

# Consciousness

Chapter 3

# Altered States of Consciousness



- Naturally occurring altered states of consciousness
  - Sleep
  - Dreaming
  - Daydreaming
- Artificially induced altered states of consciousness
  - Hypnosis
  - Meditation
  - Drug-altered consciousness

# Selective Attention

- **Selective attention** is the focusing of conscious awareness on a particular stimulus
  - we are bombarded with tens of thousands of stimuli per second
  - we only focus on a small fraction of these stimuli
  - Cocktail Party Phenomenon
- Selective attention and accidents
  - Cell phones and driving?
  - Cell phones and *walking!*?

# Selective Inattention

- When we focus on one thing, we “miss out” on others
  - **Inattentional blindness** occurs when we fail to see things because we are focused on other stimuli
    - Change Blindness (Simons, 1996) occurs when we fail to notice a change in the environment when we are focused elsewhere (change *deafness* exists, too!)
- In some instances, a stimulus may demand our attention (e.g. hearing our name in noisy room → Cocktail Party Effect)

# Biological Rhythms and Sleep



- Circadian Rhythms
  - 24-hour cycle of biological functioning (circa-diem)
  - Humans naturally wake with sunlight and sleep when it gets dark

I'm so good at  
sleeping I can do it with  
my eyes closed.

**Sleep**

# Sleep



- We may not be conscious, but our brain is active
- We continue to process information while we sleep

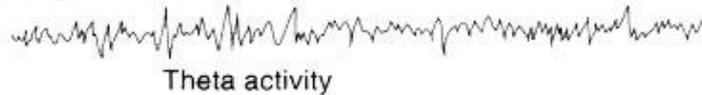


# The Sleep Stages: Specifics

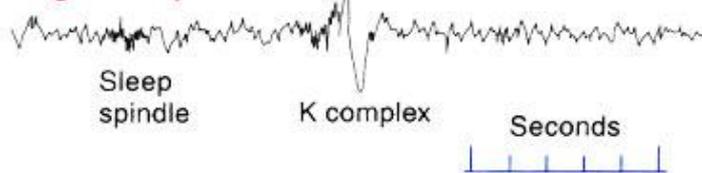
## Awake



## Stage 1 sleep



## Stage 2 sleep



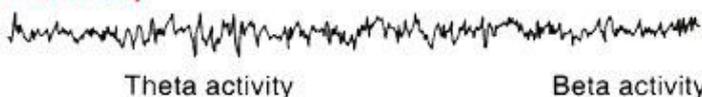
## Stage 3 sleep



## Stage 4 sleep



## REM sleep



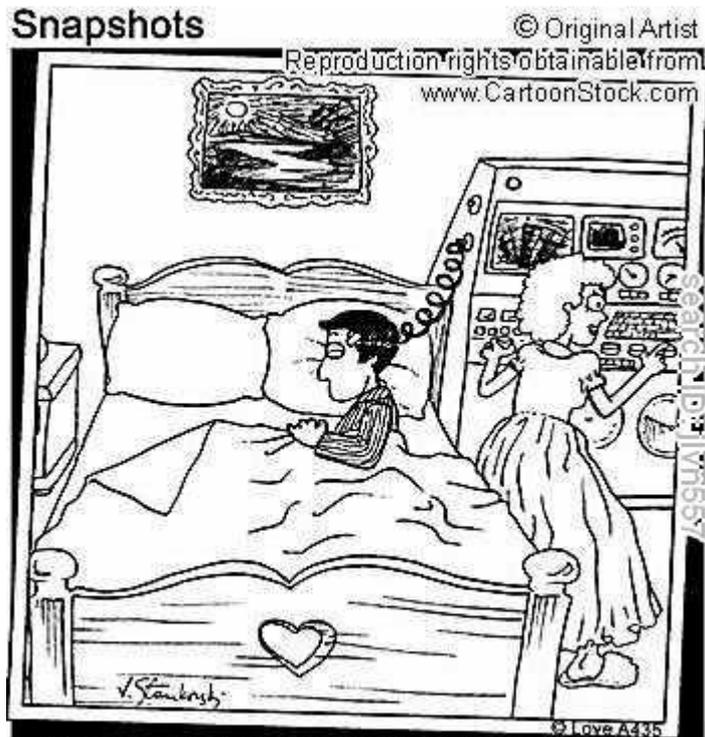
- **Awake but relaxed**: alpha waves dominate
- **Awake and alert**: beta waves dominate
- **Stage 1 Sleep**: slowed breathing, irregular, larger brain waves, hallucinations (*hypnagogic sensations*) – feelings of falling    Theta waves
- **Stage 2 Sleep**: deeper sleep, more difficult to awaken, sleep spindles, K-complex sleep talking
- **Stage 3 Sleep**: even deeper sleep, difficult to awaken, delta waves begin
- **Stage 4 Sleep**: very deep sleep, delta waves, sleepwalking, bedwetting
- **REM**: rapid brain waves, dreaming, increased heart rate, cortical activity, sexual arousal, “paradoxical sleep”
- In general, as sleep deepens, sleep waves increase in amplitude and decrease in frequency

# K-Complex and Sleep Spindles

- **K complexes** are large waves that stand out from the background and often occur in response to environmental stimuli such as sounds in the bedroom.
- **Sleep spindles** are brief bursts of fast activity, associated with refreshment in our ability to learn.

# Sleep Stages: General Trends

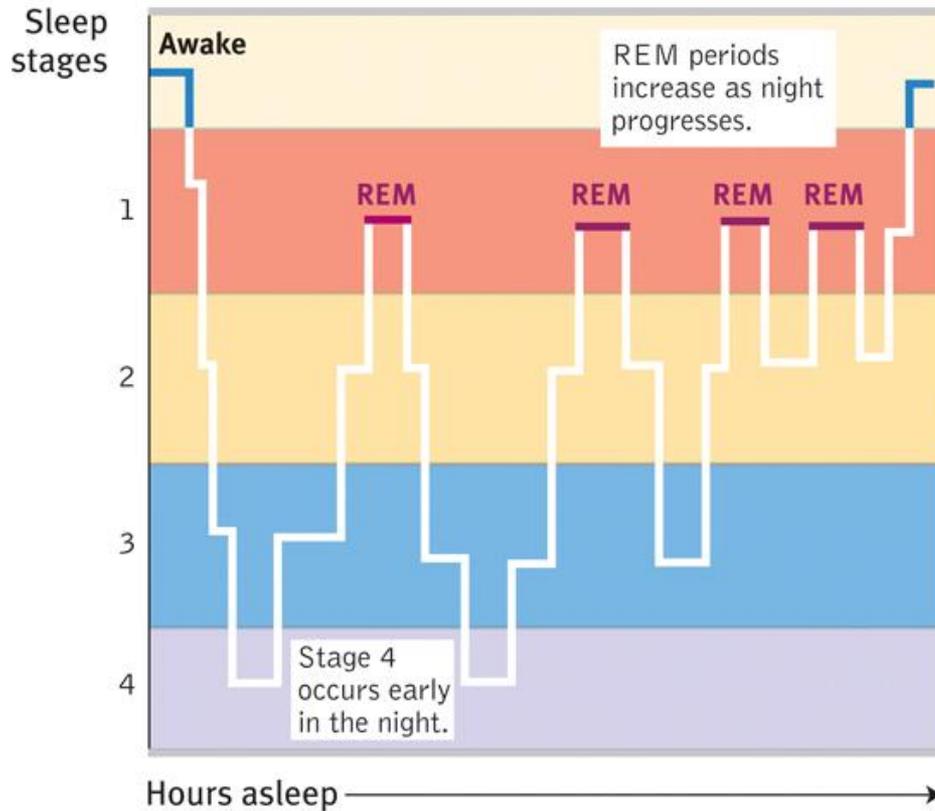
- Every 90-Minutes, we cycle through 5 sleep stages several times during the night (Stages 1, 2, 3, 4, and REM)
- Researchers monitor brain waves, eye movement, and facial muscle tension to study these stages
- Generally, as the night progresses, we experience **shorter stage 4 and 3 sleep and longer periods of REM sleep**
- Over a third of people report never dreaming, though they do – they just do not recall
  - We spend 20-25% of our sleeping time in REM, dreaming away...



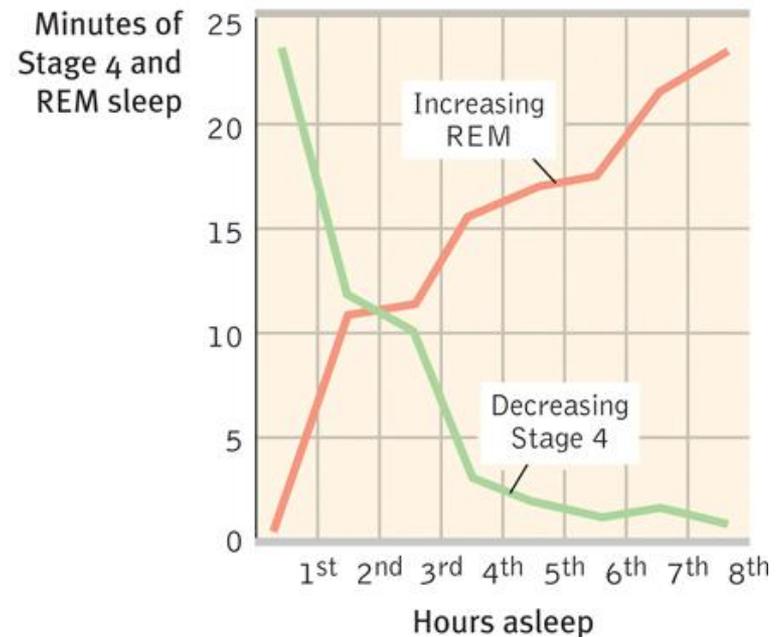
Debbie attaches her husband to a proprietary dream monitor to make sure he doesn't cheat on her in his sleep.

# Sleep Stages

(a)



(b)

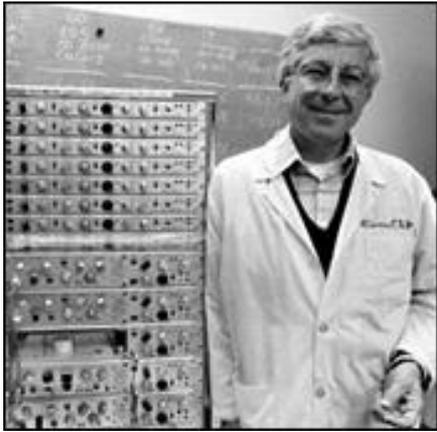


REM is important, and when we are deprived of it, we may experience **REM Rebound**. The loss of muscle tone/paralysis that occurs during REM helps us avoid acting out our dreams. Sleepwalking and talking must therefore occur during nREM in most people. REM decreases with age.

# Why Do We Sleep?

- Protective Value: we sleep at night, as we are not adapted for hunting/gathering in darkness.
- Restorative Value: we restore and repair brain tissue and prune unused neural pathways
- Memory: we recall better after a good night's sleep
- Creativity: the break that sleep provides and even dreams allow us to awaken with a fresh new approach
- Growth: Pituitary releases more growth hormone during deep sleep – may explain why we spend less time in deep sleep as we age

# Sleep Deprivation



- Nearly half of all Americans are sleep deprived!
- Sleep deprivation is linked with concentration difficulties, irritability, unhappiness, fatigue, illness, obesity, hypertension, and poor motor performance
- William Dement's research on sleep: "Sleep deprivation makes you stupid!"
- People who report getting enough sleep also are more likely to report feeling satisfied with their lives!



# Sleep Disorders: Insomnia



- 1 in 10 adults; 1 in 4 older adults
- Inability to fall asleep or remain asleep
- Role of hypothalamus
  - helps “shut off” brain activity associated with wakefulness
  - Degenerates with **age**
- Treatments
  - Sleeping pills and alcohol?
  - Exercise but not before bed
  - Avoid caffeine and rich foods before bed; milk for serotonin instead
  - Unwind before bed – dim lights, no TV
  - Keep regular sleep schedule with no naps
  - Avoid stressors – looking at clock, ruminating, etc.

# Sleep Disorders: Narcolepsy



- Sudden lapse into sleep – in severe cases, REM
- Usually brief – 5 minutes
- Linked to lack of a neurotransmitter linked to alertness, orexin, produced in hypothalamus.
- [Skeeter the Narcoleptic Dog](#)

# Sleep Disorders: Sleep Apnea



- Temporary cessation of breathing during the night
- Puts great stress on heart
- Irritability, fatigue
- Linked with obesity
- CPAP and BiPAP

# Sleep Disorders: Night Terrors

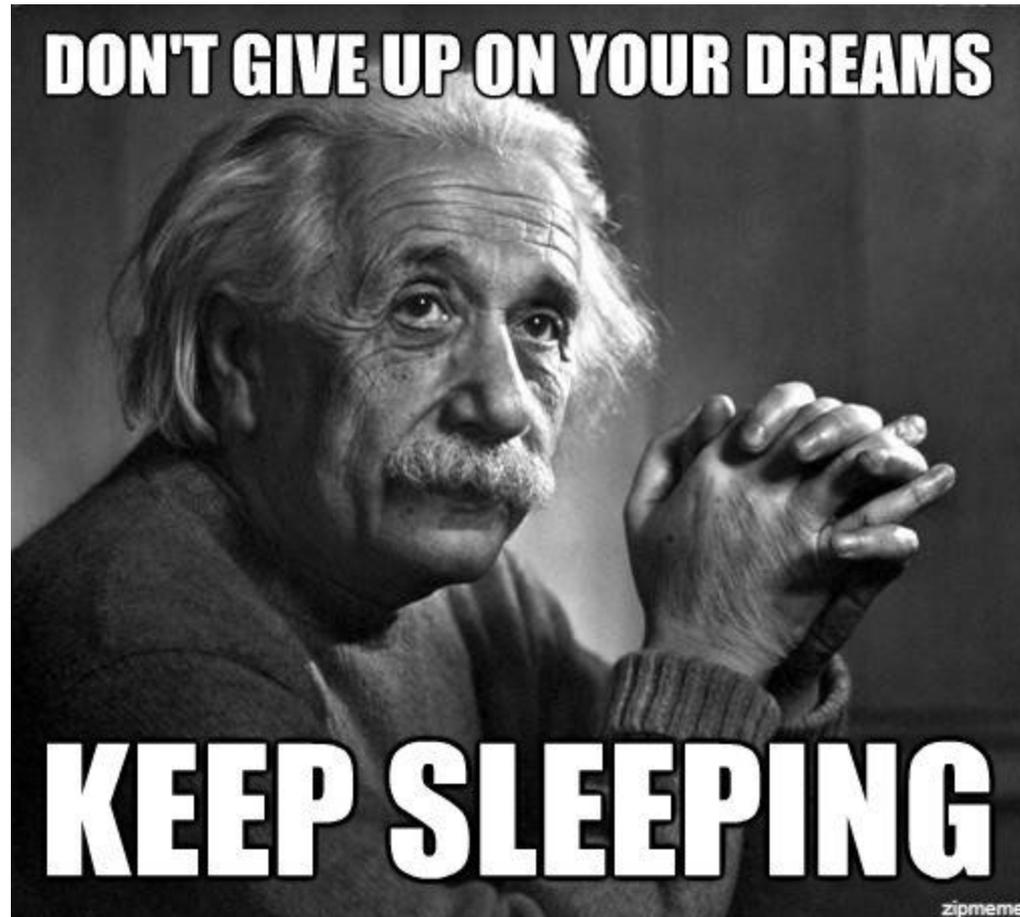


- Uncontrollable screaming and arousal without the ability to be awakened
- Although sleep terrors are more common in children, they can also affect adults.
- Occur during stage 4 sleep typically, not REM like nightmares

# Sleep Disorders: Sleepwalking and Sleepwalking



- Stage 4 sleep disorder where individuals walk and talk in sleep and do not recall anything in the morning
- Seems to run in families
- Because children experience longer stage 4 sleep, it is more common in children
- Sleepwalkers (somnambulists) usually return to bed on their own



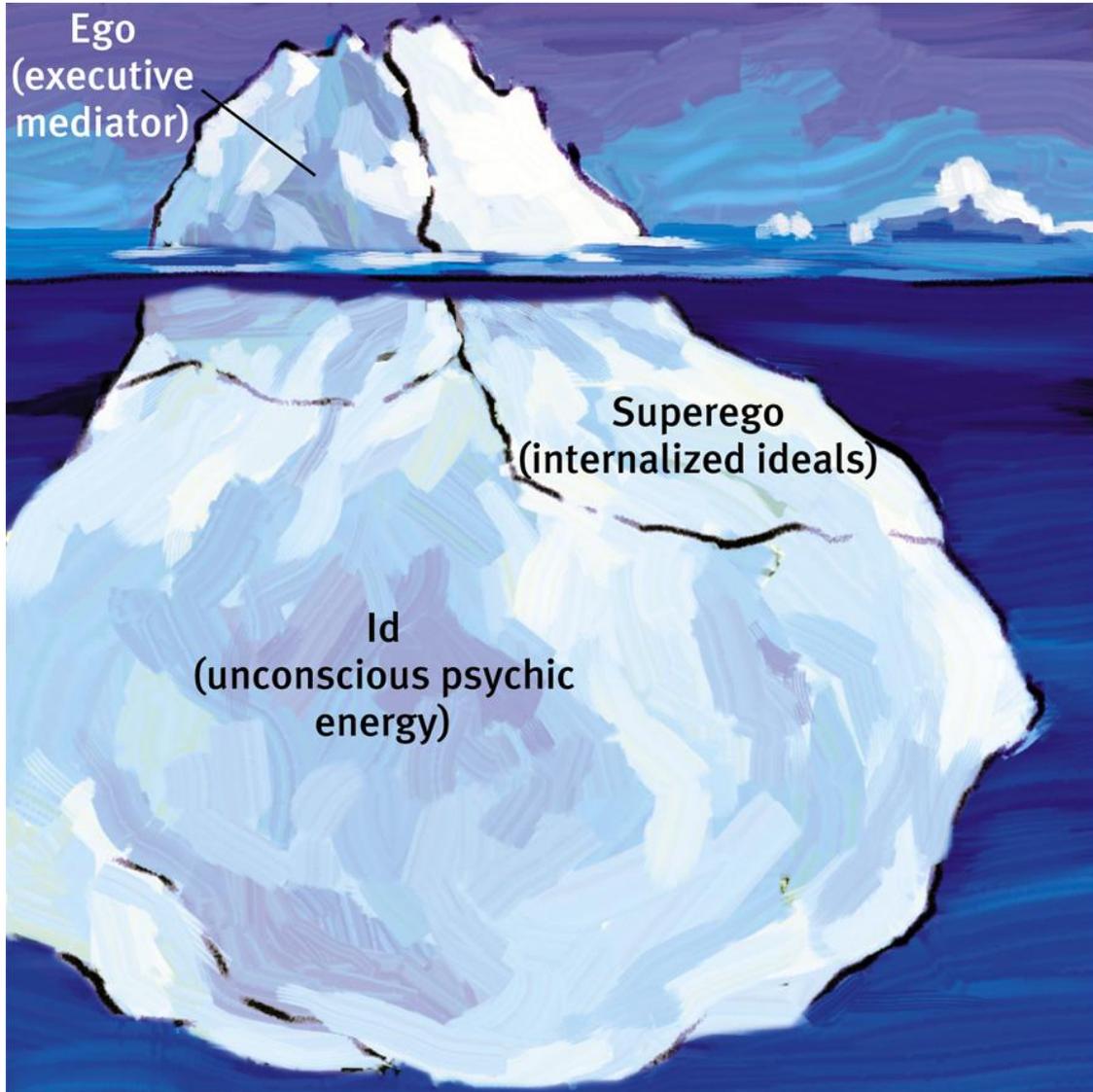
**Dreaming**

# Dreaming

- Occurs in REM sleep
- We spend 6 years of our lives in dreams!
- Sensory stimuli from the outside may intrude – alarm clock, smells – indicating some level of awareness even when unconscious
- Frontal lobe areas inactive during dreams and NTS dopamine, norepinephrine are low- makes new memory formation hard



# Freud's Concept of Mind



Conscious mind

Preconscious (outside awareness but accessible)

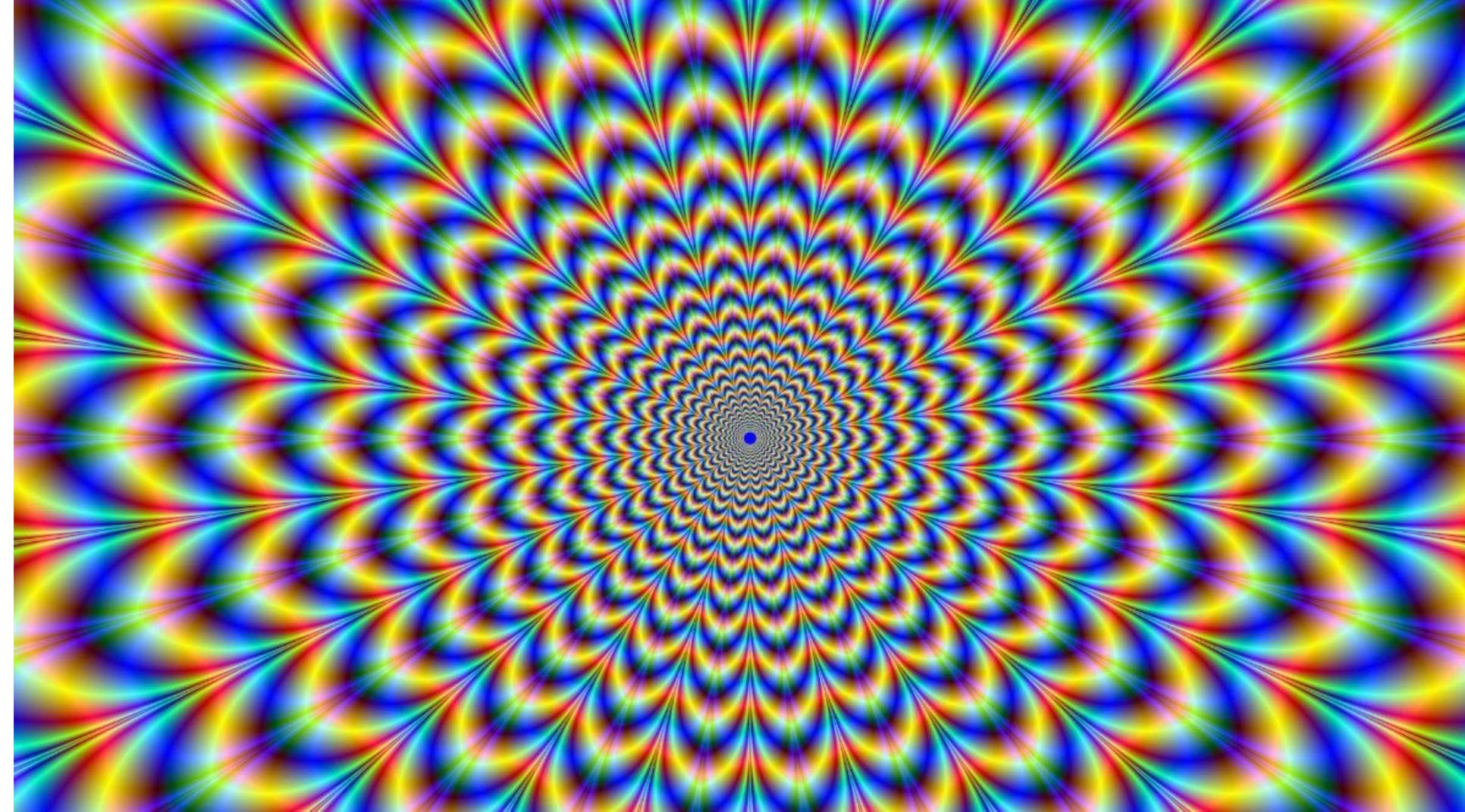
Unconscious mind

# Freud

- Manifest Content – actual storyline of the dreams – often reflect our experiences and preoccupations
- Latent Content- underlying meaning of the dream
- All based on the concept of Id, Ego and Superego

# Theories of Dreaming

- **Freud's Wish Fulfillment**
  - *Interpretation of Dreams* (1900)
  - Manifest and Latent Content
  - Lacks any scientific backing
- **Activation Synthesis**
  - Hobson and McCarley's Theory
  - REM sleep causes neural activity that the brain weaves into stories
  - Does not explain meaning of dreams
- **Information Processing**
  - Sort out our day
  - Improve and organize memories
  - Does not explain dreams about places we have never seen/things never experienced
- **Physiological Function**
  - REM sleep brain stimulation develops and preserves/prunes neural pathways
  - Infants with developing brains spent much time in REM



**Hypnosis** |

# Hypnosis

- Greek root: *hypnos*, meaning “sleep”
- Anton Mesmer (1732-1815) and “mesmerism” as a cure



# Hypnosis: what is it?

- Hypnosis is a systematic procedure used to produce a heightened state of suggestibility
- Not everyone can be hypnotized
  - Hypnotic Susceptibility Scales
  - Willingness to be hypnotized
  - Those with good imagination and fantasy life, who are able to concentrate, and who have a favorable opinion of hypnosis

# Power of Hypnosis...?

- Age Regression: acting like of reliving one's child-state
  - Hypnosis may cause hypnotized people to feel like children, but they often still have adult abilities
  - Memories that have been "hypnotically refreshed" are often a combination of fact and suggestion
- Acting against one's will?
  - People do not do this *because* they are hypnotized
  - They may perform unlikely acts simply because anyone in authority can induce people – hypnotized or not – to act against one's will

# Hypnosis as Therapy

- Hypnotherapists try to help clients heal themselves
  - Posthypnotic suggestions: suggestion made to hypnotized client that influence client's later behavior
  - Posthypnotic amnesia: client told they will not remember anything that happened while they were hypnotized
  - Hypnotherapy as a supplement to therapy has been shown to be helpful – particularly in managing obesity, but not for drugs, smoking or alcohol

# Hilgard: The Hidden Observer

- Hypnosis has been successful in pain management
  - Hypnotized people can endure things from ice baths to surgery without anesthesia!
  - Hypnosis can be used for pain management in lieu of addictive pain killers
- The “Hidden Observer”- you can observe but not be aware of your pain

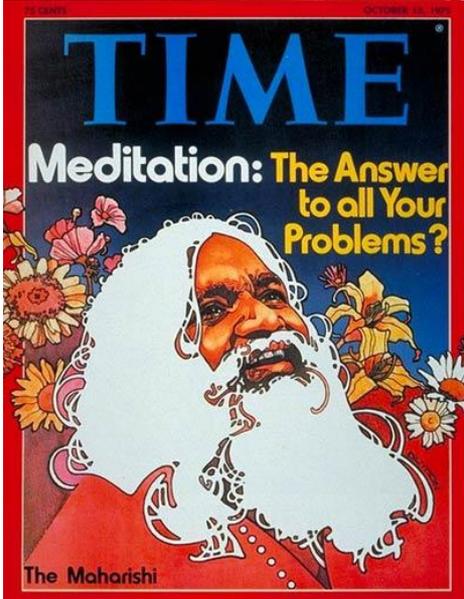
# The Hypnotized State

- Role Theory
  - Hypnotized individuals are playing a role
  - If they trust the hypnotist, they will behave accordingly – as expected
- Dissociation Theory
  - A dissociation is a split in consciousness which allows thoughts and behaviors to occur simultaneously but separately
  - The hypnotized individual gives some control over these processes to the hypnotist
  - Automatic writing: subject writes one thing and discusses an unrelated thing at same time
- State Theory
  - Hypnosis is a special state of consciousness
  - Specific, distinct changes in mental processes take place during hypnosis

# Meditation



- Techniques that attempt to focus attention and promote relaxation
- Deliberate attempt to alter consciousness
- Concentrative Meditation attempts to focus all attention on ONE thing: a word, a sound, etc. so that the same information is cycled through the nervous system repeatedly.
- Alpha waves predominate
- Can be used for relaxation, suppression of sympathetic nervous system





# Psychoactive Drugs

# True or False?

- About 70% of Americans admit to trying illicit drugs but most usage is before age 35.
- College students spend more money on alcohol than books.
- Drinking contributes to 1200 college student deaths, 70,000 sexual assaults and 500,000 injuries each year.
- Alcohol kills more people than all illegal drugs combined
- Tobacco kills more people than all illegal drugs combined.
- From 1896-1905 Coca-Cola included an extract of the coca plant, making it cocaine tonic water.
- 5% of high school students admit to having tried cocaine

# Definitions

- Look at the definitions for the following terms:
  - Psychoactive Drugs
  - Tolerance
  - Dependence (physical vs psychological)
  - Addiction
  - Antagonist (pg 55)
  - Agonist (pg 55)

# Depressants

- *Depress* the functioning of the CNS, reduce neural activity and slow body functions
- Alcohol
  - Mild euphoria, relaxation, lowered inhibitions, Slowed neural processing (don't drive!)
  - Memory disruption: brain shrinkage
  - Highly physically and psychologically addictive
  - Agonist for GABA, serotonin, dopamine and Antagonist for glutamate



# Depressants



- Barbiturates (Tranquilizers)
  - Calming, sedative effect – reduce inhibitions
  - e.g. Seconal, Nembutal, Valium
  - Mimics GABA- Agonist
- Withdrawal: tremors, nausea, sweating, restlessness, irritability, possibly death

# Depressants



- Drugs that relieve pain and cause euphoria and relaxation.
- Opiates are narcotics that include heroin, morphine, codeine and their derivatives.
- Can produce quick feeling of pleasure, then calmness or drowsiness.
- Highly addictive and addiction can happen very quickly
- Work by attaching to opioid receptors in the brain

# Stimulants



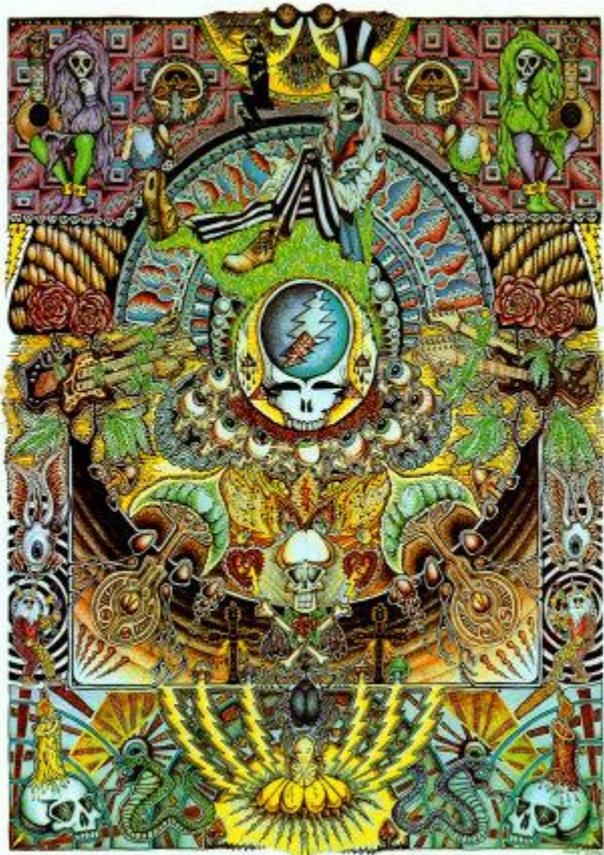
- Increase central nervous system activity and speed up body functions; arousal response
- Nicotine
  - Euphoria, triggers epinephrine and norepinephrine release
  - Suppresses hunger and increases alertness
  - Mimics ACh, moderate dependence
  - Withdrawal leads to insomnia, anxiety, irritability and weight gain
- Cocaine
  - Fast euphoria – fast crash
  - Block dopamine reuptake (indirect agonist)
  - HIGHLY addictive
  - Withdrawal leads to fatigue, irritability, increased appetite, depression

# Stimulants

- Methamphetamine
  - Euphoria, triggers release of dopamine
  - Irritability, insomnia, seizures, depression, violence, psychosis
  - Stimulates dopamine and norepinephrine release
  - HIGHLY addictive
- Ecstasy (MDMA)
  - Stimulant and mild hallucinogen
  - Triggers release of serotonin and prevents its reabsorption
  - Destroys serotonin-producing neurons – permanent depression
  - Suppresses immune system



# Hallucinogens



- Drugs that alter perceptions of reality and distort sensory and perceptual experiences
- LSD (lysergic acid diethylamide)
  - Derived from fungus ergot
  - Abbie Hoffman, Timothy Leary
  - Hours of mild euphoria, hallucinations, sensory distortion, and “mind expansion”
  - Not physically addictive, but can produce “bad trips” and flashbacks
  - Unknown NTS link

# Hallucinogens

- Marijuana (THC)
  - Several hours of euphoria, relaxation, hallucinations
  - ALSO a stimulant at higher doses/depressant at lower doses
  - Low physical addiction/moderate psychological addiction
  - Activates receptors for cannabinoids (agonist)
  - Impairs motor skills and perception, may trigger paranoia, disrupts memory, shrinks brain, intensifies sensory experiences

# Influences on Drug Use

- **Biological Influences**
  - Hereditary tendencies: twin and adoptive studies
  - Dopamine deficiencies may provoke usage
  - Self medicating for biologically-based disorders?
- **Psychological Influences**
  - Feeling life is meaningless
  - People under stress or experiencing depression
- **Social Influences**
  - Peer pressure
  - Teenage rebellion and thrill-seeking
  - Seeking social networks with similar interests can perpetuate usage or help to quit