Chapter 6
Consciousness
What’s It For? The Value of Consciousness

- Setting Priorities for Mental Functioning
- Sleeping and Dreaming
- Altering Awareness: Psychoactive Drugs
- Altering Awareness: Induced States
Attention: Learning Goals

1. Define attention and discuss its adaptive value.
2. Explain how experiments on dichotic listening can be used to study attention.
3. Describe automaticity and its effects on awareness.
4. Describe such disorders as visual neglect and attention deficit/hyperactivity disorder.
Attention: Overview

• Internal processes used to set priorities for mental functioning
  – Selective; reflects limitations on how much the brain can process at one time
• Prioritizing is adaptive
  – Make best use of limited cognitive resources
  – Focus on most relevant information
Experiments on Attention: Dichotic Listening

• Technique where different messages are presented simultaneously to each ear
  – Task: Repeat (shadow) one message, ignore the other

• Unattended message: Little is remembered
  – However, some processing does occur:
    • Cocktail party effect
    • Treisman’s “ear-switching” experiment
Attended Channel

“Four-score and seven years ago our fathers ...”

Unattended Channel

“When asked the question, ‘what is consciousness?’ we become conscious of consciousness ...”
Attended Channel
“Against the advice of his broker, the little lamb bounded into the field.”

Unattended Channel
“Released from his cage the naive investor panicked.”
Processing without Attention: Automaticity

• Fast and effortless processing that requires little or no focused attention

• When a process is more automatic, the less likely you are to be consciously aware of it
  – Automaticity “frees up” resources for more demanding tasks

• What about subliminal influences?
  – Controlled studies show little or no effect
Disorders of Attention: Visual Neglect

• Tendency to ignore things on one side of the body (usually left)
  – Results from damage to right parietal lobe
  – Symptoms may include: reading only one side of a page, dressing one side of body

• However: Some information from neglected side does get through
Disorders of Attention: Attention Deficit/Hyperactivity Disorder

• Disorder marked by difficulties in concentrating, sustaining attention for extended periods
  – Sometimes, but not always, associated with hyperactivity

• Some debate about definition, brain areas that are involved, overdiagnosis
  – Treatable with medication and/or training
Sleeping and Dreaming: Learning Goals

1. Define biological rhythms and discuss how they are controlled.
2. Describe the various stages and characteristics of sleep.
3. Discuss the function and adaptive significance of sleep.
4. Discuss the function of REM sleep and theories of dreaming.
5. Describe the various sleep disorders.
Biological Rhythms

• Example: Regular daily transition from waking to sleep
  – Circadian rhythms: Activities that rise and fall along a 24-hour cycle

• Biological clocks: Structures that control biological rhythms (e.g., suprachiasmatic nucleus in hypothalamus)
  – Environment synchronizes these
  – Light is particularly important
Studying Sleep: EEG Recordings

• Short for electroencephalograph
• How they are collected:
  – Electrodes pasted to scalp (painless)
  – Changes in electrical potentials of brain cells recorded in the form of line tracings
    • Also called “brain waves”
• EEGs reveal regular, cyclic changes in brain activity during sleep
Stages of Sleep

• Stage 1: Theta waves appear
  – Light sleep; person may claim to still be awake

• Stage 2: Sleep spindles, K complexes
  – Person definitely asleep but may respond to some events, such as noises

• Stage 3 and Stage 4: Delta activity
  – Very deep sleep; nonresponsive to most stimuli and slow to awake
<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
<th>EEG Traces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awake</td>
<td>Fast, random, low voltage</td>
<td>![Awake EEG]</td>
</tr>
<tr>
<td>Drowsy, Relaxed</td>
<td>Alpha waves</td>
<td>![Alpha waves]</td>
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<tr>
<td>Stage 1 Sleep</td>
<td>Theta waves</td>
<td>![Theta waves]</td>
</tr>
<tr>
<td>Stage 2 Sleep</td>
<td>Sleep spindles, K complexes</td>
<td>![Sleep spindle, K complex]</td>
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<tr>
<td>Stage 3/Stage 4 Sleep</td>
<td>Slow-wave sleep</td>
<td>![Delta activity]</td>
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<tr>
<td>REM Sleep</td>
<td>Fast, random</td>
<td>![Sawtooth waves]</td>
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REM Sleep

• Begins 70-90 minutes into the sleep cycle
• Changes in physiological pattern including increased heart rate, darting eyes, twitching
• EEG: Resembles waking state
• Dreaming:
  – Most people awakened during REM report dreaming
  – Might dream during some non-REM sleep
The Sleep Cycle

- Cycle through stages, in order, 4-5 times a night
- REM interspersed with other stages
- About 90 minutes per cycle
  - Time in each stage varies
  - REM dominates later stages, especially right before waking
The Function of Sleep

• No one knows exactly why we sleep
• Several hypotheses:
  – Repairing/restoring: “Down time” helps repair normal wear and tear on body and brain
  – Survival value: Stops us from going out when low light puts us at risk for predators
Sleep Deprivation

• In humans: Severe sleep deprivation hurts virtually all aspects of functioning, especially complex tasks
  – Contributes to accidents

• In animals:
  – Internal functions such as temperature can’t be regulated; weight loss; immune system and organ failure, even death, may result
The Function of REM and Dreaming

• Lost REM tends to be made up the next night
  – REM rebound

• Traditional view: Wish fulfillment
  – Associated with Freud
  – Way to symbolically act out wishes, desires
    • Manifest content versus latent content
  – But: Little evidence for this view, and symbolism can be very subjective
Alternative Views of Dreams

• Activation-synthesis hypothesis: Dreams are the brain’s attempt to make sense of random patterns of neural activity
• Explains physiological basis for bizarre dream imagery, but difficult to test
• Other possibilities
  – Problem solving
  – Practice responses to threats from the environment
Disorders of Sleep: Dyssomnias

- Dyssomnias - disorders of amount, timing, quality of sleep
  - Insomnia: Difficulty initiating or maintaining sleep (15%-30% of population)
    - Many causes
      - Hypersomnia: Chronic excessive sleepiness
        - One cause is sleep apnea
      - Narcolepsy: Sudden extreme sleepiness
        - Rare
Disorders of Sleep: Parasomnias

- Parasomnias: abnormal disturbances occurring during sleep
  - Nightmares: Frightening dreams occurring primarily during REM sleep
  - Night terrors: Sleeper awakens suddenly in an extreme state of panic
  - Sleepwalking: Sleeper rises during sleep and wanders about
  - Night terrors and sleepwalking happen during non-REM sleep, decrease with age
Psychoactive Drugs: Learning Goals

1. Compare neurotransmitters with psychoactive drugs.

2. Discuss the different categories of psychoactive drugs, with examples of each.

3. Discuss the psychological factors that influence the effects of psychoactive drugs.
Drug Actions and Effects

- Psychoactive drugs: Drugs that affect behavior and mental processes through alterations of conscious awareness
- Work mainly by changing communication channels of neurons
  - May mimic neurotransmitters
    - Example: Nicotine
  - May depress or block the action of neurotransmitters
    - Example: Some sleeping pills
What Can Happen With Repeated Use

• Tolerance: Body adapts to compensate for continued use -- increasing amounts are needed to produce the same effects

• Drug dependency: Condition in which an individual experiences physical or psychological need for the drug
  – With physical dependency: Withdrawal may result
    • Physical reactions when a person stops taking the drug
Categories of Psychoactive Drugs

• Depressants
  – Slow the activity of the central nervous system (CNS)
  – Examples: Ethyl alcohol, barbiturates, tranquilizers

• Stimulants
  – Increase activity of the CNS
  – Examples: Caffeine, nicotine, amphetamines, cocaine, MDMA (Ecstasy)
Categories of Psychoactive Drugs, continued…

• Opiates
  – Depress CNS activity, reduce pain, and produce euphoria
  – Examples: opium, heroin, morphine

• Hallucinogens
  – Affect perception, distort idea of reality
  – Examples: LSD, mescaline, psilocybin, marijuana
Psychological Factors

• Same amount of same drug may produce different effects on different people
  – Example: One person might feel euphoria, another fear

• Factors that can influence the effect:
  – Setting
  – Past experience with the drug
  – User’s physical, psychological state
Induced States: Learning Goals

1. Describe the physiological and behavioral effects of hypnosis.

2. Discuss whether hypnosis can be used effectively to enhance memory.

3. Describe the dissociation and role-playing accounts of hypnosis.

4. Describe the physical, behavioral, and psychological effects of meditation.
The Phenomenon of Hypnosis

• What it is: Any form of social interaction that produces a heightened state of suggestibility in a willing participant
  – Induced by various means

• What it isn’t
  – A deep sleep
  – Something that happens only to weak-willed people
Possible Effects of Hypnosis

• Respond to commands in ways that seem automatic, involuntary
  – Can include suggestions to stop certain behaviors such as smoking
• Anesthesia
• What about memory enhancement?
  – Little evidence for this
  – Memories may actually be fabricated
Explaining Hypnosis

• Hypnotic dissociations: Consciousness splits into multiple forms of awareness

• Social role playing: Hypnotized person conforms to what he or she expects will happen
  – Like acting out a role
  – “Simulated subjects” often produce the same phenomena as hypnotized people
Meditation

- Technique for self-induced manipulation of awareness, often used for the purpose of relaxation and self-awareness
  - Goal may include relaxation, focused concentration, clear thoughts
- Can produce physiological changes, such as lowered blood pressure, EEG changes
- Does have some beneficial psychological effects