

THIRD (AND FINAL) REVIEW SESSION

SLEEP

SLEEP: A recurring state characterized by:

- reduced awareness of, and interaction with, the external environment
- reduced motility and muscular activity
- partial or complete cessation of voluntary behavior and self-consciousness

- Under normal conditions, sleep occurs in a cyclic manner, termed a circadian rhythm (*circa*: about; *-dies*: day)
- Diurnal animals seep at night and are awake and active during daylight hours.
- The opposite is true of nocturnal animals.
- The sleep-wake cycle is synchronized with the day-night cycle.

- As the day-night cycle changes with the seasons, the animals' sleep-wake cycles change also.
- A biological clock, located in the brain, is also involved in sleep-wakefulness cycles.
- Studies have demonstrated that the biological clock in humans tends to run in a consistent sleep-waking cycle of about twenty-five hours.

THEORIES OF SLEEP

Why do we sleep? The question remains unanswered.

There are five categories of theories:

- Humoral (Blood)/Circulatory Theory:
 - Suggests that sleep is a result of the brain being deprived of its normal amount of oxygen.
- Restorative or Reparative Theory:
 - Necessary cellular repairs are made during sleep.
- Passive Theory - Reticular Hypothesis:
 - Suggests that sleep results from the cessation of ascending impulses in the ascending reticular activating system.
- Active Theory:
 - Suggest that sleep is an active process produced by the activation of a sleep-producing system.
- Adaptive or Evolutionary Theory:
 - Suggests that sleep is a product of evolution. Sleep evolved as a survival adaption and/or as a system of conserving energy.

Brain-wave patterns associated with sleep activity:

- BETA: 14 - 30 Hz; up to 20 mV amplitude. Normal waking consciousness, alert, excited.
- ALPHA: 8 - 13 Hz; 25 - 100 mV amplitude. Awake but in a quiet, resting state with the eyes shut.
- DROWSY: Mixed frequencies, 12 - 17 Hz predominate; low voltage. Represents a transition in consciousness between wakefulness and the deeper stages of sleep.
- THETA: 4 - 7 Hz; moderately large amplitudes of less than 20 mV. Found in states of meditation, drug intoxication and sleep.
- DELTA: 0.5 - 4 Hz; large amplitude. Deep sleep.

FIVE STAGES OF SLEEP:

Stage 1: Drowsiness. Brain wave activity is desynchronous, some Alpha.

Stage 2: Onset of *sleep spindles* and *k-complexes*. Theta wave activity.

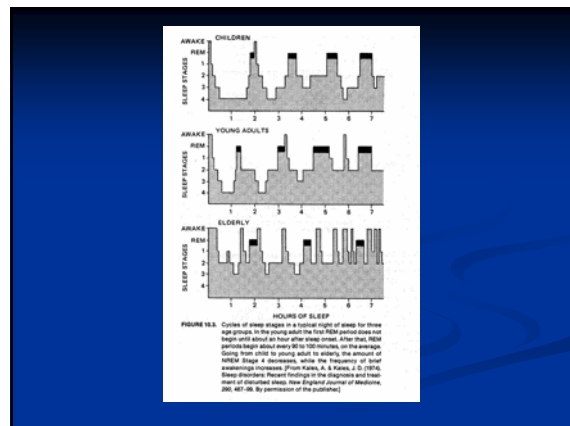
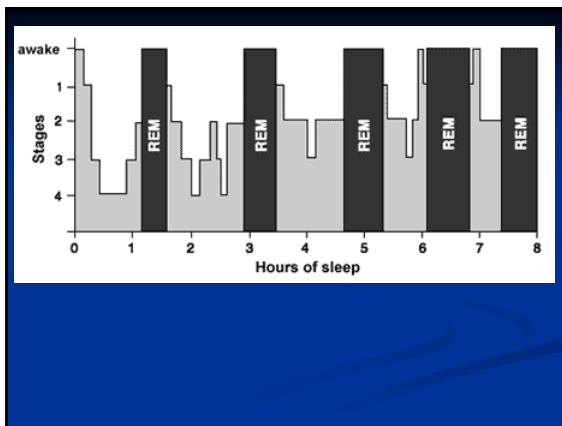
Stage 3: Defined by delta wave activity (20% - 50%).

Stage 4: Defined by 50% or more delta wave activity. Deep sleep.

Rapid Eye Motion (REM) Stage.

- Very similar to Stage 1 sleep, although the individual is much more difficult to arouse.
- Most dreaming is thought to occur during the REM stage of sleep.

- Normal sleep patterns move from 1 -4, and then cycle back: 4, 3, 2, 3, 4...
- Most adults complete a full cycle of sleep stages every 90 - 120 minutes.



DREAMS

The first scientific dream studies started in the later half of the 19th century, around the same time as introspectionism ruled in psychology.

- The study of dreams focused on the subjective appearance and experience of dreams, not on the meaning or the function of dreams.
- The introspective dream report was considered as a valid testimony of what had been experienced during dreaming.
- A student of William James, Mary Calkins conducted the first statistical studies on dreams in 1893. She calculated the frequency of occurrence of the various sensory modalities in dreams and came up with similar figures to those of modern dream researchers.

- The rise of Sigmund Freud's theories of psychoanalysis and John Watson's behaviorism seriously curtailed scientific dream research in the early 20th century.
- According to Freud, the experienced (or manifest) dream is not the *real* dream; it is merely a disguised and distorted *symbolic representation* of the real (or latent) dream.
- The manifest dream must be interpreted by a psychoanalyst, who alone has the abilities to decipher what the true dream was all about.
- Thus the science of dreaming was replaced by the art of dream interpretation.

HYPNAGOGIA and HYPNOPOMPIA

- “Hypnagogia” is the brief transitional state from wakefulness to sleep (literally, “leading to sleep”). The internally generated images in this state are called hypnagogic hallucinations.
- By contrast, hypnopompic hallucinations (literally, “leading out of sleep”) occur in the transitional state from sleep back to wakefulness.

SLEEP PARALYSIS

- An ASC that often takes place in the hypnagogic or hypnopompic state is called sleep paralysis.
- It is a mixture of wakefulness and REM sleep-related muscular atonia: you feel awake, but cannot move any part of your body.

SLEEP MENTATION vs. DREAMING

- During sleep, subjective experiences of some kind occur most of the time. The subjective experiences during sleep can be roughly divided into two categories: *sleep mentation* and *dreaming*.
- All conscious mental events that occur during sleep are instances of *sleep mentation*.
- But not all instances of sleep mentation are *dreams*.

- **Dream:** a subjective experience, occurring during sleep, that involves complex, organized mental images that show temporal progression or change.
- **Mental Image:** a quasi-perceptual conscious experience of an object or event that exists in the absence of its genuine perceptual counterpart.
- **Temporal progression:** conveys the idea that dreams tell stories, or at least are like scenes from a story.

Most dreams have a central character or a *dream-self*, who is a representation of the dreamer in the dream.

The dream-self usually feels and seems to be the same person we are in our waking lives.

- However, we often do not have at our disposal all the mental powers and cognitive skills that we have during wakefulness.
- Dream logic is unlike waking logic. We suffer memory lapses, objects and people can become composites and transform.
- People can do things for the strangest reasons. Normal laws of physics don't apply.

The most popular modern theories of dreaming can be classified into four categories:

- Problem-Solving Theories
- Mental Health Theories
- Threat Simulation Theories
- Random Activation Theories

Random Activation Theories

Hobson and McCarley (1977) proposed an activation-synthesis hypothesis.

- Dreaming has no function whatsoever. Dreaming is only a useless side-effect of neuronal activations that take place in the dreaming brain for purely biological reasons.

- Hobson and colleagues (2000) have reworked the activation-synthesis hypothesis to reflect concerns about dream meaning, calling it the activation-information-mode model, or AIM.
- In this newer version, information that is accessed during waking hours can have an influence on the synthesis of dreams.
- In other words, when the brain is “making up” a dream to explain its own activation, it uses meaningful bits and pieces of the person’s experiences from the previous day or the last few days rather than just random items from memory.

Lucid Dreaming

Lucid Dream: to dream while knowing that we are dreaming.

Characteristics of a Lucid Dream:

- The dreamer’s consciousness seems remarkably awakeful

The lucid dreamer can:

- Reason clearly
- Remember freely
- Act volitionally
- Change the plot of the dream

What is the significance of Lucid Dreaming?

- Dreams could be the magic theater of all possibilities and a workshop of creativity and growth
- The illusory sense of certainty about the completeness and coherence of our lives leads us to what William James described as a “premature closing of our accounts with reality.”
- Lucid dreams may guide us to higher levels of consciousness, for they suggest what it would be like to discover that we are not yet fully awake.
- As the state of ordinary dreaming is to lucid dreaming, so the ordinary waking state might be to the fully awakened state.

Mnemonic Induction of Lucid Dreams (MILD)

- During the early morning, awaken spontaneously from a dream.
- After memorizing the dream, engage in ten to fifteen minutes of any activity that demands full wakefulness.
- Then, while lying in bed, repeat to yourself, “Next time I’m dreaming, I want to remember I’m dreaming.”
- Visualize your body lying asleep in bed, with rapid eye movements indicating that you are dreaming. At the same time, see yourself as being in the dream just rehearsed (or in any other dream) and realizing that you are in fact dreaming.
- Repeat steps 3 and 4 until you feel your intention is clearly fixed.

HYPNOSIS

What is Hypnosis?

- A clear definition of the phenomenon has still not been produced.
- Hypnosis does not give the hypnotist total control over the subject.
- A dangerous or antisocial act will be ignored
- Hypnotic suggestion works well as long as it does not conflict with our deeper convictions.

Historical Development

- Franz Anton Mesmer (1734 - 1815)
 - Coined the terms *animal magnetism* and the process called *mesmerism*
- James Esdaile (1808 - 1859)
 - demonstrated medical hypnosis in London
- James Braid (1785 - 1860)
 - credited with coining the term *hypnotism*
- Jose Custodi di Faria (1756 - 1819)
 - "lucid sleep"
- Jean Martin Charcot (1825 - 1893)
 - hypnosis involved physiological reflex actions.
- Sigmund Freud (1856 - 1939)
 - used hypnosis to explore the unconscious or subconscious mind

Hypnotic Procedure

Administration of the Stanford Hypnotic Susceptibility Scale, Form C

- Beginning the Induction
- The Sleep Parallel

Formal Tests of Hypnotizability

Form A of the Stanford Scale:

1. Postural Sway
2. Eye Closure
3. Hand Lowering
4. Arm Immobilization
5. Finger Lock
6. Arm Rigidity
7. Hand Movement
8. Verbal Inhibition
9. Fly Hallucination
10. Eye Catalepsy
11. Posthypnotic Suggestion
12. Hypnotic Amnesia

Other Tests from Forms B & C

- Sweet or Sour Taste in Mouth
- Vivid Dream
- Age Regression
- Anosmia - inability to smell
- Anesthesia
- Positive Hallucination
- Negative Hallucination

Explanations of Hypnosis

Correlates of Hypnotic Susceptibility

- Cognitive: Susceptibility has been found to correlate with susceptibility to visual illusions
- Hypnotic susceptibility has also been found to correlate with a high capacity for absorption in imaginative activities outside of hypnosis
- Personality: Studies have found no significant correlation between hypnotizability and personality variables
- Physiological: Evidence suggests that hypnotizability is correlated to right-brain processing.
- Highly susceptible subjects show more alpha wave brain activity during normal waking state.

Three Dimensions of Hypnosis (Tart)

- Role-Playing: (sociological theory) we become identified with the role we are playing
- Trance: refers to a fading of the intellectual framework by which we automatically evaluate our experiences.
 - In the trance dimension, experiences occur in isolation, without automatic or conscious evaluation.
- Archaic Regression: similar to Freud's concept of transference: we transfer a childlike cognitive/emotional attitude onto the hypnotist.

Therapeutic Uses of Hypnosis

- Habit Control: most successful when used in combination with behavior modification or cognitive techniques.
- Phobias: often used along with systematic desensitization with quite successful results.
- Psychological Disorders: sexual dysfunctions; manic-depression; eating disorders; personality disorders, etc.
- Pain Control: historical use as an anesthesia before chemicals appeared.
 - Also has use as an analgesic, as a substitute for chemical agents.
- Memory: Hyper-mnesia opposite of a-mnesia
- Hypnotic age regression

Self-Hypnosis

- Has much in common with affirmation and visualization
- Many variations and styles. Often effective to tape record your own voice and listen through headphones. Can also be done through mentally guiding yourself.
- Best done in the morning immediately after rising or just before going to sleep.

1. Know your objective and goal before you start.
2. Begin with relaxation technique
3. Once relaxation is achieved, begin by mentally repeating the phrase
 - Gradually return to waking consciousness.
 - It's OK to fall asleep after the practice (especially if done before sleep)

Consensus Trance

- Each of us is in a profound trance, *consensus consciousness*, a state of partly suspended animation, of stupor, of inability to function at our maximum level. Automatized and conditioned patterns of perception, thinking, feeling, and behaving dominate our lives.
- Consensus trance involves a loss of much of our essential vitality. It is also a state of profound abstraction, a great retreat from immediate sensory/instinctual reality to abstractions about reality.
- Just as people vary in their hypnotizability, we vary in how deep our consensus trance is.

CONSCIOUSNESS-ALTERING DRUGS

Seven Observations on Altered States of Consciousness (Andrew Weil):

1. We are born with a desire or urge to experience altered states.
2. Individuals experiment with methods or techniques of changing consciousness.
3. Altered state experiences are normal and we all experience them.
4. Individuals may not always be aware that they are experiencing an altered state.
5. Altered states flow naturally from the waking state.
6. Drugs may elicit altered states but do not cause them.
7. Altered states are beneficial and we need to make greater use of their potential.

PSYCHOACTIVE DRUG: a compound which can be ingested or injected, and that, by virtue of its chemical structure, brings about changes in consciousness or affects mood.

- Aside from REM sleep (dreaming), the most dramatic altered states of consciousness are those produced by psychoactive drugs.
- These drugs can vary considerably both in chemical structure and in their effects on awareness and mood.

Ray and Ksir (1987) proposed four basic principles that apply to all psychoactive drugs:

1. Every psychoactive drug has multiple effects.
2. The effects of a psychoactive drug depend on the amount of drug taken.
3. The effects of a psychoactive drug depend in part on the user's history and expectations.
4. The psychoactive drug is, by itself, neither "good" nor "bad." It is not the drug, but the use to which it is put, that is labeled.
example: morphine

PHARMACOLOGY OF NEUROTRANSMISSION

- Practically all of the drugs that act upon the central nervous system, and thereby affect consciousness and behavior, do so by somehow influencing some aspect of the neurotransmission process.

According to Leavett (1995), interference may take place on one of eight ways:

1. Interference with the synthesis of the neurotransmitter, decreasing the amount of the NTS available at the presynaptic site.
2. Interference with the release of the NTS.
3. Acting as a false transmitter by replacing the normal NTS in the presynaptic neuron. The effects may not be similar to those of the normal NTS.
4. Replacement of the normal NTS at the postsynaptic site, thus preventing the action of the normal NTS.
5. Destruction of the normal NTS.
6. Interference with the reuptake process at either the presynaptic or extraneuronal sites, or both.
7. Interference with the sensitivity of the receptor cell.
8. Destruction of neural tissue - a neurotoxic agent.

SIX CLASSES OF PSYCHOACTIVE DRUGS

1. Sedative-Hypnotic or CNS Depressants
2. Behavioral/CNS Stimulants and Convulsants
3. Narcotic Analgesics (Opiates)
4. Antipsychotic Agents
5. Clinical Antidepressants
6. Psychedelics and Hallucinogens

Key points (Julien 1997):

- The action of psychoactive drugs is seldom restricted to a single functional or anatomical subdivision of the brain.
- Although a psychoactive drug might have a single effect on a specific neurotransmitter, a variety of effects can be expected because the neurotransmitter is involved in many different functions.
- Psychoactive drugs simply modify ongoing behavioral or physiological responses; they do not create new responses.

THE MAJOR HALLUCINOGENS

- **Hallucinogens: a chemically heterogeneous group of drugs that are capable of inducing hallucinations at normal dose levels.**
- **True hallucination: "Any percept-like experience which:**
 - occurs in the absence of an appropriate stimulus,
 - has the full force or impact of the corresponding actual (real) perception, and
 - is not amenable to direct and voluntary control by the experienter.

- The most critical feature of true hallucinations is their apparent reality.
- *Pseudo-hallucination*: a perceptual experience that the individual knows not to be real, though it may be just as vivid and spontaneous as a true hallucination.
- *Illusion*: a misperception or misinterpretation of objective reality.

Three major hallucinogens used in the Americas are:

- Psilocybin mushrooms
- Peyote
- LSD

LSD

- LSD-25 (*d-lysergic acid diethylamide*) was first synthesized in 1938 by Albert Hofmann, working at the Sandoz Laboratories in Basel, Switzerland.
- It was synthesized from ergot alkaloids (taken from a highly toxic mold that sometimes grows on rye grain).
- It wasn't until 1943 that LSD's hallucinogenic effects were discovered, when Dr. Hoffman accidentally absorbed it through his fingers while working in the laboratory.

- Like psilocybin, the chemical structure of LSD is similar to the neurotransmitter serotonin. Both share a unique feature of their molecules called an indole ring.
- It is not clear how LSD affects consciousness; however, current theory suggests that it acts as a blocker of activity of serotonergic neurons in the brain, possibly by activating the serotonergic autoreceptors directly on cell bodies.

Hallucinations

Research has identified three stages of hallucinogen-induced imagery:

- *Simple Form Constants*
 - Lattice
 - Cobweb-like
 - Tunnel
 - Spiral
- *Complex Combined Images*
- *Complex Memory Images*

MARIJUANA

- The hemp plant, *Cannabis sativa*, is one of the most important plants in human history.
- The main active ingredient of cannabis is *delta-9-tetrahydro-cannabinol*, abbreviated as delta-9-THC or simply THC.
- There are over 80 known cannabinoids.
- THC concentration is greatest in the resin found on the flowers, seeds, and upper leaves of the female plant.
- THC is not water soluble, but it is soluble in alcohol and fat.

Experimental Research on Marijuana

Physiological Effects of Marijuana:

- The most reliable physiological effect is an increase in heartbeat rate (pulse rate).
- Heartbeat increase is reliable enough that it can be used to determine whether the subject has smoked marijuana effectively enough to get the chemicals into the bloodstream.

Cognitive Effects of Marijuana

Sensory-perceptual effects:

- Studies with objective measures have failed to find evidence of enhanced sensory-perceptual abilities during marijuana intoxication.

Sensory-motor performance:

- Studies by Sharma & Moskowitz 1974 showed that marijuana caused increasingly greater disruptions in the ability to maintain continuous attention to a task, compared to placebo, as the amount of time-on-task increased.
- Studies on reaction time showed that marijuana increased the variability of reaction times. Most responses are as fast with marijuana as with placebo, but marijuana increases the frequency of unusually long reaction times (Clark, Hughes, & Nakashima 1970)

Memory

- Memory disruption is probably the most reliable objective behavioral effect of marijuana.
- Marijuana affects short-term memory operations only when reporting is delayed, allowing time for a shift of attention to occur, resulting in interference with STM.
- Marijuana decreases STM's functional capacity by increasing its susceptibility to interference.
- It does not interfere with retrieval from LTM of material learned earlier while straight.

PEYOTE

Description:

- Peyote (*Lophophora williamsii*) is a small, grey-green, round cactus with grayish-white fuzzy tufts instead of spines and occasionally flowers.
- It rarely rises more than an inch or so above the soil surface.
- The largest part of the cactus is actually underground in the long, carrot-like root.

- Over 50 chemically related alkaloid compounds have been isolated in peyote.
- 30 are thought to have some psychoactive properties.
- The main psychoactive compound is mescaline.
- Mescaline is chemically very similar to the neurotransmitter substance, norepinephrine.
- Mescaline was first extracted from peyote in 1896.
- This was the first hallucinogenic compound to be chemically isolated.

Background and Historical Use:

- Peyote has a long history of use as a medicinal and sacramental plant.
- Dried peyote has been found within a Texas cave and it has been dated at approximately 7000 years old.
- Archaeological evidence indicates that peyote was a sacred plant of the Aztecs.
- Peyote traditions later spread north to the Plains Indians.

Peyote Use in Native American Religion and Medicine:

- The religious use peyote is very ancient.
- Mexican natives, predominately the Tarahumara and the Huichol peoples, may have introduced peyote to the Mescalero Apache, who then introduced it to the Kiowa and Comanche tribes around 1870.
- Today, it is the Kiowa-Comanche type of peyote ceremony that, with slight modifications, prevails north of the Mexican border.

Studies on the Long-Term Use of Peyote Among Native Americans:

- A study published in November 2005 by researchers at the McLean Hospital and Harvard Medical School found no mental or behavioral problems associated with long-term use of peyote among members of the Native American Church.

PARAPSYCHOLOGY

Main areas of study:

- Extrasensory Perception (ESP)
 - Clairvoyance: the ability to experience the occurrence of an event without physically perceiving it (with the five "normal" senses).
 - Precognition: the ability to predict a future event.
 - Telepathy: the ability to read someone's mind and to tell others the thoughts perceived in this fashion.
 - Remote Viewing: the ability to describe places being visited by other people without having any normal form of communication with the visitors.
- Psychokinetic (PK) Abilities:
 - The ability to make an object move by mind control, without being in physical contact with it.

HISTORICAL BACKGROUND

- Parapsychology, or psychic research (PSI), may be one of the oldest areas of study, interest and controversy in the history of human consciousness.
- It is precisely because of its long association with "the occult" that *modern* psychologists remain skeptical at best
- The first organized, Western scientific studies began in 1882 with the founding of the Society for Psychical Research in London.
- In the United States, serious study in parapsychology got underway in 1927, at Duke University, with the establishment of the first laboratory devoted to the investigation of psi - specifically ESP and PK.

GENERAL PROBLEMS IN RESEARCH

1. Inadequate reporting of test procedures and experimental designs
2. Failure to replicate most parapsychology experiments
3. Absence of psychological, predictive laws and theories of psi
4. Lack of harmony between psi and established physical and biological laws and theories
5. Absence of generally observable psi phenomena in the real world
6. General absence of scientific evidence in the laboratory to establish the existence of psi
7. Absence of clear proof that extraneous variables cannot account for psi

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