunting me; however, I was met with frustration when I failed to draw logic from them. Hence, this thesis came to fruition in an attempt to fulfill my childhood wish to search for meaning behind certain dreams. Also, as both a biochemist and a philosopher, my desire to find an interface between the two areas with respect to dream theories propelled me to move forward with this idea. Even after extensive research, I still have unanswered questions; however, this thesis brought me to appreciate the complexities of the dreaming mind and to gain a greater knowledge of the many factors involved in creating these nocturnal mysteries.

## Introduction:

*I am accustomed to sleep and in my dreams to imagine the same things that lunatics imagine when awake. -Rene Descartes*

Every night, while our bodies rest, our minds are restless -- they conjure up story lines that often leave us perplexed the next morning. Although we often cannot accurately recall them, we have dreams nearly every night and these dreams emerge in innumerable forms: fictitious reoccurring characters, familiar faces in unfamiliar places, celebrities feigning friendships, painful repressed memories, and more.

Dreams are often times compelling and may even lead to epiphanies that help govern our lifestyles. In the past few months, I discussed dreams with many friends and family members. Some were able to provide elaborate details while others merely provided basic storylines. Though the dreams varied immensely from one person to another, these quixotic visions left each person perplexed.

Dreams are not always a collage of nonsensical images incongruously meshed together—a few major scientific discoveries and some classical tales were formed *a posteriori* to dreams. In the 1800s, one teenager dreamt of “a hideous phantasm of a man stretched out,” and later, “on the working of some powerful engine which showed signs of life and stirred with an uneasy, half vital motion” (Shelley Intro.). Soon after, the dreamer Mary Shelley wrote the international bestseller Frankenstein. Shelley stated in her book that “if I could only contrive one [story] which would frighten my reader as I myself had been frightened that night. On the morrow I announced that I had thought of a story. I began that day with the words, 'It was on a dreary night of November', making only a transcript of the grim terrors of my waking dream” (Intro.).

Dreams have also led to musical inspirations. In 1965, The Beatles were in London filming *Help!* when Paul McCartney awoke one morning with an “entirely magical” experience—he had dreamt of a new song. McCartney later described the birth of the international hit “*Yesterday*” (Sacks 308):

I woke up with a lovely tune in my head. I thought, ‘That's great, I wonder what that is?’ There was an upright piano next to me, to the right of the bed by the window. I got out of bed, sat at the piano, found G, found F sharp minor 7th -- and that leads you through then to B to E minor, and finally back to E. It all leads forward logically. I liked the melody a lot, but because I'd dreamed it, I couldn't believe I'd written it. I thought, 'No, I've never written anything like this before.' But I had the tune, which was the most magic thing!<sup>1</sup>

*Yesterday*, a song that BBC named the best song of the 20<sup>th</sup> Century, emerged first in the form of Paul McCartney’s dream.

Dreams have also led to scientific discoveries. Friedrich August Kekulé, a Dutch chemist, had a dream of a snake chasing its own tail. This led Kekule to his discovery of the benzene ring. In a speech given at the German Chemical Society, Kekule described his dream (Horvitz 36):

...long rows sometimes more closely fitted together all twining and twisting in snake-like motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke; and this time also I spent the rest of the night in working out the consequences of the hypothesis.

Another scientific discovery, which had its seeds embedded in a dream, led Otto Loewi to receive a Nobel Prize in medicine in 1936. Loewi had the idea that there might be a chemical transmission of the nervous impulse rather than simply an electric one (this at the time was the common belief) but he was at a loss of how to prove his hunch. The idea

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<sup>1</sup> Discovering music and lyrics through dreams has been studied extensively in a sleep laboratory in Florence, Italy. Results of the lab showed that it is not very uncommon for musicians to experience music in dreams, which often times inspire their real life music.

slipped to the back of his mind until almost two decades later when he was confronted with it in his dream. According to Loewi (Horvitz 43):

The night before Easter Sunday of that year I awoke, turned on the light, and jotted down a few notes on a tiny slip of paper. Then I fell asleep again. It occurred to me at 6 o'clock in the morning that during the night I had written down something most important, but I was unable to decipher the scrawl. The next night, at 3 o'clock, the idea returned. It was the design of an experiment to determine whether or not the hypothesis of chemical transmission that I had uttered 17 years ago was correct. I got up immediately, went to the laboratory, and performed a single experiment on a frog's heart according to the nocturnal design.

It took Loewi a decade to carry out a decisive series of tests to satisfy his critics, but ultimately the result of his initial dream-induced experiment became the foundation for the theory of chemical transmission of the nervous impulses.

This thesis will first discuss historical and ancient dream theories before examining the role of dreams within major religions. It will then delve into modern philosophical interpretations of dreams, focusing on theories postulated by well-known philosophers René Descartes, Sigmund Freud, Carl Jung.<sup>2</sup> As neuroscience has recently gained more vigor, scientific breakthroughs, many of which will be discussed in this thesis, allow better insight into the 'science of dreams,' termed *oneirology*. This thesis will undertake the task of merging philosophical and neuroscientific findings after analyzing each separately. Though past scientific findings have invalidated some philosophical and psychoanalytic theories pertaining to dreams, new scientific data are reverting back to some aspects of psychoanalytic theories, and this thesis will examine those in great detail. The final component, and arguably the most salient feature of the

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<sup>2</sup> Note that while Sigmund Freud and Carl Jung are more accurately viewed as psychoanalysts--for the purpose of this paper their theories will be regarded as philosophical ideas. This is in contrast to neuroscientific dream theories that quantitatively test brain activity whilst dreaming.

thesis, will focus on deriving a workable explanation for the purpose of dreaming, if such exists, after establishing the overlap between scientific and philosophical dream theories.



# Chapter 1: Ancient Theories on Dreams

*Dreams digest the meals that are our days. -Astrid Alauda, Dyspeptic Enlightenment*

## 1.1 Ancient Egypt

Thousands of years before Freud and neuroscientists tackled the issue, ancient Egyptians devoted a great deal of time to dream interpretation. They relied on dreamt 'messages' to help cure illnesses, to make political decisions, to decide the location of sacred temples, and even when to wage battles. Dreams were considered to be divine predictions of the future. They were thought to be messages from the gods that could foretell impending disasters or good fortune. The understanding of the implications of certain dreams was critical to a prosperous life in ancient Egypt.

If one wished to communicate with a certain god through dreams, precise rituals, such as fasting and isolation, would be performed in that god's honor. A specific technique that ancient Egyptians used to induce dreams with divine messages was called *dream scrying*. Ancient Egyptians took this process seriously and in preparation would abstain from alcohol and food for at least four hours prior. Another prerequisite before the ritual was a warm bath and the anointing of temples with olive oil, a substance thought to be pure and earthly. The ritual itself consisted of a clean piece of linen that would contain wishes to the gods written with specially made ink. The linen would also indicate which god was called upon and what the dreamer desired from that god. The piece of linen would then be rolled up into a wick and inserted into the oil of the lamp. On the left palm, the image of the dream god would be drawn with ink. The lamp would be lit while the dreamer recited a special prayer to the god (Muadhnaït 2):

Thoth, (name of desired god) I invoke, blessed power of dreams divine,

Angel of future fates, swift wings are thine,  
Great source of oracles to human kind,  
When stealing soft, and whispering to the mind,  
Through sleep's sweet silence and the gloom of night,  
Thy power awake the sight,  
To silent souls the will of heaven relates,  
And silently reveals their future fates.

Following the invocation, a piece of black linen would then be wrapped around the left hand, which symbolized the black eye of Isis, a goddess thought to contain magical powers. The dreamer would sleep bereft of all worldly items except for the ink with which he would copy down the god's 'message.' In days following the event, the message would be interpreted by an elite few, which included priests and professional 'dream interpreters.' If the god spoke directly to the dreamer, however, no interpretation would be needed (Muadhnaith 7).

Ancient Egyptians not only had tried to answer where dreams came from but also attempted to discern possible meanings behind them. Ancient Egyptians were one of the first to have written records of dream interpretations. In the library of Scribe Kenhirkhopeshef, a man in charge of overseeing the tomb of the Great Ramses, was an exhaustive book containing records dating back to 1279-1213 B.C.E. This Dream Book, scribbled in hieroglyphics, contained hundreds of dreams alongside the interpretations of each. The book was organized by major types of dreams and the two main subcategories were 'positive images' and 'negative images.' For decades, this book was paramount to dream interpretations and it also provided unpredictable explanations. An interpretation taken from The Dream Book (The British Museum):

If a man sees himself dead this is good; it means a long life in front of him. If a man sees himself eating crocodile flesh this is good; it means acting as an official amongst his people. If a man sees himself with his face in a mirror this is bad; it

means a new life. If a boy sees himself uncovering his own backside this is bad; it means he will be an orphan later in life. Dreaming of a deep well meant prison in the near future due to metaphorical images of isolation.

Though the original owner of The Dream Book is unknown, it contains names of owners including Khaemamenand his son Amennakht, both of whom were notable scribes. The Dream Book is now in The British Museum.

## 1.2 Ancient Greece

While Ancient Egyptians held the belief that dreams were direct messages from the gods, Greeks shifted their view and thought dreams were not necessarily signs from the divine. Antiphon the Sophist, a dream interpreter, wrote the first known Greek book of dreams called “On Interpretation of Dreams,” which served several practical purposes for Greek citizens. Antiphon, a contemporary of Socrates, argued that dreams were not created by supernatural powers but instead were caused by natural conditions (Pendrick 51). Artemidorus, a Greek physician in the 2<sup>nd</sup> century C.E., was arguably the most monumental figure in Greek dream studies and for this reason his work will be further analyzed later in this thesis (see 3.1).

The most common view of dream interpretation in Greek literature was the Homeric view. Homer, a Greek poet in the 8<sup>th</sup> Century B.C.E,<sup>3</sup> discussed the nature of “true” and “false” dreams in the *Odyssey* and the *Iliad*. He would tell that (Homer 1506):

Dreams have two gates: one is fashioned of horn and one of ivory. Those which pass through the one of sawn ivory are deceptive, bringing tidings which come to nought, but those which issue from the one of polished horn bring true results when a mortal sees them.”

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<sup>3</sup> The time in which Homer lived is controversial. Some historians claim that he lived not during 850 B.C. but around the time of the Trojan War in the 12<sup>th</sup> Century.

The Greek god Morpheus was mentioned several times in the *Iliad* as ‘Dream’ and had the power to take any human form and incept dreams to delineate messages. The Homeric view merged Egyptian beliefs, which emphasized the divine nature of dreams, with the Greek beliefs of Antiphon and Artemidorus, which both focused on the mundane humanistic aspects of dreams. According to the Homeric view, everyday occurrences in human affairs interested gods who would then communicate with humans through ‘true’ dreams.

To induce dreams, the Ancient Greeks adopted a method called “temple sleeping,” which was influenced by both Egyptians and Mesopotamians. Asclepius, the Greek god of medicine, possessed the art of healing. In honor of Asclepius, the ancient Greeks constructed healing temples and sanctuaries, which were called Asclepia. If an ailing patient needed a cure, he would go into an Asclepia and perform sacrifices in hopes of having a true dream sent from this god. The patient would then go into a period of incubation, during which he would sleep on the skin of a sacrificed animal near the statue of Asclepius in hopes of being cured the next morning. The messages sent from Asclepius were then interpreted by priests or by professional dream interpreters. If a healing dream would be successful in its cure, the patient would write the outcome on the walls of the Asclepia (Stewart 14). Rituals performed prior to temple sleeping included full body cleansing, fasting, and abstinence for three days prior to incubation -- similar to Ancient Egyptian rituals prior to scrying.

### 1.3 Ancient Hindus

Dreams in Hinduism are strongly tied to religious motifs. The earliest references to dreams are found in Rig Veda, an ancient Hindu sacred text written between 1500 and 1000 B.C.E.<sup>4</sup> In the Rig Veda, dreams of violence were thought to be manifestations of evil spirits. Ancient Hindus would try to keep these spirits away by praying to Lord Varuna.<sup>5</sup> But some retributive dreams were not necessarily thought to be bad because they were thought to have ethical justifications. Some such dreams were even thought to lead to success and happiness if the aggression was pro-actively handled in the dream. But if the dreamer remained passive and became hurt by his own passivity, however, it was often considered a bad omen. These dreams might be more indicative of the dreamer's character than prophecy, since "those who take an active role in their dreams are likely to be more active, and therefore, more successful, in their daily lives" (Van de Castle 59). Some dreams that evoked various emotions from deep pleasure to intolerable pain yielded insight to the nature of karma that the dreamer was destined to undergo. In order to reward the soul for minor Karmas, the Brahman was thought to create positive dreams.

The *Upanishads*, philosophical Hindu texts written between 900 and 500 BC, display two perspectives on dreams: the first maintains that dreams are merely expressions of inner desires, while the second states that during the state of dreaming, the soul leaves the body and is guided by supreme forces until it is awakened. It was also

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<sup>4</sup> The Vedas is composed of four canonical sacred texts including the Rigveda. The Rigveda is mostly a compilation of hymns and prayers meant to be recited by priests.

<sup>5</sup> In the Vedic religion, Varuna is the god of not only the underworld but also the sky and world's oceans.

thought that if the sleeper was awakened abruptly, the soul might not return to the body quickly enough and that the sleeper could die (Hastings 185).

Indian scholar Charaka wrote the main Hindu dream interpretation book in 300 B.C.E. An example of his dream interpretation included seeing Ganesh, the revered elephant-headed god associated with wealth. Dreaming of an elephant was always, according to Charaka, a harbinger of good luck. If the elephant were friendly and happy, one would have a prosperous future. If the dreamer were riding an elephant, this indicated a rise in social status. If the elephant attacked or were angry, this implied that the attainment of one's goals would not come without obstacles (Sri Swami 17).

An ancient Hindu dream song sang by tribesmen read (Sri Swami 1):

When you perceive the things in dream you take them all to be real,  
When you wake up and perceive they are all false and unreal.  
The world of name and forms is like the dream you have during the night,  
you take them all as real things, but they are only false and transient.  
The only one which really exists is that God with Brahmic splendor.  
Wake up, wake up, wake up to Light; Wake up, wake up...  
And see the things in their proper light.

### **A Long Standing Quagmire: Dreaming or Awake?**

Are dreams truly false and unreal? What made Hindus certain that the 'real' world was not an illusion and the 'dream world' was not real, especially since Ancient Hindus thought the dream world was more connected to divine powers? Later Hindu thought addressed this problem, concluding that dreams are real and caused by the Brahman, the transcendent being of all living things.

Swami Sivananda Saraswati (Sri Swami) was a 20<sup>th</sup> century Hindu spiritual teacher and a pioneer in studying the implications of dreams. He was one of the first people to question and analyze whether the reality of the dreaming state was real while

the waking state was an illusion. In Swami's "*Philosophy of Dreams*," he outlines the skeptical hypothesis about the ontology of dreaming (11).

In both the waking and dreaming states, perception is associated with an object-subject relationship. The only difference between the two states is that the objects in a dream are perceived in the space within the body, whereas in the waking state objects are seen in the space outside of the body. Anything that is 'perceived' falls into the trap of being considered unreal since the objects are creations of the mind. To test reality, the theory of non-contradiction is used: that which persists forever is real and that which has a beginning and an ending is unreal since it is changeable and hence non-eternal. The dreaming and waking states both have a beginning and an end. Swami argues that the relations of the waking state are contradicted by those of the dreaming state and since duality is unreal, all objects in the dream and awake states must be unreal. As long as a dream lasts, the awake state is unreal; as long as one is awake, the dream state is unreal. The reality of the one is dependent on the reality of the other and since both states cannot occur simultaneously, the waking state is as unreal as the dream. Swami further validates his claim through examples. When one dreams, one sees the events of fifty years within an hour of sleep. The waking state and the dreaming state are of the same quality of nature. The only difference is that the waking state is a long dream, known as *Deergha Svapna* (Swami 11-12).

This question has resurfaced many more times in the recent years, with movies like *Inception* capitalizing on the unsettling concept of reality. If the state we are in for the majority of our lives is actually an illusion while the shorter dreaming state is reality,

how can we draw purposeful meaning from our life experiences? Perhaps Sri Swami's interpretation of dreams has led to more questions than answers.



## Chapter 2: Monotheism & Dreams

*Dreaming is an act of pure imagination, attesting in all men a creative power, which if it were available in waking, would make every man a Dante or Shakespeare. -H.F. Hedge*

Dreams have their influences in nearly all ancient cultures and religions, polytheistic as well as monotheistic. In Judaism, Christianity, and Islam, the majority of sacred texts contain dreams. A third of the Bible contains stories and actions that originated from dreams. In all three of the major monotheistic religions, the same story of Joseph and the power of his dream are given. Joseph was first abandoned by his brothers and then sold into slavery. He was unrightfully thrown into prison where he started interpreting others' dreams. The Pharaoh's butler was impressed by the accuracy of Joseph's dream interpretation and told the Pharaoh about Joseph's abilities. The Pharaoh, who had been having some troublesome dreams himself, called Joseph to him in hopes of receiving guidance.

And behold, there came up out of the river seven fat and beautiful cows; and they fed in a meadow. And behold, seven other cows came up after them, poor and lean. And the lean cows ate up the first seven fat cows. And behold, seven ears of grain growing on one stalk, full and good, and behold, seven other ears thin and blasted by the east wind, sprang up after them, and the thin ears devoured the seven good ears (Genesis 41:18-23).

Joseph interpreted this dream to mean that Egypt would have seven years of abundance followed by seven years of famine. The Pharaoh was able to prepare for the seven years of famine in advance, which allowed Egypt to prosper. As a reward, Joseph was freed from prison and made ruler of Egypt.

Dreams, as believed in the Abrahamic religions, originate from three primary sources: Fortuitous dreams are sent from God; troubling dreams are sent from Satan; and incoherent dreams are derived from "the rambling mind" (Ahmed). Though similarities

existed among the religions in regards to the causes of certain dreams, such as their prophetic nature, nuances arose when exploring the meaning and interpretation behind dreams.

## 2.1 Judaism

The *Talmud*, which was written between 200 and 500 C.E, included over two hundred references to dreams. It stated, “Dreams which are not understood are like letters which are not opened.”<sup>6</sup> However, in Judaism, the dreamer was not recommended to interpret his own dream so most devotees would turn to professional dream interpreters who were usually community leaders thought to have connections to the divine. Weight was placed on deriving meaning of a dream only after having it interpreted by these experts.

There were twenty-four interpreters of dreams in Jerusalem in the 3<sup>rd</sup> Century and each one was highly coveted. If there were variations in dream interpretation among different interpreters, it caused little controversy since each interpretation carried truth. Rabbi Bana'ah, a Jewish sage, stated that “Once I dreamt a dream and I went around to all of them [interpreters] and they all gave different interpretations. All were fulfilled, thus confirming that all dreams follow the mouth” (Jewish Encyclopedia). Was the statement that “all dreams follow the mouth” Scriptural? Rabbi Eleazar<sup>7</sup> adherently believed that and said, “Whence do we know that all dreams follow the mouth? Because it says, and it came to pass, as he interpreted to us, so it was” (Fishbane 200).

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<sup>6</sup> Due to the importance of dreams in the Talmud, Hebrews practiced dream incubation to receive divine revelation. If no such revelations were revealed, then it was essential to turn to a dream expert for interpretation.

<sup>7</sup> Rabbi Eleazar was a secondary teacher who was acquired fame as teach of traditional Jewish law.

## 2.2 Christianity

The New Testament similarly suggests that dreams experienced by Biblical figures contain spiritual messages sent directly from God. Biblical personages, such as Solomon, Magi, Jacob, Nebuchadnezzar, Joseph, Gideon, Samuel, Saul, and Paul, were all visited by God or by prophets in their dreams. Dream interpretations are simple and focus on interpreting symbolic reoccurring dreams.

In the New Testament, dreams are mentioned at least seven times and four of them are regarding Joseph and provided advice on how to take care of baby Jesus. Most of the revelations are in the Gospel of Matthew:<sup>8</sup>

Matthew 1:20: But after he had considered this, an angel of the Lord appeared to him in a dream and said, "Joseph son of David, do not be afraid to take Mary home as your wife, because what is conceived in her is from the Holy Spirit.  
Matthew 2:12 And having been warned in a dream not to go back to Herod, they returned to their country by another route. Matthew 2:13: When they had gone, an angel of the Lord appeared to Joseph in a dream. "Get up," he said, "take the child and his mother and escape to Egypt. Stay there until I tell you, for Herod is going to search for the child to kill him" (New Testament, Matthew).

Though Christian dream dictionaries do exist, very little is mentioned directly in the New Testament on how to interpret dreams *now*. Some Christian denominations believe that God no longer uses dreams to communicate with man and women because it is 'no longer necessary.' These Christians argue that God has completely revealed his will in the Bible. Consequently, a majority of Christians look at dream interpretation as potentially harmful and fear that those who follow dreams too closely, in the delusion that they are 'messages from God,' may be misguided or may overlook symptoms of serious mental illnesses (Brueggemann). As a result, dream research and analysis were and still are overlooked by

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<sup>8</sup> The Gospel of Matthew, or simply Matthew, is one of the four canonical gospels and also the first book of the New Testament.

the Christian faith.

### 2.3 Islam

Dreams perhaps take the most pivotal role in the last major monotheistic religion: Islam. A majority of the Qur'an is thought to have been revealed in dreams to Prophet Muhammad through his famous "night journey" of *Lailatal-Miraj* to Jerusalem. In the seventh century, Muhammad had a dream that he had a divine nature and in it he traveled from Medina to Mecca to see devout Muslims worshipping a single God. Though Mecca was at the time reserved for polytheists and prohibited the worship of a single deity, Muhammad's dream helped him envision a religion devoted to a single God. (Coxhead 102). Muhammad's impetus started a revolution that eventually led to the formation of what is now known as Islam. In another dream, Muhammad had been sent to lead a battle, in which he saw that the enemy forces were small. Muslims believe that an angel later told Muhammad (Bulkeley 197):

Allah made them appear to you in a dream as a small band. Had He showed them to you as a great army, your courage would have failed you and discord would have triumphed in your ranks. But this Allah spared you. He knows your inmost thoughts.

This encouraged Muhammad to recruit a large army and, as the story goes, he was able to defeat his opponents because his dream foretold the future

A majority of Muslims feel that dreams are likely to offer metaphysical and divinatory knowledge in the contemporary world. Dreams are seen as practical commodities, which, when interpreted correctly, may help guide one's lifestyle. *Tabir*, or dream interpretation in Islam, emerged in the 9<sup>th</sup> to 13<sup>th</sup> Century as a dynamic body of knowledge that integrated science with Islamic beliefs (Bland 120-124). Kelly Bulkeley, a world-renowned dream expert, states that nothing emerged in Judaism or Christianity to

rival the breadth and sophistication of dream interpretation in Islam (201). To this day, a deep intellectual understanding, and reverence of dreams and thrives in Islamic culture.

# Chapter 3: Philosophy & Dreams

*Dreams are illustrations from the book your soul is writing about you. -Marsha Norman*

## **3.1 A Classical Philosophical Approach**

Aristotle (384 BC – 322 BC) was one of the earliest philosophers who established a systematic way to analyze dreams. When asked a question regarding the origin of dreams, Aristotle realized that the cause of enigmatic visions were in no way easy to explain. In *On Divination During Sleep*, Aristotle deviated from religious thinkers and boldly stated that gods do not send dreams. He reasoned that since we observe many non-human animals dreaming, and since dreaming is a prevalent occurrence in these animals, there is little reason to think that it carries divine messages. He also stated that actual waking actions often shape our dreams, in which they may even be played out or repeated. In such cases, reality paves the way for dreams. Dreams are many times versions of reality, albeit more extreme. For example, a part of the body can get slightly warmer in the middle of the night, which can lead to a person dreaming of walking through fire. Aristotle hypothesized that external stimuli are absent during sleep, so dreams are manifestations of an awareness of internal sensations that are expressed as enigmatic nighttime visions (Holowchak 407-412).

Aristotle is responsible for another major work called *On Dreams*. In it, he explains that the human mind is capable of forming vivid imagery of an object that is no longer present. While awake, humans can easily distinguish an external object from an imagined object (Aristotle Chp. 1). During sleep, this faculty to discern the real from the imaginary disappears. Resulting is the sense of reality that humans have in dreams, a

concept which Freud many centuries later would term as the “hallucinogenic property of dreams.” Thus, just because a dream seems extravagant does not mean that it has a prophetic nature, especially since our mind not only exaggerates senses but also fabricates images seen in the awake-state.

Artemidorus, a Roman Philosopher during the 2<sup>nd</sup> Century A.D., wrote *The Interpretation of Dreams* or *Oneirocritica*, a five-volume work on dream interpretations. He classified dreams into visions, oracles, fantasies, and apparitions. His observations led him to say that “dreams and visions are infused into men for their advantage and instruction” and that “the rules of dreaming are not general, and therefore cannot satisfy all persons, but often, according to times and persons, they admit of varied interpretations” (Artemidorus, Encyclopedia Britannica). He formed two classes of dreams: somnium and insomnium. Insomnium dreams are concerned with the feelings evoked by everyday life and deal with contemporary matters such as unrequited love or fear of spiders. Dreams of the somnium type forecast the future and have a more divine nature, giving the study of these types of dreams its own name, *oneiromancy*. Some somnium interpretations in *Oneirocriticus* are as follows: The cackling of geese means good luck and speedy success in business; A blossoming tree means that future life will be filled with gladness and of prosperity. Artemidorus, a man before his time, explored reasons behind the sexual and incestuous nature of some dreams -- a topic brought to the platform many centuries later by Sigmund Freud. In a dream involving sex with one's mother, Artemidorus stated (Artemidorus, Encyclopedia Britannica):

The case of one's mother is both complex and manifold and admits of many different interpretations—a thing not all dream interpreters have realized. The

fact is that the mere act of intercourse by itself is not enough to show what is portended. Rather, the manner of the embraces and the various positions of the bodies indicate different outcomes.

Artemidorus' greatest contribution to dream study was his theory that dreams are unique to each individual and that one person's dream cannot satisfy all persons.

### **3.2: René Descartes: I Think, Therefore, I Dream**

René Descartes was a 17<sup>th</sup> Century French mathematician, scientist, and philosopher and is now considered the father of modern philosophy. He received the title mainly because he broke away from the traditional and prevalent Aristotelian philosophy, developing a new and systematic approach to answering questions. Though Descartes' focus was not on dream research, he unintentionally contributed significantly to the field. In 1619, while in Germany, Descartes experienced three powerful dreams that inspired him to begin looking for the new method of thought. In the first dream, Descartes found himself flung down by a powerful whirlwind while walking near a college. In the second, he was awoken by an inexplicable explosion, a sound in his head, and found sparks coming from the stove in his room. In the third dream, he found a dictionary and an anthology of ancient Latin poets on his bedside table. He read a verse that began with, "What path shall I follow in life?" Descartes concluded from these visions that the pursuit of science would be the pursuit of true wisdom and a central part of his life's work (Desmond 58-59).

Descartes introduced a major concept called "universal doubt" in an effort to prove that science rested on firm foundations that were not tarnished by the senses.



Knowledge gained from our senses is open to doubt and he used the dream argument<sup>9</sup> in the *First Meditation* to help validate his point. In it, he states that we often have perceptions similar to the ones we usually have while dreaming. There are no definite signs to distinguish dream experience from waking experience. Thus, it is possible that we are dreaming right now and that all of so-called perceptions are false (Broughton 82).

However, this theory poses obvious problems. From personal experience, we know that dreams come in a multitude of variations. Some dreams are as mundane as putting on our jogging shoes and going for a run, a vision that has the potential of being confused with events from waking-state, as Descartes claimed. On the other hand, dreams may be as abstract and imaginative as a person confronting and conversing with a human sized butterfly. Therefore, Descartes' claim that no definite signs exist to distinguish dream experience from waking experience is easily refuted.

In the *Sixth Meditation*, Descartes revised his "Dream Argument" by claiming that dreams can in fact be distinguished from the waking state because dreams are not linked by memory with all the other actions of life as are waking experiences; thus, dreams fail to cohere with the rest of what we remember. George Botterill, a 20<sup>th</sup> Century British philosopher, organized ideas posed in the "Incoherence of Dreams" theory by Descartes by dividing dreams into two categories: failure of fit and bizarre sequence. "Failure of fit" is exhibited by a dream in which a subject represents herself in the dream as something different from her life in the wake-state. Examples that Botterill gives include a middle-aged parent-less woman fell asleep only to resurrect herself in a dream

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<sup>9</sup> Rene Descartes later revises his Dream Argument after receiving much criticism from others such as Hobbes. His revision is part of the Sixth Meditation in which he admits that one can distinguish between a dream and reality.

as a child on vacation with her mother and father, and a person falls asleep in Tokyo and then dreams to be in London without any awareness of how he might have gotten there (142). “Bizarre sequence” is exhibited by a dream in which what happens, according to the content of the dream, breaks known principles of causal or metaphysical possibility. An example that Botterill gives is that, in a dream things might simply vanish into thin air, or you might seem to be holding a conversation with someone who changes into a chimpanzee while you talk (Botterill 144).

But Descartes was challenged in his attempt to explain dreams and their relation to the waking-state. Though he conveyed novel ideas in *Meditation*, he did not theorize the purpose of dreaming nor on how to interpret them. For that, a different man took the stage two centuries later and completely changed the way dreams were interpreted.

### **3.3: Sigmund Freud: The Father of Dream Psychoanalysis**

Sigmund Freud is incontrovertibly one of the greatest contributors to dream research. Although much of Freud’s radical theories brought him criticism, Freud nonetheless acted as the catalyst for cultivating the Western interest on dreams and paving the way for oneirologists.

Sigmund Freud was born May 6<sup>th</sup>, 1856, to Jewish parents in a small town in Austria. Even as a child, he displayed brilliance and, as was expected for top students during those days, he embarked on a journey to practice medicine. On that journey he became involved in research under the direction of a physiology professor named Ernst Brücke. Freud was very good at his research and he concentrated on neurophysiology. After completing residency, Freud permanently settled in Vienna, married his longtime

fiancée, and started a private practice in neuropsychiatry. Freud immigrated to England shortly before World War II when Vienna became too dangerous for Jews. He spent much of his time writing and further enhancing his dream theories. One of his most well known works, *The Interpretation of Dreams*, largely a work of self-analysis, was influenced by his series of nightmares that followed short after his father's death (Boeree, "Sigmund Freud").

Freud popularized the idea of the conscious and the unconscious mind, --key ideas to understanding his later proposed theories on dream interpretation. The conscious mind is what allows an individual to think and act rationally. It is one's *awareness* of any particular moments, memories, thoughts, fantasies, and feelings. Related to the conscious mind is the preconscious, which is merely ordinary memory. This can be retrieved fairly easily at any time and brought to our awareness. Freud theorized that the largest part of our mind is occupied by the 'unconscious.' He claimed it to be a reservoir of thoughts and memories that manifest in our minds but are still outside of our conscious awareness (Encyclopedia of Philosophy). The theory of the unconscious, as Freud viewed it, suggested that neurotic behavior, through actions or dreams, has a hidden cause and may be explained in a meaningful way.

Alongside Freud's account of the conscious and unconscious is his tripartite model of personality. Freud's theoretical model divides the human mind into three structural elements: *id*, *ego*, and *superego*.

The *id* is the part of the mind that gives rise to instinctual impulses, usually implicative of sexual desires, which are natural, usually uncontrollable, and demand satisfaction. In other words, the *id* is the pool of repressed images and thoughts belonging to the unconscious area of the mind in a primitive form. The *superego* is the

agency that carries out thoughts due to social coercion and internalized control mechanisms. The *superego* restricts reprehensible sexual drives formed by the *id* through the *ego*. The *ego* is the conscious body of mind that tries to reconcile conflicting demands placed by the *id* and *superego* (Stock 544).

Although certain thoughts and drives can be repressed, Freud explains that they cannot be destroyed and thus often times show up in dreams during the “*ego collapse*.” Erotic dreams, for instance, occur because the control mechanism is stymied and unfiltered thoughts can flow freely through to the conscious *ego*. Dream analysis, according to Freud, may lead to beneficiary results and serve as a precursor for psychoanalytic treatment. He wrote (Freud 83):

My patients, after I had obliged them to inform me of all the ideas and thoughts which came to them in connection with the given theme, related their dreams, and thus taught me that a dream may be linked into the psychic concatenation which must be followed backwards into the memory from the pathological idea as a starting-point.

When implementing Freud's dream theories, a person no longer needs dream dictionaries or interpreters since the “manifest content” of a dream does not contain generic symbols that have objective meaning. While there may be certain scenarios within dreams that have similar content, as will be revealed shortly, final interpretation must be made in context of the dreamer's personal experience -- subjectively. As Freud said, “One has a readily understood aversion to exposing so many intimate things from one's own psychic life, and one does not feel safe from the misinterpretation of strangers” (Freud 88).

However, a dream that Freud found common in young men led him to create a psychological construct that aroused popular interest but also triggered skepticism from experts in similar fields. Freud analyzed numerous incidents in which young men would dream of their fathers' deaths that would evoke little to no emotion in their dreams. From

this, Freud constructed a concept called the “Oedipus complex,” drawing from the Greek legend of King Oedipus who killed his father to marry his mother.

Freud described Oedipus and the basis for creating the Oedipus complex (Freud 280):

His [Oedipus] destiny moves us only because it might have been ours — because the Oracle laid the same curse upon us before our birth as upon him. It is the fate of all of us, perhaps, to direct our first sexual impulse towards our mother and our first hatred and our first murderous wish against our father. Our dreams convince us that this is so.

Freud believed that the inner voice in the story of King Oedipus exists within each individual but is repressed in the waking state. He argued that men have a strong, natural current that pulls them towards their mothers, which in turn creates jealousy and hatred towards their fathers.

In Freud’s own words (223):

King Oedipus, who has struck his father Laius dead and married his mother Jocasta, is nothing more than the realized wish of our childhood. But more fortunate than he, we have since succeeded, unless we have become psychoneurotics, in withdrawing our sexual impulses from our mothers and in forgetting our jealousy of our fathers.

Although the Oedipus Complex theory was extreme to many, Freud’s key insight was that some dreams represent an ongoing wish that was at least partially motivated by childhood experiences, sprinkled with signs of delusion and psychosis.

Freud also theorized that there are two types of dream content: manifest and latent. The manifest content, in simplified terms, is superficial and masks underlying and unconscious issues of the dream. It is what the dreamer reports and has little significance in revealing underlying currents about him or herself. In contrast, the latent content explores repressed fantasies and desires such as those in the Oedipus complex — this content allows a person to better understand him or herself.

However controversial Freud’s ideas may have been, Freud explained not only the

‘natural’ reason behind dream occurrence but also the revealing nature of dreams, a feat that no others before him accomplished in such great detail.

### **3.4: Divergence from Freud: Carl Jung on Dreams**

Carl Jung, a Swiss psychiatrist and founder of Analytical Psychology, first met Freud in 1907 to discuss his early research in the psychotherapeutic technique of word association. From that moment, Jung and Freud formed a seemingly interminable friendship, talking sometimes up to thirteen hours a day (Gay 22). Each was captivated by the other's brilliance and in the midst of heated criticism over Freud's work, Jung quickly jumped to Freud's defense. They worked closely together for many years, mainly to bring about academic recognition of psychology as a real science. However, their friendship soon started wavering over the years due to disagreements over certain concepts and by 1913 their friendship ended.

This divergence occurred after Jung implied that Freud's notion of dreams was too simplistic and his idea of the unconscious too negative. While Freud believed that dreams were delusions of the human mind that unveiled early signs of psychosis, Jung believed that dreams presented us with revelations that would allow us to resolve a multitude of issues, whether they are religious, emotional, or psychological.

Jung proposed that the unconscious is composed of what he called the ‘personal’ and the ‘collective.’ He also believed that our dreams had archetypes, abstract symbols from within the so-called ‘collective unconscious,’ which guided the human psyche toward a state of ‘wholeness.’ Who we are as individuals evolves out of the collective unconscious in cycles of transformation, under the influence of a force called “the Self.”

Jung observed that dreams act on a natural tendency towards balance or wholeness to benefit the individual (Hoss, "The Divine Presence").

Jung proposed two basic approaches to analyzing dream material: the objective and the subjective systems. The neurological psyche contains an inherent subjective system, which forms dream images that are not an evident reflection of reality. Though the subjective system is more difficult for a dreamer to understand, in most dream analyses, the dreamer will eventually realize that the dream characters can represent an unacknowledged aspect of him or herself. In an objective system, every person in the dream refers to an aspect that is true in reality (Heyward 12), a concept rejected by Freud who believed that dreams are individual-based.

## Chapter 4: Modern Science of Dreams

*“We experience a dream as real because it is real...the miracle is how, without any help from the sense organs, the brain replicates in the dream all the sensory information that creates the world we live in when we are awake.”-William Dement*

While Sigmund Freud and Carl Jung were finalizing their theories, neuroscientific findings, focused on analyzing dreams using qualitative and scientific data, were starting to surface in the 1950s with the advent of neural imaging technologies. The term *oneirology* refers to the scientific study of dreams and mainly concerns the analysis of various parts of the brain as a precursor to developing dream theories. The term oneirology is derived from the combination of the Greek terms “oneiros,” meaning dream, and “logia,” meaning the study of, and emerged as a discipline after the discovery of REM sleep by Eugene Aserinsky. Unlike dream analysis, which Freud and Jung were mainly concerned with, post-1950s oneirology focused on *quantitatively* studying the process of dreaming instead of *qualitatively* trying to interpret dreams. This chapter accounts for a few, among several dozens, of the major theories that quantitatively attempt to further understand dreams

### **4.1: Mechanism of Dreaming**

The mechanism by which dreams arise, according to neuroscientific findings, has to be understood before discussing the interpretation of dreams. As technologies such as positron emission tomography (PET) scans, computerized axial tomography (CAT) scans, electroencephalography (EEG), and magnetic resonance imaging (MRI) developed, dream research gained legitimacy as a scientific study and many researchers focused on uncovering the parts of the brain that were primarily responsible for dreams.



When describing the neural mechanism that is responsible for dreams, tension among researchers ensues to this day. However, there is agreement that most *remembered* dreams occur during rapid eye movement (REM) sleep. Nathaniel Kleitman and Eugene Aserinsky defined REM, in the early 1950s, as a stage of sleep that has a distinct EEG pattern and causes sleepers to rapidly flutter their eyelids (273). Studies have showed that dreaming occurs during this stage. Kleitman and Aserinsky tested their proposed correlation between dreaming and REM sleep using test subjects and EEG images. Subjects would be awakened during both REM and non-REM (NREM) sleep. When awakened during REM sleep, subjects recalled that in their first 27 awakenings, 20 dreams had occurred. As a control, subjects were awakened during NREM sleep and out of the twenty-three test subjects, nineteen of them failed to recollect any dream. Kleitman and Aserinsky (273) then tested their theory on a larger body that yielded breakthrough results: out of 190 individuals who were awakened during REM sleep, 152 yielded dream reports. It is now generally accepted that if someone is awakened from REM sleep, he or she will report to have dreamt 95% of the time (Solms, "Interp. of Dreams").

In the first few sleep cycles of the night, REM sleep periods last for a few minutes and occur intermittently. The duration of REM sleep increases later in the sleep cycles, lasting even up to two hours at a time. During REM sleep specific regions of the brain are activated. At the start of REM sleep, an area of the brain called the *pons* shuts off signals to the spinal cord, which causes the body to immobilize. Extroceptive sensory input and motor output are inhibited from the higher centers of the brain. The thalamus, a subcortical structure that filters sensory and motor information, relays messages from the pons to the cerebral cortex. The cerebral cortex is the part of the brain involved in

processing information and helps with learning and memory. MRI scans also showed that during REM sleep the amygdala, a walnut-sized cluster of nuclei in the brain, is highly active (Discovery Health). Renè Descartes dubbed this part of the brain as the “seat of the soul”<sup>10</sup> since it controls emotions such as fear and plays a pivotal role in maintaining the flight or fight responses.

A misconception debunked nearly a decade after Kleitman and Aserinsky’s discovery was that dreams occur only during the REM stage of sleep. Recent studies have shown that in the last stage of NREM, before the deeper REM sleep begins, dreams also occur though they are not as common nor are they as vivid as those experienced during REM sleep (McNamara 114).

Lucid dreams, in which the dreamer is aware that he is dreaming, occur when a person goes from a waking state directly into a dream state, with no apparent lapse in consciousness. The dreamer can carry out pre-arranged tasks during the dream even though these dreams occur during REM sleep. The mechanism for lucid dreaming, however, differs from regular REM sleep. A person recognizes that he is dreaming because the dorsolateral prefrontal cortex is not fully de-activated. This area of the brain allows for a person to recognize his present state and clearly remember events (Ursula 1197).

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<sup>10</sup> Renè Descartes focused much of his time on studying the pineal gland. He knew that the pineal gland controlled emotional responses and so thought that this organ was the bridge that connected the intellect with the body. In the Stanford Encyclopedia of Philosophy, it is stated that Descartes said: My view is that this gland is the principal seat of the soul, and the place in which all our thoughts are formed. The reason I believe this is that I cannot find any part of the brain, except this, which is not double.

## 4.2 Activation Synthesis Theory

Although many scientific theories attempt to explain the purpose of dreaming, a major theory that is backed by an immense amount of data is the activation synthesis hypothesis. Harvard University psychiatrists John Allan Hobson and Robery McCarley proposed this neurophysiological model in 1977. “Activation” refers to the automatic intensification of brain activity during certain stages of the sleep cycle that results in the bizarre nature of dreams. The "dream state generator" located in the brain stem is responsible for activating the dream-state in a predictable manner, one which enabled these scientists to mathematically model the data. “Synthesis” refers to the process that threads these unharmonious dream visions into a narrative.

In “*The Brain as a Dream State Generator: An Activation-Synthesis Hypothesis of the Dream Process*,” Hobson and McCarley stated that “The primary motivating force for dreaming is not psychological but rather physiological since the time of occurrence and duration of dreaming sleep are quite constant, suggesting a pre-programmed, neurally determined genesis” (1338).

In stark contrast to the Freudian view, Hobson and McCarley’s theory states that the force behind the dreaming process is not only automatic and periodic but also metabolically determined. Past childhood conflicts therefore do not create future dreams (1340). These Harvard neurophysiologists further supported their physiological stance on dreams when explaining bizarre and unrealistic dreams. While Freudians would state that the *id* was accountable for these images that contained underlying sexual overtones, Hobson and McCarley argued that these dreams have a simpler neurophysiological explanation: “The forebrain may be making the best of a bad job in producing even

partially coherent dream imagery from the relatively noisy signals sent up to it from the brain stem. The dream process is thus seen as having its origin in sensorimotor systems, with little or no primary ideational, volitional, or emotional content. This concept is markedly different from that of the 'dream thoughts' or wishes seen by Freud as the primary stimulus for the dream" (1340-1346). Hobson and McCarley focused on first refuting Freud's theories and then establishing their own, which essentially stated that dreams are purely physiological and meaningless.

But just like Freud, Hobson and McCarley were met with criticism over their theory that spurred much controversy. The view that dreams are meaningless conglomerations of information sent during the autonomous electrical activity of the central nervous system was unsettling for not only dream researchers but also for therapists, psychologists, and other psychiatrists. Dr. Morton Reiser, Chairman of the Department of Psychiatry at Yale University, and a past president of the American Psychoanalytic Association argued that Hobson and McCarley overextended the implications of their work to make such a conclusion. Reiser stated (Goleman, NYT):

I agree with them that their work refutes Freud's idea that a dream is instigated by a disguised wish. Knowing what we do now of brain physiology, we can no longer say that. The wish may not cause the dream, but that does not mean that dreams do not disguise wishes. The brain activity that causes dreams offers a means whereby a conflicted wish can give rise to a particular dream. In other words, wishes exploit--but do not cause--dreams.

Although the activation synthesis theory has been open to much debate, it was one of the first dream analyses that used science to develop a theory. It was also the first dream theory that emphasized the physiological nature of dreams. As Hobson said himself: "Dreams are like a Rorschach inkblot. They are ambiguous stimuli that can be interpreted

in any way a therapist is predisposed to. But their meaning is in the eye of the beholder--not in the dream itself" (Goleman, NYT).

### **4.3 Reverse Learning Theory**

The reverse learning theory of dreams was developed by Francis Crick and Graeme Mitchison in the 1980s. This theory states that over time, connections are made in the neocortex, the part of the brain responsible for higher level of thought. As the number of connections increases over time, the network becomes less and less efficient. If no mechanism exists to control the number of connections, "parasitic" memories disrupt the natural flow of the thought process. Crick and Mitchison predicted that if this were to happen, people might develop bizarre thoughts and "obsessional" behavior. A way our mind prevents this from happening is through REM dreaming. Before Crick and Mitchison explain their reason behind the reviving power of REM dreaming, they highlight two major features of dreaming.

The first feature of REM dreams is what Crick and Mitchison calls "bizarre intrusions"— a distortion of reality seen in dreams. These intrusions are somehow related to that day's events and pertain to matters that preoccupied the dreamer's mind during the waking state. Crick also points out that only rarely do dreams replicate events or situations in real life accurately (Crick and Mitchison 152).

The other main feature of dreams, according to Crick and Mitchison, appears to be the narrative or the story-telling nature of dreams. This inherent nature that is fundamental to dreams is a way for the brain to make some sense of the bizarre intrusions, similar to what one would do if such events happened in the waking state.

While Crick and Mitchison worked to resolve the issues within the first feature of

dreams, they admitted to having difficulties in understanding the nature of the narrative common in dreams (Crick and Mitchison 148):

The narrative often has a particular emotional tone, such as sexual or anxious, that one suspects is related to other causes. It is unclear whether the first few intrusions set up the narrative or whether the narrative exists in some latent form before the first intrusion. When one speaks of 'a dream' one is usually referring to a single fairly continuous narrative. We tend to regard such mention as a separate dream if it has a distinct narrative. As will be seen, our theory provides a good explanation of the nature of the bizarre intrusions. It has nothing useful to say about the narrative.

Crick and Mitchison, in an attempt to reason out bizarre intrusions, defined the term “neural net” as elaborate units of the brain that are interconnected and store information in a way that is robust and effective. During REM sleep, our brain functions to dampen unwanted memory in our cerebral cortex storage net. Bizarre intrusions and distortions occur in our dreams due to mixed outputs produced by overlapping memories that our brain is trying to dispose. Thus, the argument posed by the reverse learning theory is that while dreaming, events that occur in that waking-state are being actively *unlearned* by the brain. The slogan that aligns itself with this theory is that, “We dream in order to forget.” Crick and Mitchison state that in this model, “attempting to remember one's dreams should not be encouraged, because such remembering may help to retain patterns of thought which are better forgotten. These are the very patterns the organism was attempting to damp down” (149).

#### **4.4: Semantic Memory Consolidation**

On the other end of the spectrum, the memory consolidation theory argues that dreams allow the brain to compartmentalize and store information. Instead of damping out memories, our brains strengthen them through dreams. Memory consolidation is the

process by which newly acquired information is integrated into long-term memory.

An interesting aspect to consider is how the effectiveness of dreams on memory consolidation varies with age. In a recent study, results showed that young children under the age of nine showed a median REM dream recall rate of about 25%, much lower than the approximate 80% seen in adults. In children the dream content is also quite different from those seen by adults. REM dream reports from children are usually composed of single images that do not move and dream narratives are not well developed. The maturity of dream reports seems to parallel cognitive maturity and also remains rudimentary until higher spatial skills develop. It is not until a person reaches adolescence that the dream reports have a different content, similar to those seen in adults. Thus, for the purpose of this paper, dream theories are implied to be relevant primarily to adults.

Two researchers at Harvard Medical School conducted an experiment on rodents to test the memory consolidation theory. By carefully monitoring brain activity, Wamsley and Stickgold showed that network activity seen when a rodent is exploring its environment is again reiterated when the rodent is in REM sleep (1010). This reactivation effect occurs in the hippocampus as well as several other cortical areas. Analogous results have been obtained in humans and the studies demonstrate that activity in certain regions of the brain engaged during a learning task are also elevated during sleep, relative to participants who did not engage in learning. This “offline reactivation” of newly acquired information helps stabilize temporary, fragile memory and convert it into a more permanent form.

Unlike Hobson’s theory of dreams during REM state, consolidation typically occurs during NREM. The dream content during NREM usually reflects recent learning

experiences that the brain is trying to consolidate. In another experiment, participants were asked to play a downhill skiing arcade game *Alpine Racer II* for a few hours. One third of participants reported that their dreams contained task-related imagery that dealt with aspects of the game (Wamsley and Stickgold 1012). Thus, memory reactivation is seen as a large contributor to the dream construction process.

In response to bizarre dreams that have seemingly no relation to waking state events, neuropsychologist Jessica Payne established that stress hormones, primarily cortisol, are responsible for those images. She stated in the *International Review of Neurobiology* (Payne 118):

The relationship between late night elevations in cortisol and explicit memory consolidation have important consequences for dreams: they produce fragmented dreams, give dreams their uniquely bizarre flavor, account for their emotional nature, and explain not only why veridical replay of episodic memories during dreaming is rare, but also why dreams are so fleeting and difficult to remember.

The reason why dreams are difficult to recall, Payne argues, is because cortisol disrupts memory retrieval. Memory consolidation, however, still occurs while dreaming.

To clarify this seemingly contradictory phenomenon, neuroscientist Erin Wamsley provided an example of how both memory consolidation and memory loss occur through the dreaming process. A spatial navigation task was given to participants prior to sleeping. Those who reported to have dreamt about fragments of the task, displaying brain activity to be at the same level as in their waking state, completed the task more efficiently. However, the dream reports did not consist of exact replays of the original learning experience. Participants reported to have dreamt about only isolated, incongruous fragments of the task. MRI patterns of neural reactivation in the dreaming state resemble that of the waking



state in the first few minutes after receiving the task, which indicates that the brain is attempting to consolidate the information and solve the challenge whilst dreaming; however, the complete episodes are not replayed in dreams and much of it is forgotten due to elevated cortisol levels during the dreaming state (Wamsley 348).

# Chapter 5: Merging Science & Philosophy

## 5.1 Overview

Presented in the past two chapters were philosophical views, that used little to no scientific methods,<sup>11</sup> followed by scientific experiments that analyzed brain activity and waves during the dreaming state. This paper provides an abridged version of dream theories in both areas, as many more theories exist in each and are in more copious details. Why these theories were carefully selected, as opposed to numerous other ones, can be explained by two reasons: these theories are the most well known and most widely accepted, or were during their times. In the next section of this chapter, focus will be placed on determining whether most dreams have meaning. For that, a closer analysis on Hobson and McCarley's theory is mandatory.

The other section will be dedicated to Sigmund Freud. Even though his ideas sparked controversy, his influence on the understanding of dreams cannot be denied. Before quickly dismissing his views as unscientific nonsense, his dream work will be carefully scrutinized once again, but this time more subjectively, to ascertain if any of his dream theories held validity when placed alongside modern neuroscience. From this, the interface of philosophy and science will be determined.

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<sup>11</sup> “Scientific technology” refers to developments in neuroscience such as MRIs, EEG, and PET and CAT scans. On the other hand, Freud and Jung, though both psychiatrists, formed their theories by deconstructing dreams in a more technologically primitive fashion—such as taking dream reports from participants.

## 5.2 Why Dreams Have Meaning

Before stating the reasons for why I believe dreams do have meaning, I must first discuss my qualms with Hobson and McCarley's reverse learning theory (4.3). According to their theory, our brain dampens unwanted information through dreams. Thus, reviving dreams in our waking state is undesirable since it implies that we are reversing the reverse learning, and reinforcing the patterns that the brain has previously deemed unhealthy. However, people who tend to remember their dreams do not seem any more prone to "hallucinations, delusions, and obsessions" than those who tend to forget their dreams. Also, if the reverse learning theory were true, dream deprivation would interfere with the "reverse-learning" process, which would lead to disastrous effects, according to the reverse learning theory. Many people, however, who have REM sleep deprivation show no signs of mental breakdown. Thus, on this basis alone, the reverse learning theory has major pitfalls and cannot be used to conclude that dreams are meaningless concoctions of an overwhelmed mind.

Even before studying oneirology, I instinctively felt that dreams had meaning. My vivid visions that would re-occur inspired some canvas paintings; my dreams of traumatic events made me closer to certain people in my life. Now, more than ever, I feel that dreams not only have meaning but also help create new ideas. This concept of what I will call "productive dreaming" is not a novel one, but recent scientific data supporting the idea has finally given it the validation that it deserves.

Ernest Hartmann, a physician and researcher, studied dreams in sleep clinics for months in 2010. After working with trauma-patients with varying types of brain damage;

analyzing MRI scans and EEG; and recording dreams of hundreds of patients, Hartman concluded that (Hartman 241-244):

Every dream makes new connections, and every dream is a creative product not a replay. Thus, in this sense, a dream is somewhat similar to a work of art. Creating a work of art has been defined in many ways, usually emphasizing that old materials are put together in a new way, and put together in a new way influenced by the artist's emotion. This is not a random process of course; materials are put together in a way that expresses an underlying emotion or emotional theme. In other words, art in general can be thought of as making new connections guided by emotions, which is exactly the way dreaming has been described.

The reverse learning theory again is weakened by this study, but both the activation synthesis and semantic memory consolidation theories hold their ground.

### **5.3 The Return of Freud to Dream Works**

Sigmund Freud's basic propositions in dream theory (see 3.3) were that our unconscious mind represses our motivations and thus they remain hidden in our waking states. Without this constraint by the *ego*, according to Freud, our unconstrained drives by the *id* would lead to socially abhorrent acts caused by free-flowing childish fantasies and sexual aggression.

As previously mentioned, the notions of the *id* and sexual undertones of dreams faced harsh criticism and became seemingly antiquated in the late 20<sup>th</sup> Century with the advent of neurotechnology. For many years, Freud was indoctrinated into the heart of neuroscientific jokes, and his psychoanalytic theory no longer considered seriously.

Here I will argue that although some of Freud's theories, such as the Oedipus Rex Complex, may forever be lost to the world of myths, aspects of Freud's theories that were previously rejected do hold some value. The unconscious merits more credit in the dreaming process than it has previously received and only in the recent years are

neuroscientists re-examining its role. Implicit memory, which occurs without conscious awareness, is partly due to a small area in the brain called the perirhinal cortex.<sup>12</sup>

A recent discovery (LeDoux) of an existing channel that connects perceptual information with the brain structures responsible for generating highly emotional responses, such as fear and love, seem to contain a kernel of truth for Freud's theory of the unconscious. Since this pathway bypasses the hippocampus (the brain component primarily responsible for conscious memories), current events routinely trigger unconscious memories of past events that carry emotional connotation, causing conscious feelings that seem irrational. Since this channel is scientifically proven to exist and it activates the perirhinal cortex, it seems reasonable to state that the level of activation is higher during the dreaming state. Thus, our unconscious thoughts and feelings are in fact expressed in dreams, though they might later perplex us in our waking state.

Freud believed that some thoughts are repressed by the *ego* during the waking state. A concept that was once dismissed by Freud's contemporaries is, as I will now argue, something that should be re-examined in light of scientific advancements. For this argument, I will use evidence from a recent study conducted on anosognosic patients.<sup>13</sup> Neurologist and Director of the Center for Brain and Cognition at the University of California, San Diego, Vilayanur Ramachandran studied patients who had damage to the right parietal lobe of the brain. As a consequence of this, these patients became unaware of their physical defects, such as cognitive impairment and paralysis. After artificially

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<sup>12</sup> Researchers in 2010 at UC-Davis discovered this using fMRI scans and carrying out memory tests on people diagnosed with amnesia, who had known damage to the perirhinal cortex or other brain areas as a type of control.

<sup>13</sup> Anosognosia is a physiologic condition in which a person is unaware of his or her disability. This is not similar to defense mechanisms such as denial, since anosognosia is physiological instead of psychological.

activating the right hemisphere of one such patient, Ramachandran observed that she suddenly became aware that part of her body was paralyzed, and more importantly, had suddenly become aware that it had been paralyzed since she had suffered a stroke. This patient was capable of recognizing her defects that she had unconsciously registered even though her conscious was unaware of the problem (Ramachandran, Chp. 7). The astounding conclusion that comes from this theory and supports Freud's is that memories can indeed be selectively repressed. Ramachandran states: "Seeing [this patient] convinced me, for the first time of the reality of the repression phenomena that forms the cornerstone of classical psychoanalytical theory" (Chp. 7).

Thus, in the recent years, Freud's theories are not only gaining recognition but also validity. Dream research, being a dynamic and emerging field of science, is constantly advancing. As shown above, science and philosophy do have overlapping ideas on dreams; however, none of the theories presented are without their flaws.

## Concluding Remarks

Prior to advanced technologies in neuroscience, dream interpretations were based on societal or religious values. In the ancient cultures, rituals such as dream incubation were common; in monotheistic religions, dream experts were sought to explain meanings behind dreams from the divine. It was not until Freud that Western thinkers began to be intrigued by dreams as a scientific field. Thus, before dismissing Freudian and other psychoanalytic views, we must first ask if the results we obtain from science may be integrated with his theories. As shown, this is possible and is in fact occurring. Even now, little is known about dreams and we have yet to see a theory that explains the purpose and meaning of dreams with negligible errors. Until science produces a way to physically examine dreams and produce a strong acceptable theory, all dream theories should be explored and considered as possible. For this reason, I take the middle ground position in regards to dream theories. This position recognizes that dreams have both physiological and psychological components—though the weight on each side of the balance has yet to be determined.

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### **Pennsylvania State University**

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*Bachelor of Arts in Philosophy, Candidate May 2011*

Recipient of Shibley Scholarship, highest award for academic achievements

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*Bachelor of Science in Biochemistry & Molecular Biology, Candidate, May 2011*

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*Middle Eastern Studies, Minor*

Focus on the Arabic language

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## **AWARDS AND HONORS**

### **Shibley Scholarship**

Top scholarship from the Philosophy Department, Spring 2011

### **Diane M. Hutchings Scholarship**

Scholarship for academic achievements from the Biochemistry Department, Fall 2010

### **Pennsylvania State President's Award**

President Freshman Award- for maintaining a high GPA, 2008

President Sparks Award- top 0.1% of standing class, 2009

### **Burke Leadership Award**

Scholarship for role in society and academic achievements, 2010

### **Schreyer Ambassador Travel Grant**

Travel expense paid by Schreyer Honors College to Dhaka Bangladesh for clinical research (Summer 2009) and charity work (Summer 2008)

### **HAMSA Dream Deferred Int'l Essay Contest, 3rd place**

"Shadow of the Other" critical analysis of U.S. media and its relation to the Middle East

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## **LEADERSHIP ROLE AND ACTIVITIES**

### **Bangladesh Student Association, Co-founder & Vice President**

On-campus club to unite Bangladeshis and expose others to the culture

2007: Int'l Culture festival, 2008: Sponsored Pool Tournament, proceeds went to charity

### **Penn State Int'l Affairs & Debate Association (PSIADA), Secretary General**

Hosted 2<sup>nd</sup> Annual Debate Conference (February 21<sup>st</sup> -23<sup>rd</sup> 2009)

Keynote Speaker: Charles Bierbauer- CNN White House Correspondent, Emmy Award recipient

**Phi Beta Kappa Society:** National academic honors society

**Honors Mentor with Distinguished Alumnus (2008-2009)**

Program in which few students are paired with a Distinguished Alumni for a year

Mentor: Perry Jenson, Founder of the Malawi NGO, Partners in Hope

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***INTERNSHIP AND WORK EXPERIENCE***

**Johns Hopkins University, D.C. Intern, Spring 2010**

The Protection Project: NGO that lobbies, conducts research, and provides solutions to curb child trafficking internationally.

Job description: Embassy visits and edited annual Trafficking in Persons (TIP) Report

**Voices, intern journalist**

Center County's non-profit news magazine; published articles covering various aspects within the community

**Kaplan Learning Institute, 2008-Present**

Trained instructor in SAT, SATII Math and Biology

Trained Premiere instructor

**Teaching Assistant in Biology 322, 2008-2009**

Helped students better understand Genetics by holding weekly office hours

**Nittany Valley Charter School, 2005-Present**

Held various after-school programs such as Art Club, Dance Club, and Fitness Club

Requires organization, commitment, leadership and communicational skills

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**Int'l Centre for Diarrheal Disease Research (ICDDR, B), Bangladesh, Summer 2009**

Clinical Science Division, Child Development Unit Position: Researcher

In collaboration with Johns Hopkins University and University of Dhaka

Project: psycho-social stimulation on malnourished infants (Bayley Test) to test development

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***VOLUNTEER EXPERIENCE***

**The Smile Train Project, Dhaka City Hospital, Summer 2008**

World's Leading Cleft Lip & Palate Non-Profit Organization founded by Bill Gates

Position: Volunteer; trained to remove stitches and conduct initial diagnoses on patients

**PA Literacy Corp, Fall 2010**

Paired for a semester with an ESL adult learner to tutor in math and science

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### ***PUBLICATIONS***

*Voices:*

"State College Home to Small but Thriving Pagan Community." *Voices* May 2008, late ed.: A8.

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### ***INTERESTS***

**Global Perspective:** Fluent in Bengali and proficient in Arabic

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