

States of Consciousness

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Consciousness and Information Processing

Sleep and Dreams

- Biological Rhythms
- The Rhythm of Sleep
- Sleep Disorders
- Dreams

States of Consciousness

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- Facts and Falsehoods
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Drugs and Consciousness

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- Psychoactive Drugs
- Influences on Drug Use

History of Consciousness

1. Psychology began as a science of consciousness.
2. Behaviorists argued about alienating consciousness from psychology.
3. However, after 1960, mental concepts (consciousness) started reentering psychology.

Forms of Consciousness

Consciousness, modern psychologists believe, is an awareness of ourselves and our environment.

Bill Ling/ Digital Vision/ Getty Images



Christine Brune



Stuart Franklin/ Magnum Photos



AP Photo/ Ricardo Mazalan



Some occur spontaneously

Daydreaming

Drowsiness

Dreaming

Some are physiologically induced

Hallucinations

Orgasm

Food or oxygen starvation

Some are psychologically induced

Sensory deprivation

Hypnosis

Meditation

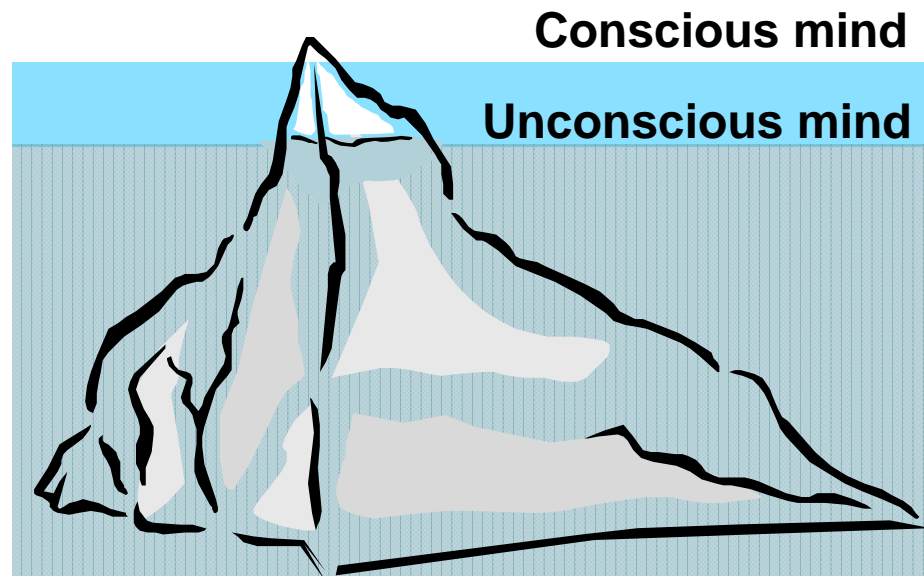
Neuroscience & Consciousness

Neuroscientists believe that consciousness emerges from the interaction of individual brain events much like a chord that is created from different musical notes.



Consciousness & Information Processing

The unconscious mind processes information simultaneously on multiple tracks, while the conscious mind processes information sequentially.



Sleep & Dreams

Sleep – the irresistible tempter to whom we inevitably succumb.



Mysteries about sleep and dreams have just started unraveling in sleep laboratories around the world.

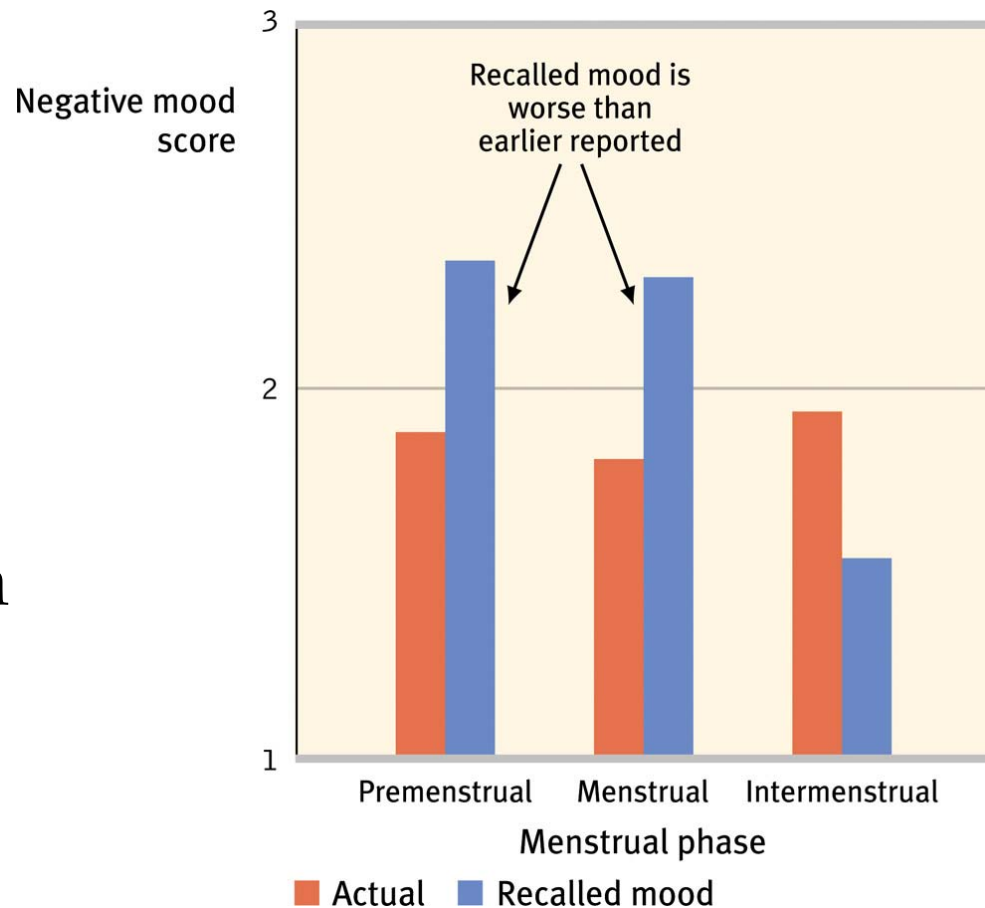
Biological Rhythms

Biological rhythms are controlled by internal “biological clocks.”

1. **Annual cycles:** On an annual cycle, geese migrate, grizzly bears hibernate, and humans experience seasonal variations in appetite, sleep, and mood. *Seasonal Affective Disorder (SAD)* is a mood disorder people experience during dark winter months.

Biological Rhythms

2. **28-day cycles:** The female menstrual cycle averages 28 days. Research shows menstruation may not affect moods.

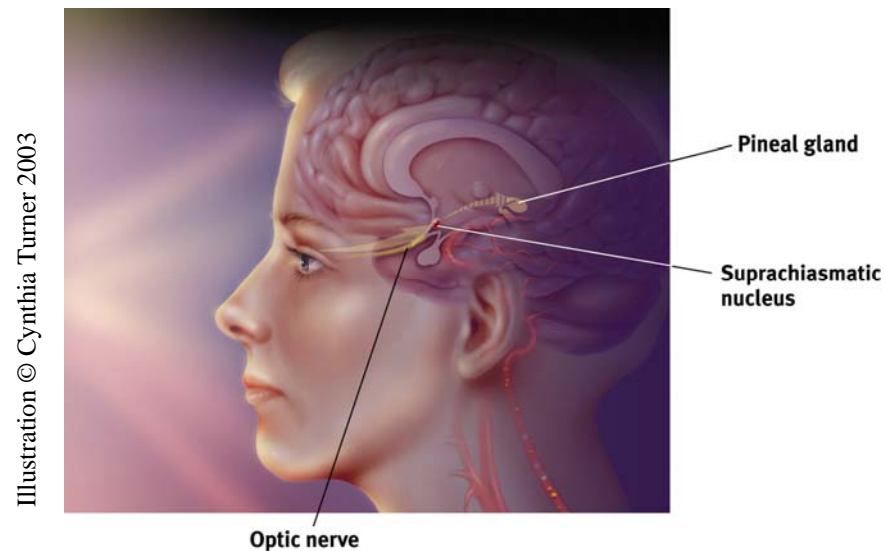


Biological Rhythms

3. **24-hour cycles:** Humans experience 24-hour cycles of varying alertness (sleep), body temperature, and growth hormone secretion.
4. **90-minute cycles:** We go through various stages of sleep in 90-minute cycles.

Rhythm of Sleep

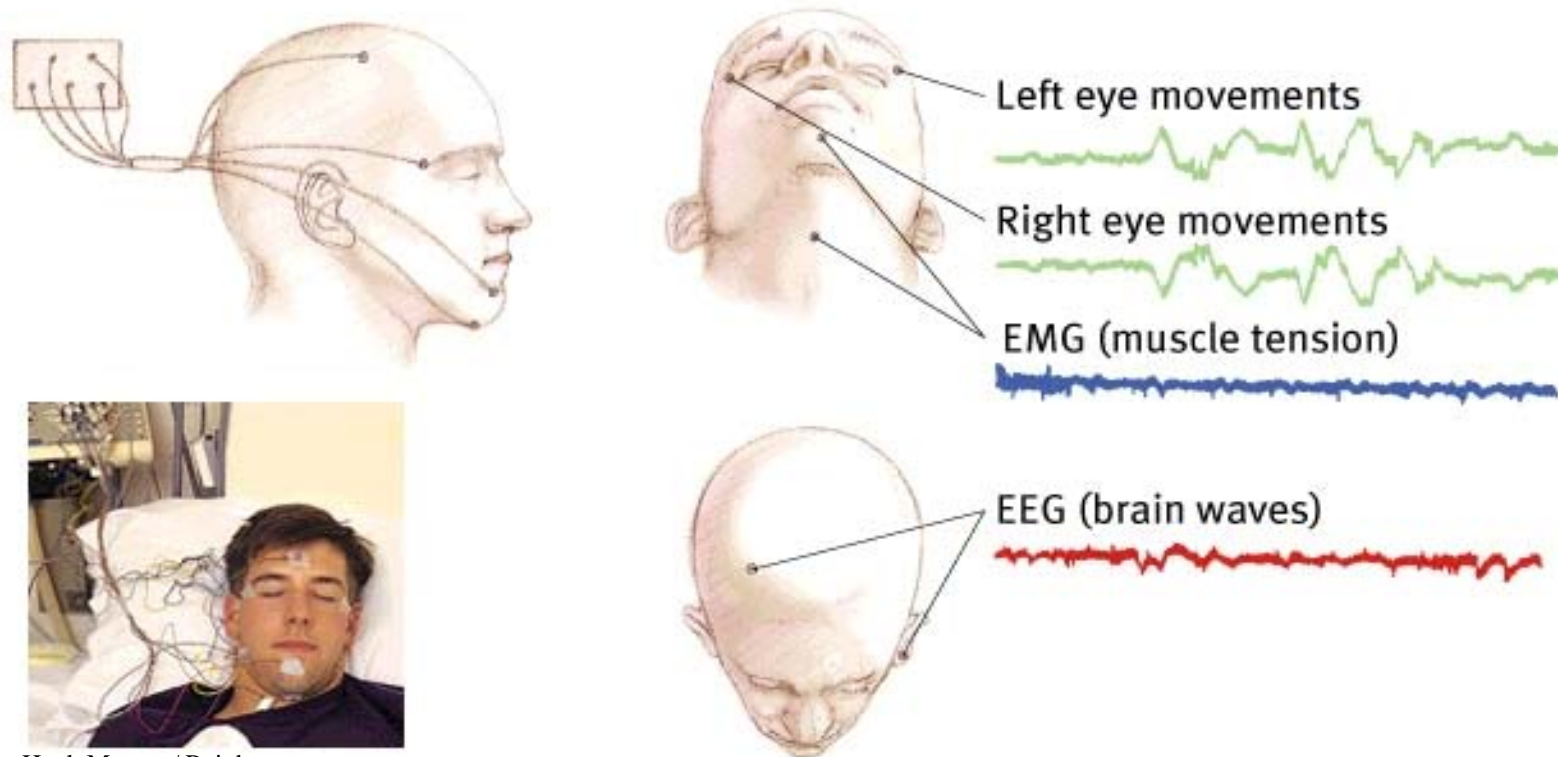
Circadian Rhythms occur on a 24-hour cycle and include sleep and wakefulness, which are disrupted during transcontinental flights.



Light triggers the suprachiasmatic nucleus to decrease (morning) melatonin from the pineal gland and increase (evening) it at night fall.

Sleep Stages

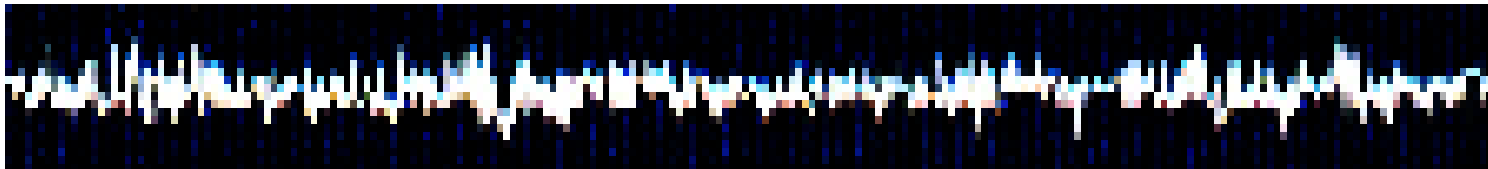
Measuring sleep: About every 90 minutes, we pass through a cycle of five distinct sleep stages.



Hank Morgan/ Rainbow

Awake & Alert

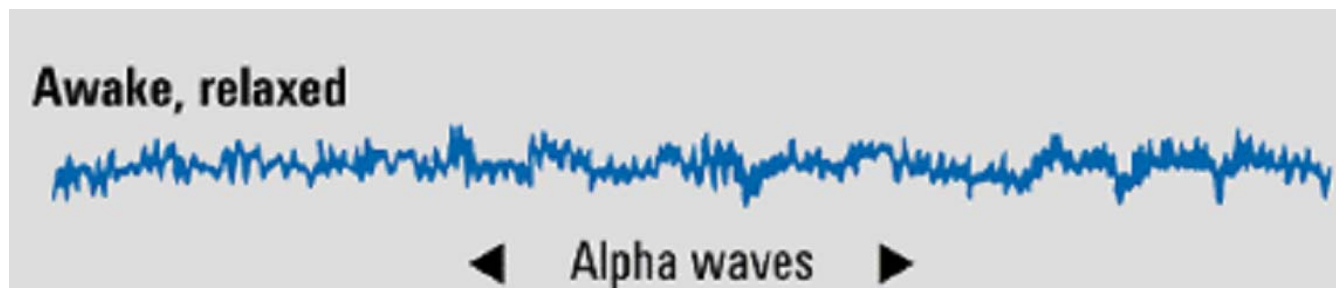
During strong mental engagement, the brain exhibits low amplitude and fast, irregular **beta waves (15-30 cps)**. An awake person involved in a conversation shows beta activity.



Beta Waves

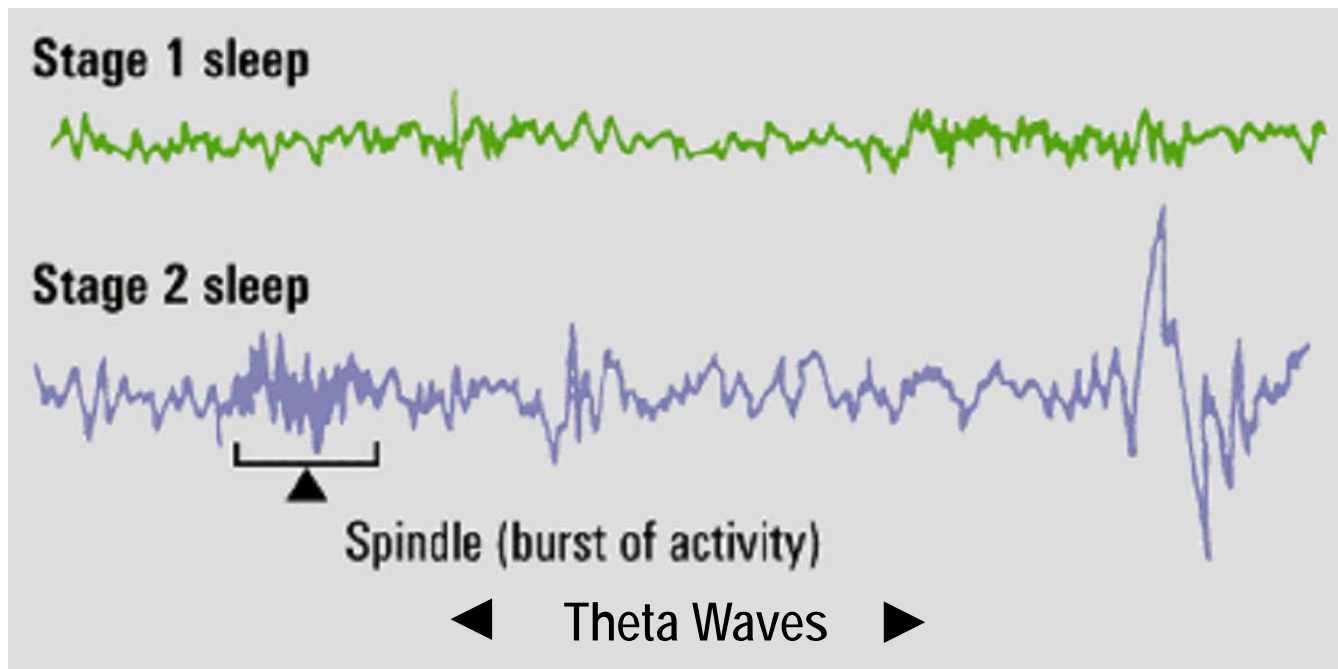
Awake but Relaxed

When an individual closes his eyes but remains awake, his brain activity slows down to a large amplitude and slow, regular **alpha waves (9-14 cps)**. A meditating person exhibits an alpha brain activity.



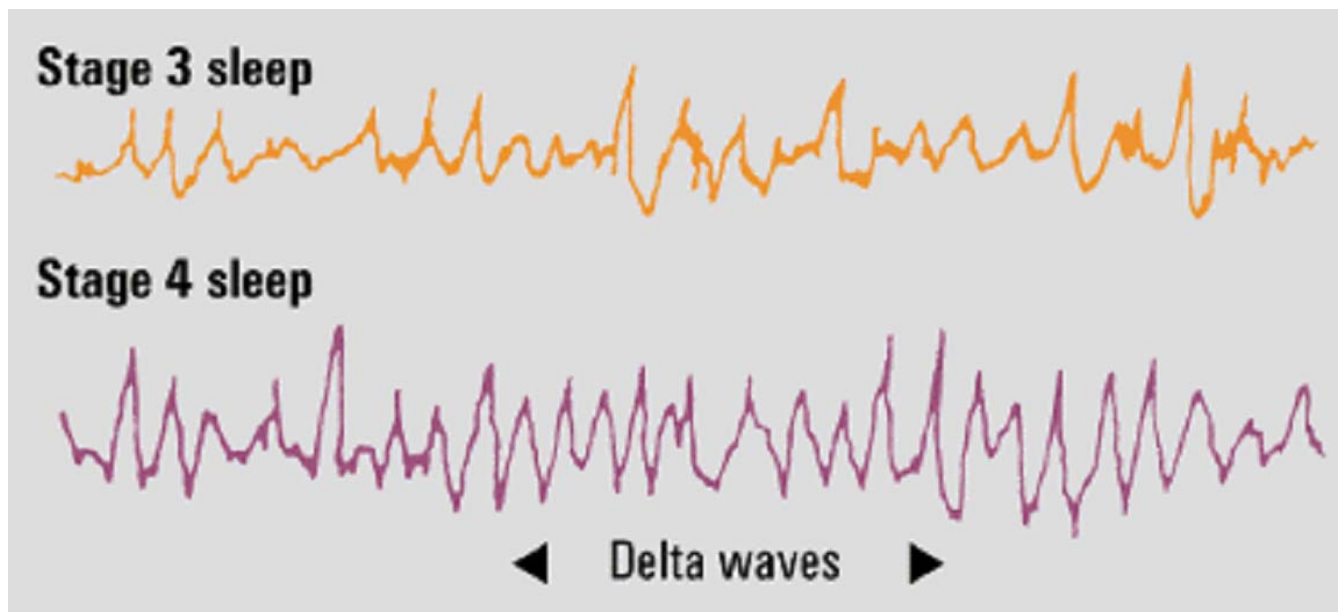
Sleep Stages 1-2

During early, light sleep (stages 1-2) the brain enters a high-amplitude, slow, regular wave form called **theta waves (5-8 cps)**. A person who is daydreaming shows theta activity.



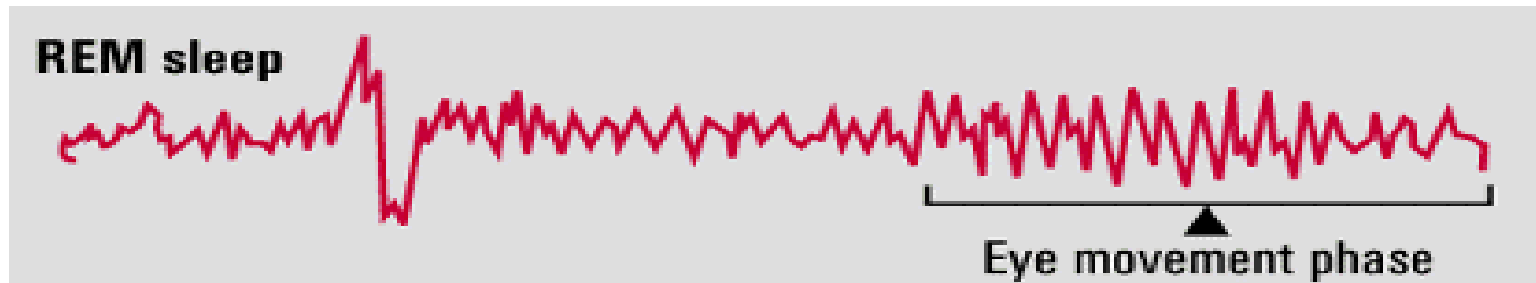
Sleep Stages 3-4

During deepest sleep (stages 3-4), brain activity slows down. There are large-amplitude, slow **delta waves (1.5-4 cps)**.



Stage 5: REM Sleep

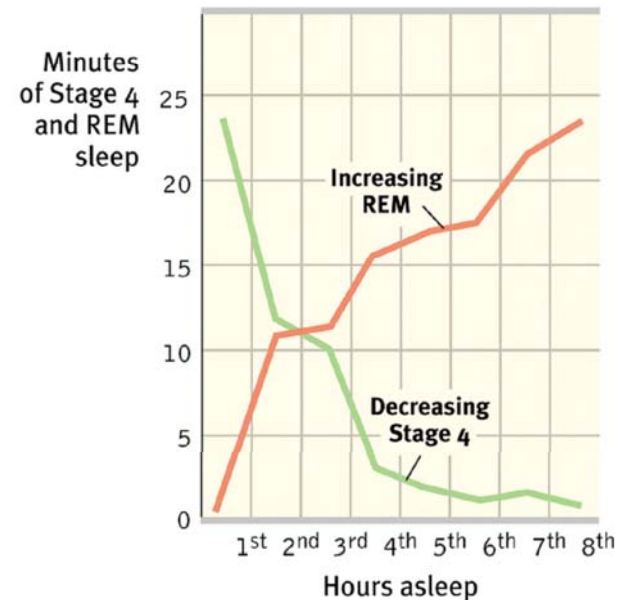
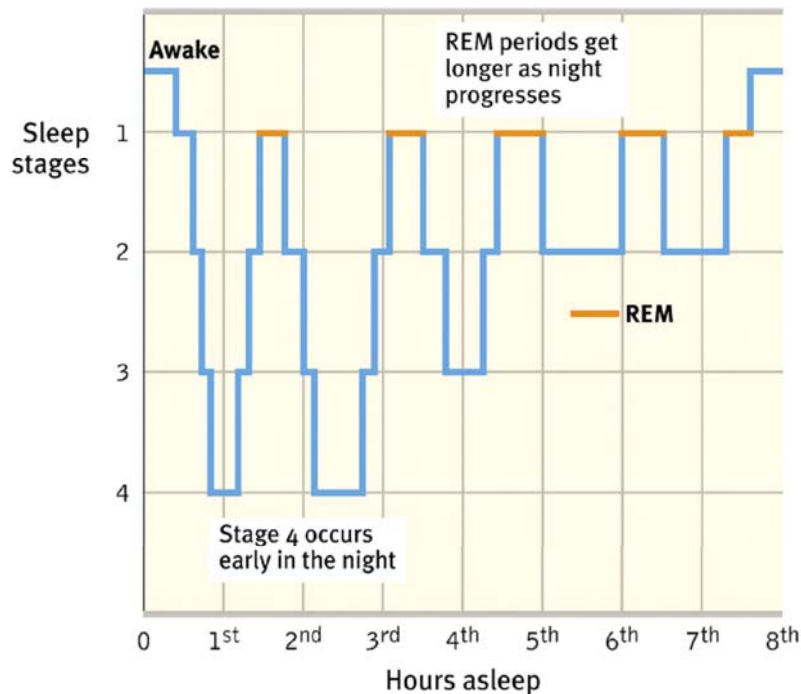
After reaching the deepest sleep stage (4), the sleep cycle starts moving backward towards stage 1. Although still asleep, the brain engages in low-amplitude, fast and regular **beta waves (15-40 cps)** much like awake-aroused state.



A person during this sleep exhibits
Rapid Eye Movements (REM)
and reports vivid dreams.

90-Minute Cycles During Sleep

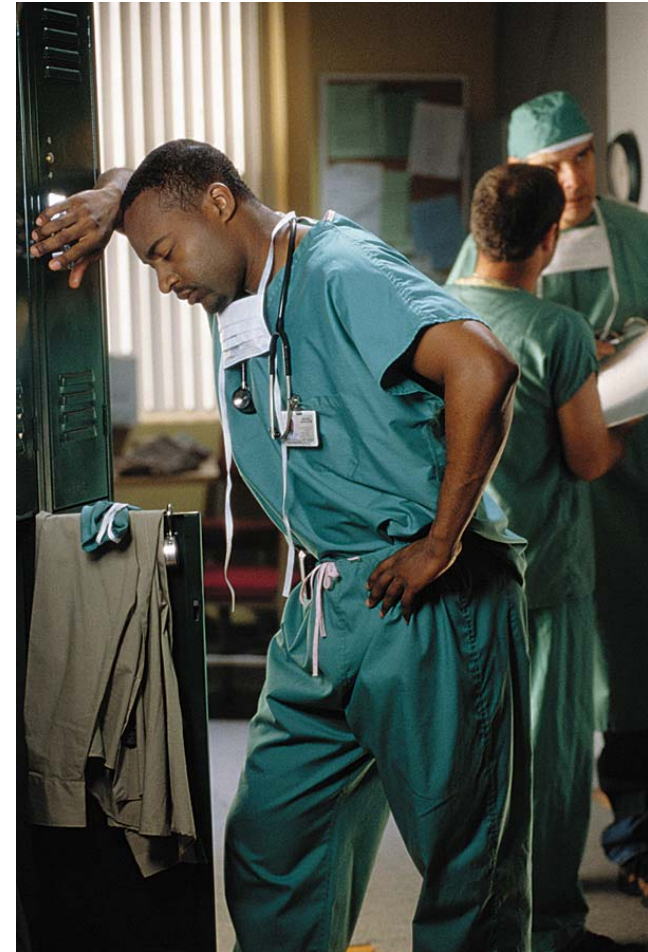
With each 90-minute cycle, stage 4 sleep decreases and the duration of REM sleep increases.



Why do we sleep?

We spend one-third of our lives sleeping.

If an individual remains awake for several days, they deteriorate in terms of immune function, concentration, and accidents.



Jose Luis Pelaez, Inc./Corbis

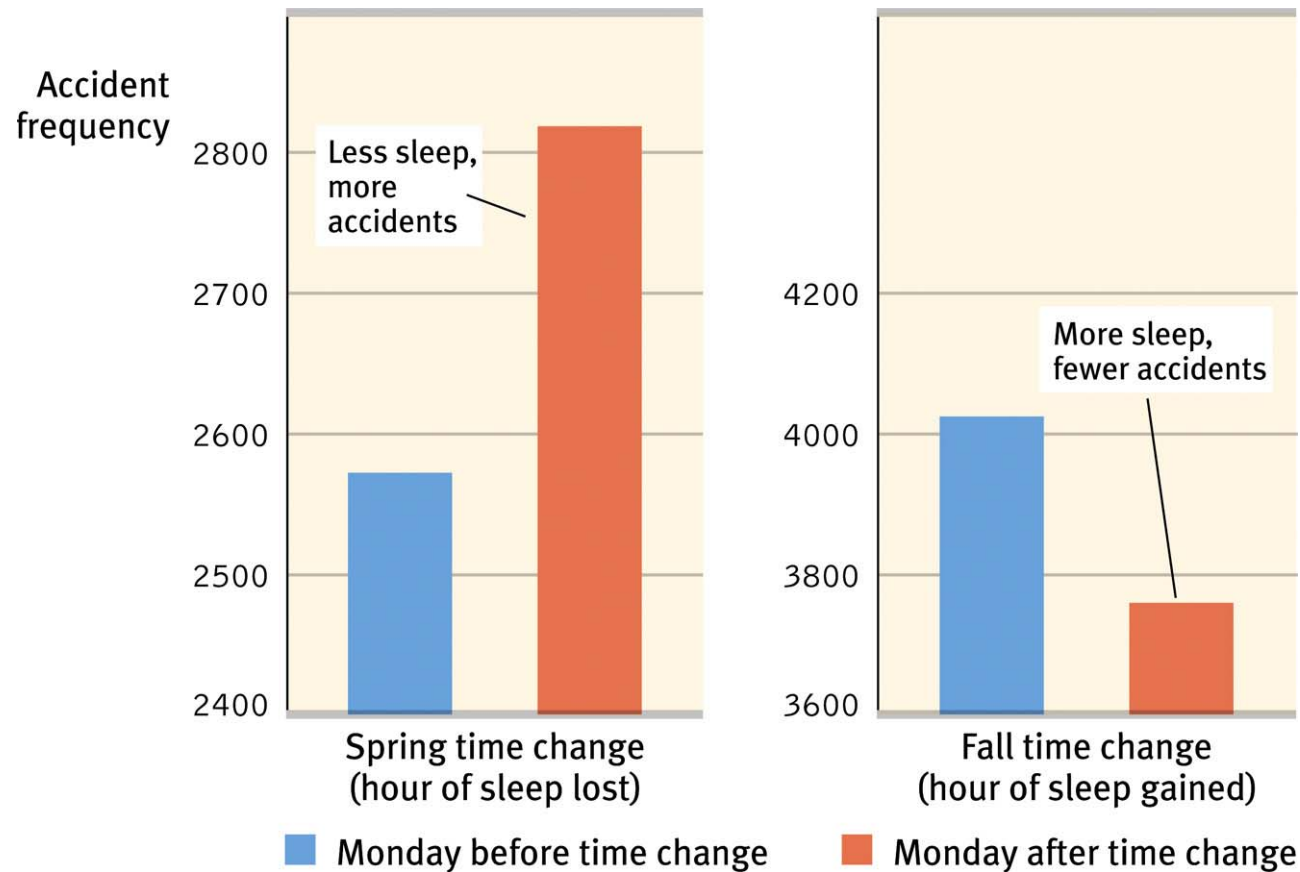
Sleep Deprivation

1. Fatigue and subsequent death.
2. Impaired concentration.
3. Emotional irritability.
4. Depressed immune system.
5. Greater vulnerability.



Accidents

Frequency of accidents increase with loss of sleep



Sleep Theories

1. **Sleep Protects:** Sleeping in the darkness when predators loomed about kept our ancestors out of harm's way.
2. **Sleep Recuperates:** Sleep helps restore and repair brain tissue.
3. **Sleep Helps Remembering:** Sleep restores and rebuilds our fading memories.
4. **Sleep and Growth:** During sleep, the pituitary gland releases growth hormone. Older people release less of this hormone and sleep less.

Sleep Disorders: Insomnia

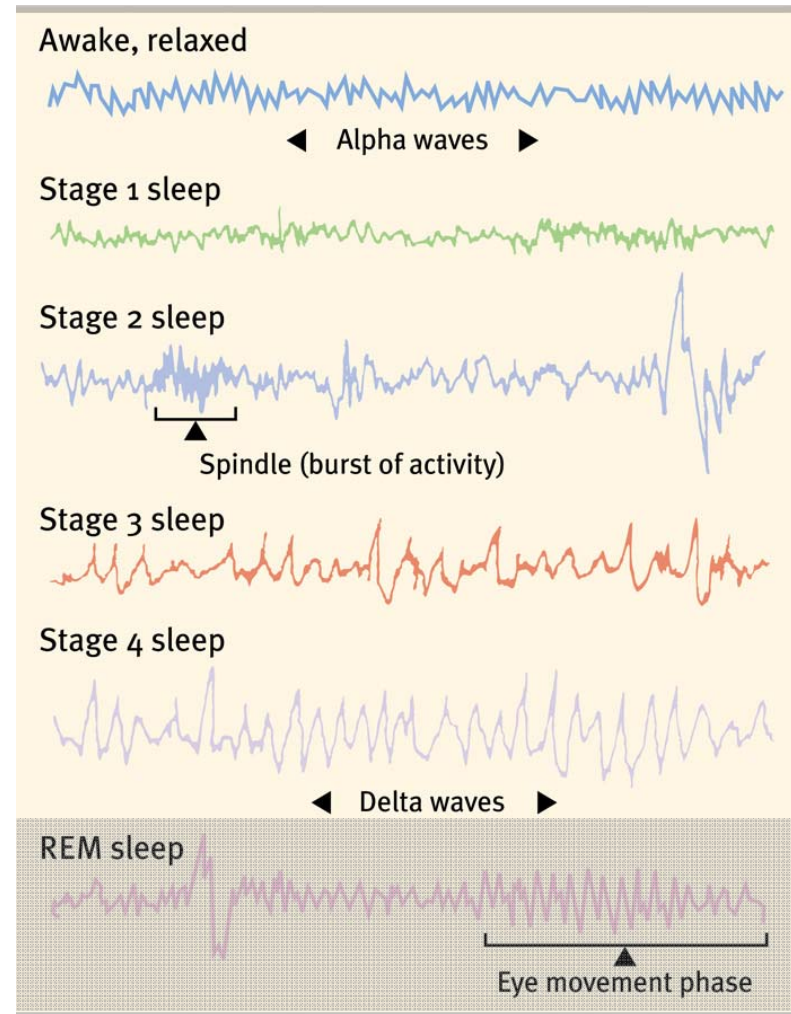
1. **Somnambulism:** Sleepwalking.
2. **Nightmares:** Frightening dreams that wake a sleeper from REM.
3. **Night terrors:** Sudden arousal from sleep with intense fear accompanied by physiological reactions (e.g., rapid heart rate, perspiration) that occur during SWS.

Sleep Disorders: Insomnia

4. **Narcolepsy**: Overpowering urge to fall asleep that may occur while talking or standing up.
5. **Sleep apnea**: Failure to breathe when asleep.

Dreams

The link between REM sleep and dreaming has opened up a new era of dream research.



What do we Dream?

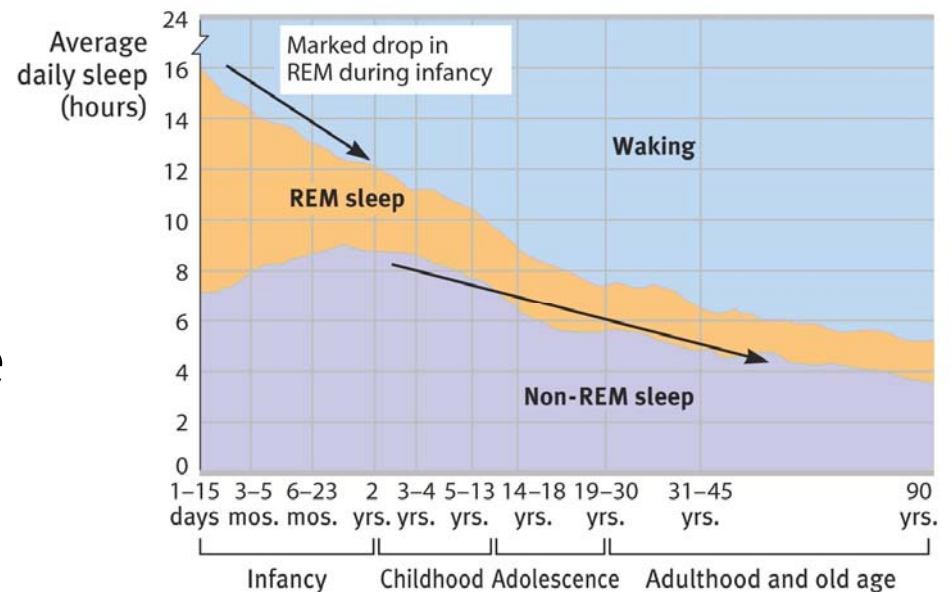
1. **Negative Emotional Content:** 8 out of 10 dreams have negative emotional content.
2. **Failure Dreams:** People commonly dream about failure, being attacked, pursued, rejected, or struck with misfortune.
3. **Sexual Dreams:** Contrary to our thinking, sexual dreams are sparse. Sexual dreams in men are 1 in 10; and in women 1 in 30.
4. **Dreams of Gender:** Women dream of men and women equally; men dream more about men than women.

Why do we dream?

1. **Wish Fulfillment:** Sigmund Freud suggested that dreams provide a psychic safety valve to discharge unacceptable feelings. The dream's manifest (apparent) content may also have symbolic meanings (latent content) that signify our unacceptable feelings.
2. **Information Processing:** Dreams may help sift, sort, and fix a day's experiences in our memories.

Why do we dream?

3. **Physiological Function:** Dreams provide the sleeping brain with periodic stimulation to develop and preserve neural pathways. Neural networks of newborns are quickly developing; therefore, they need more sleep.



Why do we dream?

4. **Activation-Synthesis Theory:** Suggests that the brain engages in a lot of random neural activity. Dreams make sense of this activity.
5. **Cognitive Development:** Some researchers argue that we dream as a part of brain maturation and cognitive development.

All dream researchers believe we need REM sleep. When deprived of REM sleep and then allowed to sleep, we show increased REM sleep called **REM Rebound**.

Dream Theories

Summary

DREAM THEORIES

Theory	Explanation	Critical Considerations
Freud's wish-fulfillment	Dreams provide a “psychic safety valve”—expressing otherwise unacceptable feelings; contain manifest (remembered) content and a deeper layer of latent content—a hidden meaning.	Lacks any scientific support; dreams may be interpreted in many different ways.
Information-processing	Dreams help us sort out the day's events and consolidate our memories.	But why do we sometimes dream about things we have not experienced?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This may be true, but it does not explain why we experience <i>meaningful</i> dreams.
Activation-synthesis	REM sleep triggers impulses that evoke random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive theory	Dream content reflects dreamers' cognitive development—their knowledge and understanding.	Does not address the neuroscience of dreams.

Hypnosis

A social interaction in which one person (the hypnotist) suggests to another (the subject) that certain perceptions, feelings, thoughts, or behaviors will spontaneously occur.



Hypnos: Greek god of sleep

Mesmerism

Credit for the popularity of hypnosis goes to Franz Anton Mesmer, a physician, who mistakenly thought he discovered “animal magnetism.” Some of his patients experienced a trancelike state and felt better upon waking up.



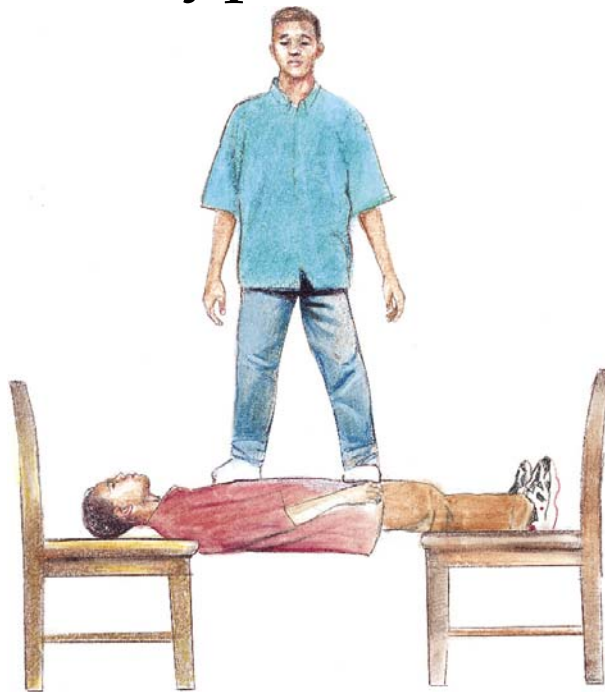
Franz Mesmer (1734 - 1815)

Aspects of Hypnosis

1. **Posthypnotic Suggestion:** Suggestion carried out after the subject is no longer hypnotized.
2. **Posthypnotic Amnesia:** Supposed inability to recall what one experienced during hypnosis.

Hypnotic Feats

Strength, stamina, and perceptual and memory abilities similarly affect those who are hypnotized and those who are not hypnotized.



Facts and Falsehood

Those who practice hypnosis agree that its power resides in the subject's openness to suggestion.

Can anyone experience hypnosis?

Yes, to some extent.

Can hypnosis enhance recall of forgotten events?

No.

Facts and Falsehood

Can hypnosis force people to act against their will?

No.

Can hypnosis be therapeutic?

Yes. Self-suggestion can heal too.

Can hypnosis alleviate pain?

Yes. Lamaze can do that too.

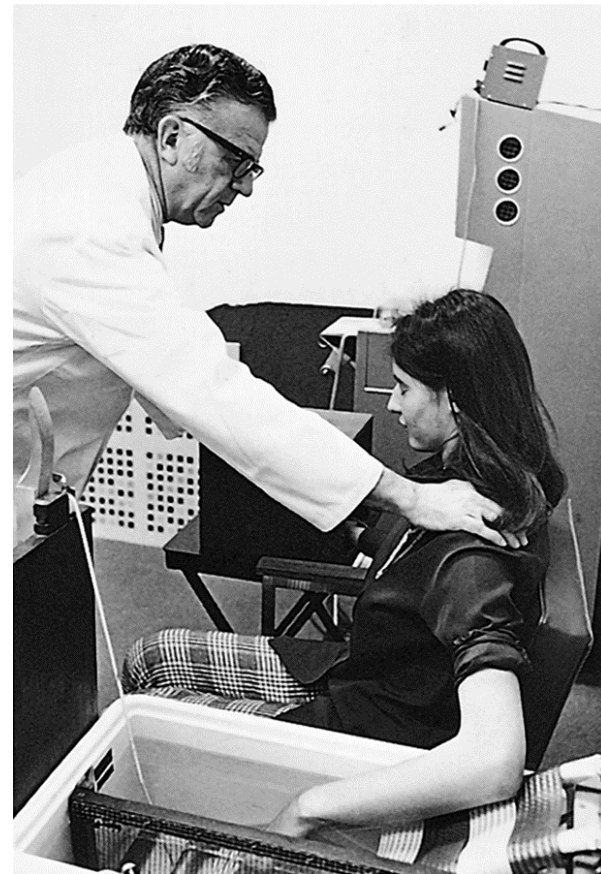
Is Hypnosis an Altered State of Consciousness?

1. Social Influence Theory:

Hypnotic subjects may simply be imaginative actors playing a social role.

2. Divided Consciousness Theory:

Hypnosis is a special state of dissociated (divided) consciousness (Hilgard, 1986, 1992).



Courtesy of News and Publications Service, Stanford University

(Hilgard, 1992)

Both Theories

Attention is diverted
from an aversive odor.
How?

**Divided-consciousness
theory:**
hypnosis has caused a
split in awareness



Mimi Forsyth

**Social influence
theory:**
the subject is so caught
up in the hypnotized role
that she ignores the
odor

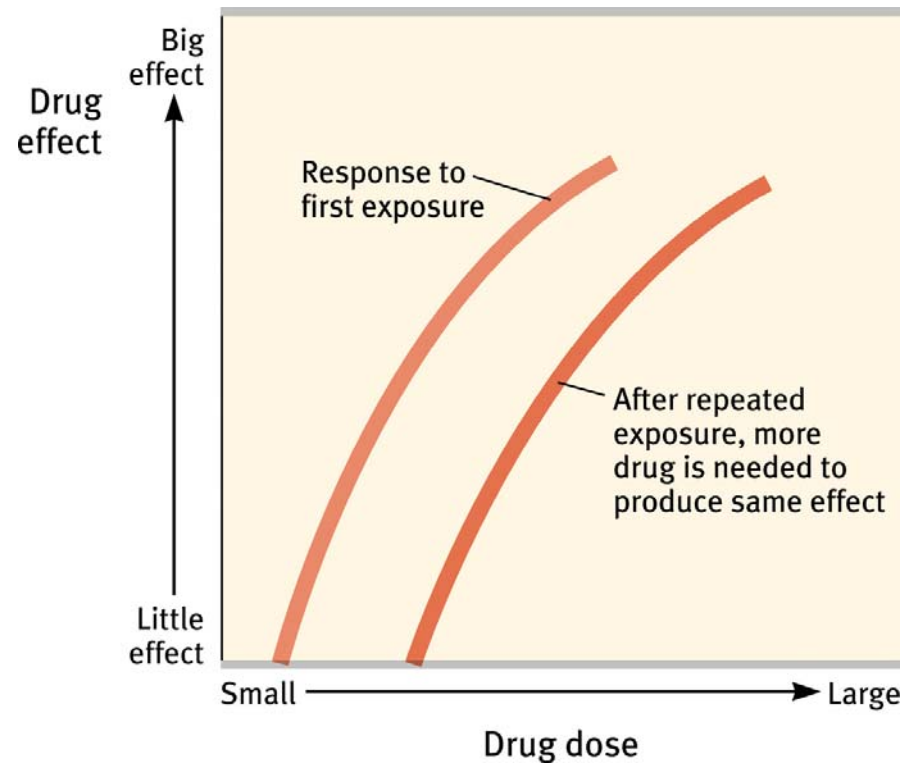
Drugs and Consciousness

Psychoactive Drug: A chemical substance that alters perceptions and mood (effects consciousness).

Dependence & Addiction

Continued use of a psychoactive drug produces **tolerance**.

With repeated exposure to a drug, the drug's effect lessens. Thus it takes greater quantities to get the desired effect.



Withdrawal & Dependence

1. **Withdrawal:** Upon stopping use of a drug (after addiction), users may experience the undesirable effects of withdrawal.
2. **Dependence:** Absence of a drug may lead to a feeling of physical pain, intense cravings (physical dependence), and negative emotions (psychological dependence).

Misconceptions about Addiction

Addiction is a craving for a chemical substance, despite its adverse consequences (physical & psychological).

1. Addictive drugs quickly corrupt.
2. Addiction cannot be overcome voluntarily.
3. Addiction is no different than repetitive pleasure-seeking behaviors.

Psychoactive Drugs

Psychoactive drugs are divided into three groups.

1. Depressants
2. Stimulants
3. Hallucinogens

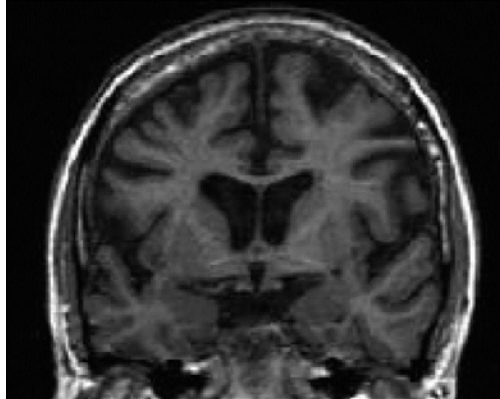
Depressants

Depressants are drugs that reduce neural activity and slow body functions. They include:

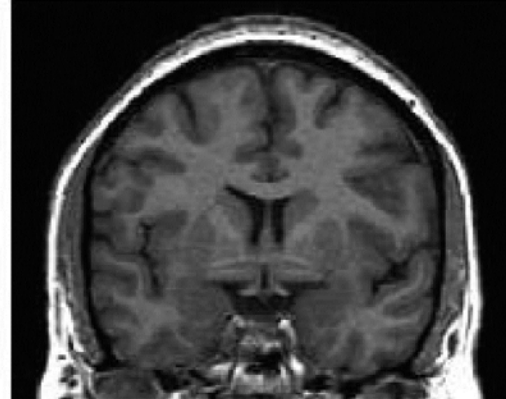
1. Alcohol
2. Barbiturates
3. Opiates

Alcohol

1. **Alcohol** affects motor skills, judgment, and memory...and increases aggressiveness while reducing self awareness.



Scan of woman with alcoholism



Scan of woman without alcoholism

Daniel Hommer, NIAAA, NIH, HHS



Drinking and Driving

Ray Ng/Time & Life Pictures/Getty Images

Barbiturates

2. **Barbiturates:** Drugs that depress the activity of the central nervous system, reducing anxiety but impairing memory and judgment. Nembutal, Seconal, and Amytal are some examples.

Depressants

3. **Opiates:** Opium and its derivatives (morphine and heroin) depress neural activity, temporarily lessening pain and anxiety. They are highly addictive.



<http://opioids.com/timeline>

Stimulants

Stimulants are drugs that excite neural activity and speed up body functions.

1. Caffeine
2. Nicotine
3. Cocaine
4. Ecstasy
5. Amphetamines
6. Methamphetamines

Caffeine & Nicotine

Caffeine and nicotine increase heart and breathing rates and other autonomic functions to provide energy.



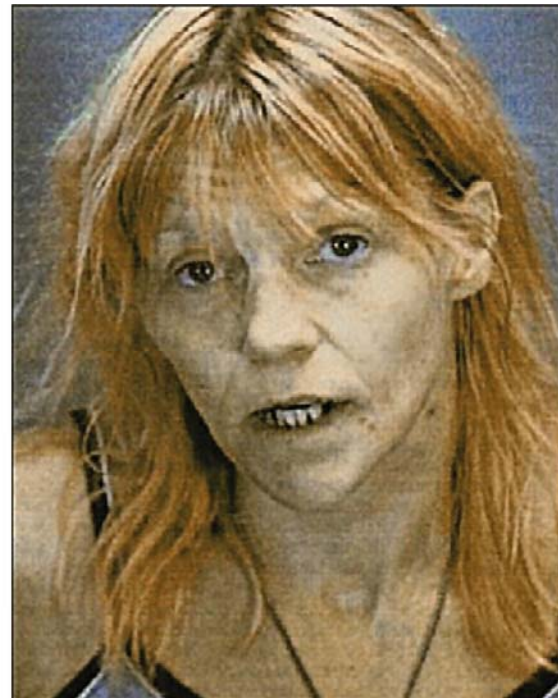
<http://www.tech-res-intl.com>



<http://office.microsoft.com/clipart>

Amphetamines

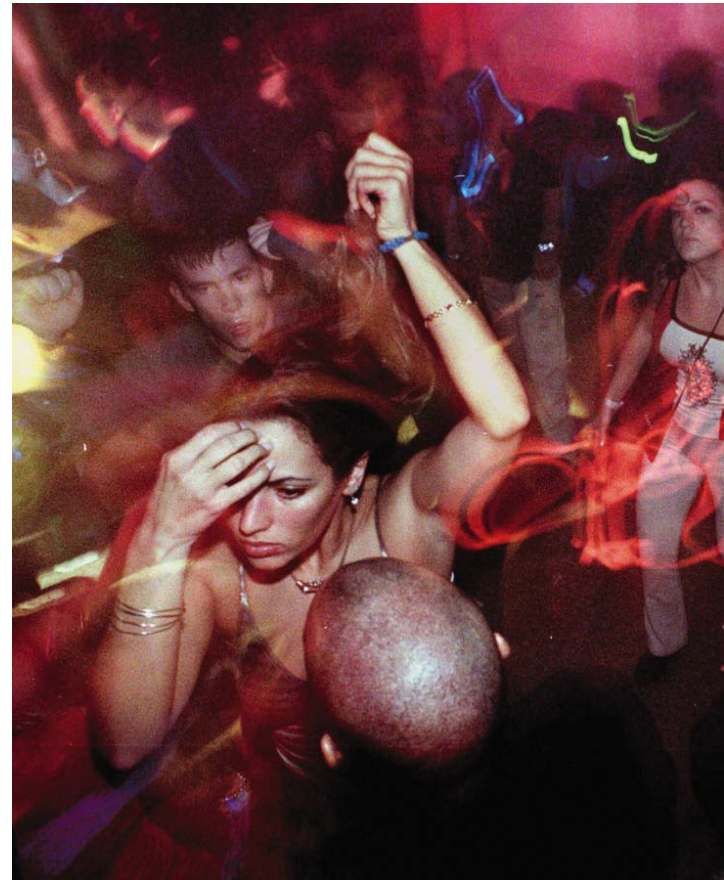
Amphetamines stimulate neural activity, causing accelerated body functions and associated energy and mood changes, with devastating effects.



National Pictures/Topham/The Image Works

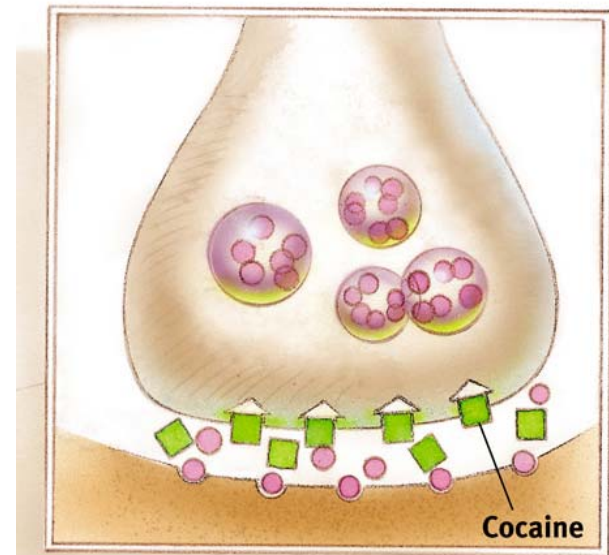
Ecstasy

Ecstasy or Methylenedioxymethamphetamine (MDMA) is a stimulant and mild hallucinogen. It produces a euphoric high and can damage serotonin-producing neurons, which results in a permanent deflation of mood and impairment of memory.



Cocaine

Cocaine induces immediate euphoria followed by a crash. Crack, a form of cocaine, can be smoked. Other forms of cocaine can be sniffed or injected.

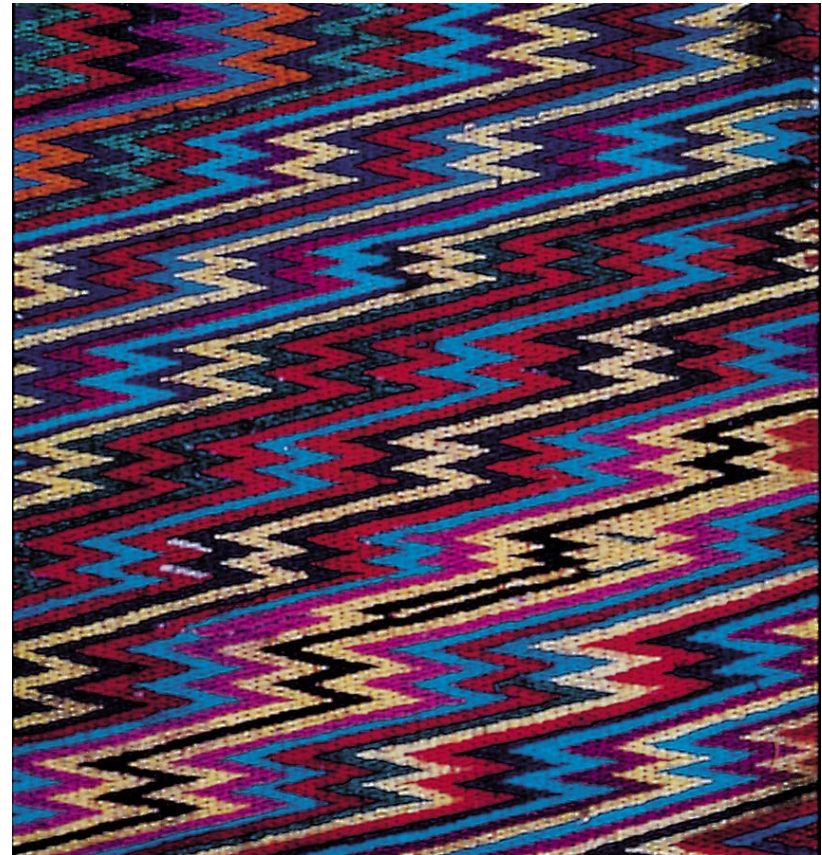


(c)

By binding to the sites that normally reabsorb neurotransmitter molecules, cocaine blocks reuptake of dopamine, norepinephrine, and serotonin (Ray & Ksir, 1990). The extra neurotransmitter molecules therefore remain in the synapse, intensifying their normal mood-altering effects and producing a euphoric rush. When the cocaine level drops, the absence of these neurotransmitters produces a crash.

Hallucinogens

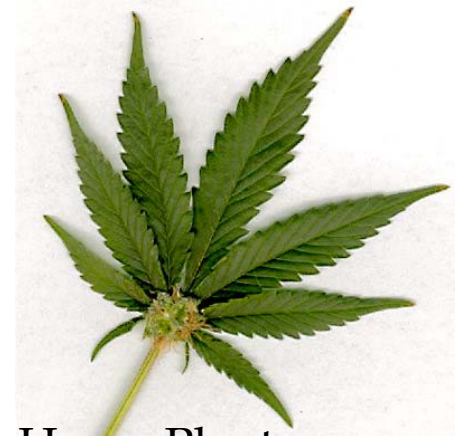
Hallucinogens are psychedelic (mind-manifesting) drugs that distort perceptions and evoke sensory images in the absence of sensory input.



Ronald K. Siegel

Hallucinogens

1. **LSD**: (lysergic acid diethylamide) powerful hallucinogenic drug (ergot fungus) that is also known as *acid*.
2. **THC (delta-9-tetrahydrocannabinol)**: is the major active ingredient in marijuana (hemp plant) that triggers a variety of effects, including mild hallucinations.



Hemp Plant

Drugs

Summary

A GUIDE TO SELECTED PSYCHOACTIVE DRUGS

Drug	Type	Pleasurable Effects	Adverse Effects
<i>Alcohol</i>	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, impaired reactions
<i>Heroin</i>	Depressant	Rush of euphoria, relief from pain	Depressed physiology, agonizing withdrawal
<i>Caffeine</i>	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
<i>Methamphetamine</i> (“speed,” “ice”)	Stimulant	Euphoria, alertness, energy	Irritability, insomnia, hypertension, seizures
<i>Cocaine</i>	Stimulant	Rush of euphoria, confidence, energy	Cardiovascular stress, suspiciousness, depressive crash
<i>Nicotine</i>	Stimulant	Arousal and relaxation, sense of well-being	Heart disease, cancer (from tars)
<i>Ecstasy (MDMA)</i>	Stimulant; mild hallucinogen	Emotional elevation, disinhibition	Dehydration, overheating, and depressed mood, cognitive, and immune functioning
<i>Marijuana</i>	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, relaxation	Impaired learning and memory, increased risk of psychological disorders, lung damage from smoke

Mind-Body Problem

Near-death experiences raise the mind-body issue.
Can the mind survive the dying body?

1. **Dualism:** Dualists believe that mind (non-physical) and body (physical) are two distinct entities that interact.
2. **Monism:** Monists believe that mind and body are different aspects of the same thing.