

Psychology - Modules 6 Notes

Module 6: States of Consciousness - Top Hat Notes

Learning Objectives:

- Describe the differences between passive versus active attention, as well as selective versus divided attention.
- Name and describe conditions and disorders related to attention and consciousness, including visual neglect, attention deficit hyperactivity disorder (ADHD), and the experiences of split-brain patients.
- Describe the various stages of sleep and how they are examined using electroencephalographic recordings.
- Understand the functions of sleep and the hypotheses that attempt to explain why we sleep and dream.
- Name and describe various sleep disorders, including dyssomnias and parasomnias.
- Understand how depressants, stimulants, and hallucinogens act in the brain chemically to produce altered states of consciousness.

6.1 Introduction: What Is Consciousness?

- General intuitive feeling that something immaterial animates us (soul/spirit)
- Self awareness is what makes humans unique
- Study of consciousness = rooted in philosophy and psychology
 - Direct relationship between workings of brain + experience of feeling, acting, thinking
 - Eg: taking drugs can alter subjective awareness / bump on head = personality change
- A lot of processes requires to create conscious perception
 - All our experiences = interactions between cells in the head → humans found ways to draw direct lines between events occurring in the brain and experience of conscious awareness

6.1.1 Learning from People with Split-Brain

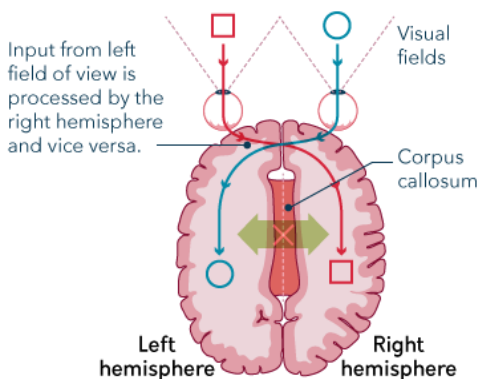
- Phenomenon called split brain: type of surgery that cuts the connections between the two hemispheres of the brain.
 - Surgery severs large band of axons that connect the two hemispheres (corpus callosum: The band of axons that connects the two hemispheres of the brain)
 - Initial purpose: reduce frequency/severity of seizures associated w/ epilepsy
 - Consequence: two hemispheres unable to share information across cortex (brain side that deals with perception are isolated from brain involved w/language)

- Good news: surgery successful in reducing seizures
- When parts of brain can no longer communicate = awareness of behaviour is altered
 - First things patients notice after surgery is: left side of body acts on its own
 - The left hand may put down a book that the individual is reading with interest. Gazzaniga suggests that it is possible that because the right hemisphere cannot use language, it cannot understand the contents of the book and becomes bored looking at the pages. The left hand might wave (or make a rude finger gesture) without the "control" of the individual. One case involved a man who was attempting to hit his wife with his left hand while trying to protect her with his right.
- Brain's split into two hemispheres means some abilities process more on one side than the other; called hemispheric specialization: Refers to the idea that the two hemispheres in your brain (right and left) have different functions
 - If message is sent to a sensory system on right side (right eye) message will travel through diff pathways to reach contralateral left hemisphere
 - If message is sent to left visual field, it would travel to right occipital lobe
 - Temporal lobe: (left) location of important language-related structures
 - Patients fully aware of message received from sensory system

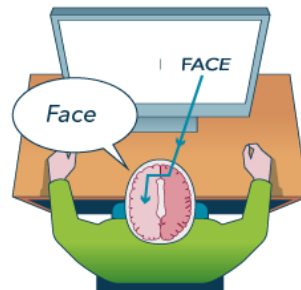
Of Two Minds

Experiments with split-brain patients have helped to illuminate the lateralized nature of brain function.

Split-brain patients have undergone surgery to cut the corpus callosum, the main bundle of neuronal fibres connecting the two sides of the brain.

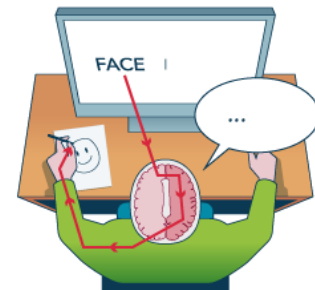


A word is flashed briefly to the right field of view, and the patient is asked what they saw.



Because the left hemisphere is dominant for verbal processing, the patient's answer matches the word.

Now a word is flashed briefly to the left field of view, and the patient is asked what they saw.



The right hemisphere cannot share information with the left, so the patient is unable to say what they saw, but they can draw it.

- Nature of conscious experience: if conscious awareness can be altered, experience of consciousness is product of the brain

6.1.2 Components of Consciousness

- Philosopher Dan Dennet, examines nature of consciousness = consciousness is result of several processes in brain that operate independently + interact when a task arrives that demands their cooperation
 - Challenge: each person has experience of own existence
- Two components of conscious experience:
 - 1: conscious content - the subjective experiences of your internal and external world.
 - Sense of self, plans, dreams, day-to-day perceptions
 - Heavily dependant on state of consciousness
 - 2: states of consciousness - refer to the different levels of arousal and attention an individual can experience
 - Experience of particular state of consciousness = based on several processes

1. **Question:** Which of the following would not be considered part of consciousness?

1A. **Answer:** The signals from your brain telling your heart to beat

Explanation: Consciousness can refer to many different levels of awareness.

2. **Question:** If Sally is currently worrying about all the things she needs to do during the day, it is most likely that a psychologist would say these thoughts are part of her _____.

2A: **Answer:** Conscious content

Explanation: If I showed a person with split brain an image of a Car on the right and an image of a Dog on the left, I should expect that (select all that apply)

3. **Question:** If Sally is currently worrying about all the things she needs to do during the day, it is most likely that a psychologist would say these thoughts are part of her _____.

3A: **Answer:** This person could name the car. This person could draw a dog with their left hand and not know why.

Explanation: Because information presented to the right ear is processed by the left half of the brain (and vice versa), and only the left half of the brain is consciously aware of verbal information, asking in the right ear results in dancing and conscious knowledge of the request. Asking in the left ear results in dancing without conscious knowledge of the request.

6.2 Attention

6.2.1 What Is Attention?

- A lot of info entering brain at every moment = necessary for brain to prioritize some information
 - Attention: the process of selecting information from the internal and external environments to prioritize for processing
 - Can be involuntary and automatic = passive attention (Occurs when attentional priorities are set by bottom-up information from the environment) *BOTTOM-UP*
 - Eg: hear a strange noise and get up to investigate
 - Active attention: directed by goals and top-down processing (Occurs when attentional priorities are set by the top-down goals of an individual) *TOP DOWN*
 - Eg: trying to find your keys on a cluttered table
- Some features of world receive more priority, while some can be missed
 - Attention is often directed based on instructions given by experiment, but in real world = attention is directed by individuals goals, state of mind + expertise
- Best Definition: The internal process that selectively sets mental priorities for processing," encompasses all forms of attention.

Match the term to its correct definition.

Drag and drop options on the right-hand side and submit. For keyboard navigation...

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| | | |
|-------------------|---|--|
| Passive attention | ≡ | Susan is reading a book when she suddenly notices a mosquito buzzing by her ear. |
| Active Attention | ≡ | Julio is trying to locate the amygdala while looking at an image in his psychology textbook. |

Explanation



Passive attention happens without active thought (as in Susan's case), while active attention requires effort.

6.2.2 Selective Attention

- Two: selective + divided attention
 - 1. selective attention = form of attention that occurs when a person attends to some information while ignoring other information.
 - Some features of environment are more relevant than others which is why they are more noticeable based on their qualities
 - Eg: bright light in dim place is more noticeable
 - Low level properties: stimulus salience = refers to the idea that some stimuli in the environment capture attention by virtue of their physical properties → BOTTOM UP qualities of scene = influence how we direct attention → colour of object/loudness capture attention first
 - When attention diverted because of salience of a stimulus = attentional capture - occurs when attention is diverted because of the salience of a stimulus.
 - Role of TOP-DOWN processes: humans are better able to give awareness to more important features and prioritize them over the ones that are less relevant
 - Evidence says: certain types of stimuli processed more effectively = relevance to evolutionary past - eg: stimuli that respond to threat
 - Selective attention becomes more better if we become proficient at a skill: eg driving on road with music playing
 - Cocktail party effect: Describes a situation associated with selective attention. At a party, a person can be engaged in a conversation and suppress/ignore all the information going on around them and attend to the conversation
 - If someone were to say your name you would turn around because you reorient your attention to respond
 - Something that is of relevance = you shift attention
 - Common measure of this effect = dichotic listening task
 - In this task, participants are asked to wear a pair of headphones that will play one message in one ear and a second, different, message in the other (see Figure 6.7). Participants are asked to attend to and repeat one message and ignore the second. It should not surprise you that participants

generally have very little trouble completing this task. Moreover, participants have a fair amount of difficulty reporting details of what occurred in the unattended ear.

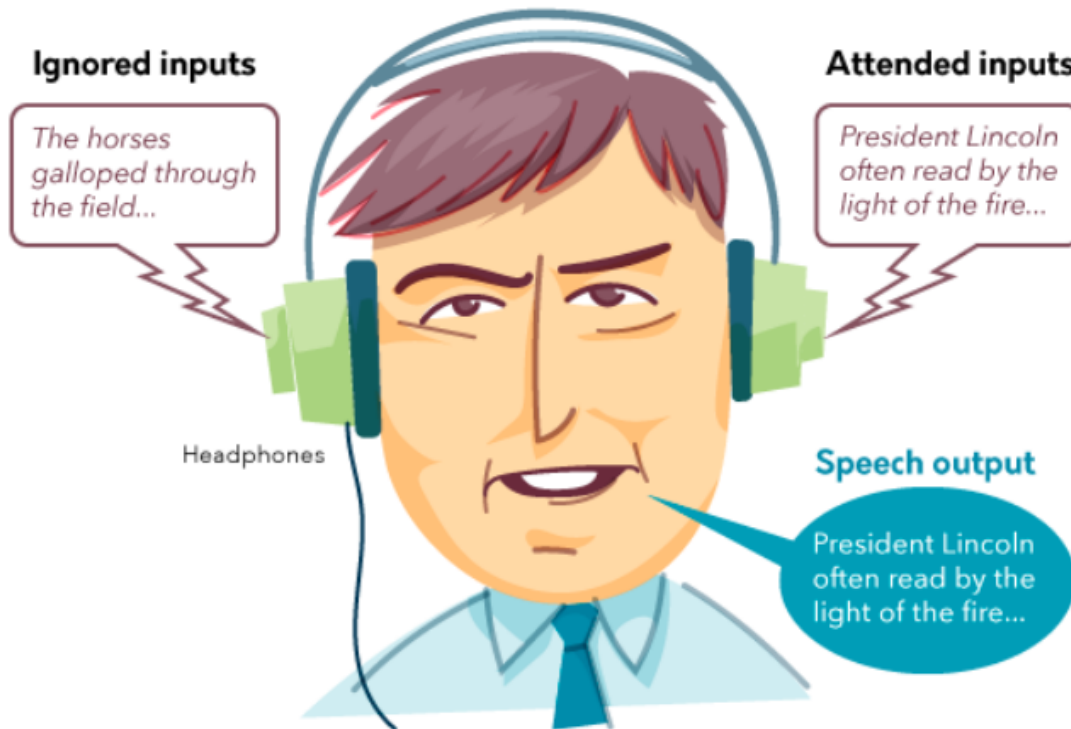


Figure 6.7: In a dichotic listening task, two messages are played, one in each ear. Participants are asked to listen and repeat only one message.

- Data from dichotic listening: an attention task where one stream of information is presented to one ear, and a different message is played in the other ear. The participant is asked to attend to only one message. Later the participant is asked information about the unattended message
 - Process is not just as simple as blocking out info, info can later be recalled
 - Participants able to identify if voice switches from male or female

4. **Question:** Imagine you are a participant in a dichotic listening task; which of the following stimuli are you most likely to notice in your unattended ear?

4A: **Answer:** If the speaker were to say your name.

Explanation: Your name is something you have learned over the course of your life to pay close attention to! Even when busy with a dichotic listening task (or imagine yourself talking to someone in a crowded room) --

we still notice our names when they are said in the other ear (or in the room around us).

5. **Question:** Jett can focus on his mother talking over the sound of the TV playing in the background. Which of the following does this best illustrate?

5A: **Answer:** Selective attention.

Explanation: Jett is focusing his attention selectively on one thing (his mother's voice) at the exclusion of others (the TV).

6. **Question:** Lizeth was at a party talking to a friend. Although many people were talking, she was able to tune out all the noise from the party and pay attention to her friend. This is known as _____.

6A: **Answer:** Cocktail-party effect.

Explanation: The "cocktail party effect" describes any time you can focus on a conversation in a small group when other distracting events and conversations are going on around you.

7. **Question:** People often look at the brightest or most colorful parts of an image first. This idea is known as _____ and it is a _____ process.

7A: **Answer:** stimulus salience; bottom-up

Explanation: Stimulus salience describes how "attention grabbing" something is, and this is a basic feature of an object related to bottom-up processing -- no prior experience or thought necessary.

8. **Question:** Phillip participated in a study in which he was asked to listen to two messages on a set of headphones. One message was played to his left ear and the second was played to his right ear. He was asked to repeat the information that he heard in his right ear. Which task/test did he participate in?

8A: **Answer:** A dichotic listening task

Explanation: Dichotic listening tasks present two different messages to a person simultaneously, and they must shadow one of these messages at the exclusion of the other.

9. **Question:** Javier was talking to a friend in class while the teacher was talking. He found that he was able to ignore his professor and listen to his friend rather easily. This process best illustrates _____. Select all that apply.

9A: **Answer:** the cocktail party effect + the principles of selective attention

Explanation: The general phenomenon is called selective attention; the name of a scenario like this is called the cocktail party effect.

6.2.3 Divided Attention

- divided attention: occurs when a person engages in two or more tasks at once (multitasking)
 - Talking to your friend in the car while also driving
- Experience contributes to ability to complete divided attention tasks + more proficient → automatic (overtime skill will be accomplished without awareness)
- Automaticity: refers to fast, effortless processing of information without conscious thought → walking and talking without thinking of the physical demands
 - automatic : when performance is not impaired by other tasks = attention frees up after automatically so you focus on other features of environment
- Driving while texting = bad, dangerous etc, even though driving is automatic, variable experiences can hold real consequences
 - Traffic accidents using phone = 4x, similar to accident rate with blood alcohol level above legal limit
 - Using phone when driving: participants miss pedestrians, traffic signals etc, make more mistakes

10. **Question:** Selma is typing her notes into a shared Google Doc for class when her roommate asks her what time the gym closes. If Selma is able to continue typing her notes while answering the question, which of the following is/are likely to be true? Select all that apply.

10A: **Answer:** Selma might make an error while typing + Selma has achieved automaticity while typing

Explanation: Selma achieving automaticity means that the skill (typing) takes up very little attention on its own. However, mistakes are often made when too few attentional resources are used for complex tasks.

11. **Question:** Elaine was playing the piano when her little sister asked her how to spell "Albuquerque." Elaine was able to think through the complicated spelling without stopping her piano practice. This suggests that, for Elaine, which of the following is true?

11A: **Answer:** Piano playing has become an automatic process.

Explanation: The hallmark of an automatic process is being able to complete it while your attention is divided; being able to play the piano while completing a spelling task shows that Elaine's piano-playing is automatic.

6.2.4 Inattentional Blindness and Change Detection

- Refers to the tendency to miss changes to some kinds of information when your attention is engaged elsewhere = inattentional blindness
 - Engaged in one task and completely miss other info

Q: Justine and Kaylie have recently moved to a new town and are trying to locate the store. The phone is giving them directions while Justine drives. While Justine is busy paying attention to the street names, she completely misses the light changing from green to red and runs the stop light. This best illustrates the concept of **inattentional blindness**.

- Den Dettmer created a common methodology: flicker task -a change attention task used to study intentional change detection and inattentional blindness.
 - Flicker task = change blindness
 - Dichotic listening task: selective attention
 - Driving task: divided attention
- Experiments that use flicker tasks = intentional change detection: an attention task that requires the participant to actively search for a change made to the stimulus.
 - Common tools to study selective attention, flicker task used to measure change detection
 - People are quicker at identifying changes to animate stimuli vs. inanimate stimuli = degree of processing prioritizes attention to specific objects
- Continuity errors: mistakes made in filmmakers movies
- Second component of information = inhibition: the process of actively reducing processing of some information while the brain attends to a specific task

6.2.5 Subliminal and Subconscious Messages

- 1. subliminal stimulus: sensory stimulus that is processed, but does not reach the threshold for conscious perception
- Understand the difference between subconscious processing and subliminal processing: subconscious processing:
 - 1. Subconscious processing: occurs when we are aware of information from the environment but are not aware that it is influencing our behavior
 - 2. Subliminal processing: information we do not consciously detect, even upon looking for it
 - subvisual messages: visual images that are presented too quickly for the brain to perceive in conscious awareness
 - subaudible messages: auditory messages that are played too quietly or in such a way that the brain cannot be consciously aware of the content
- Studies conducted on subliminal messages shows that messages have no effect on behaviour

- Overall, subliminal messaging isn't very effective at getting us to do things or improve our abilities

12. **Question:** You are having a “Pirates of the Caribbean” marathon with several friends. Early in the first movie, while Jack Sparrow (played by Johnny Depp) and Will Turner (played by Orlando Bloom) engage in a sword fight, a small tattoo with Elven writing is visible on Orlando Bloom’s wrist. Orlando Bloom got this tattoo to commemorate his role in Lord of the Rings, but it should have been edited out of the movie. Which of the following are true? Select all that apply.

12A: **Answer:** Your inability to detect this tattoo is best explained by intentional blindness + Someone who is an avid fan of Johnny Depp, in general, would be less likely to notice the tattoo.

Explanation: Inattention blindness -- not change blindness -- explains a person's failure to notice it because the average person is not actively looking for it. (If you were actively looking for it and still missed it, this would be change blindness instead). Fans of Depp are paying attention to Depp and not Bloom, and are therefore less likely to notice it. Fans of Bloom would be more likely! Fans of Tolkein would also be more likely to notice it, not less.

13. **Question:** Diana is participating in an experiment where she is to look at two images and try to find 10 differences between them. It is most likely that this experiment can be considered to be _____.

13A: **Answer:** an intentional change detection task

Explanation: Because she is intentionally looking for changes, this is an intentional change detection task.

6.2.6 Attention Disorders

- Attention + content of consciousness = linked
 - Regions of brain that facilitate attention if damaged work different
 - Such as deficiencies in attention

6.2.6.1 Visual Neglect

- Patients with damage to lesions on parietal lobe of cortex = lose awareness of visual stimuli on left
 - Late processing of dorsal visual system travels to inferior parietal lobe = helps identify location of visual stimuli → patients still able to report details of colour/form
 - Intact what system is still evaluating components of whole message, despite the patients unawareness

- Info is not brought to conscious awareness = visual stimuli in neglected region can still impact behaviour
 - House experiment, showed a burning one and then asked which one would you rather live in = Stimuli in the neglected field can influence behavior even if they are not consciously aware of it

6.2.6.2 Attention Deficit Hyperactivity Disorder (ADHD)

- ADHD = one of the most common diagnosed psychological problems = disruptive to normal development
- Behaviours associated with ADHD include 9 individual measures of attention + 9 diff behaviours associated with hyperactivity
 - Individuals need 6 or more such as impulsivity, poor planning, hyperactivity, etc
- Behaviour must occur to a degree that they impair child's ability to function normally
- Children w/ ADHD show deficits on neuropsychological testing = poor academic performance + social problems
- Genetics may influence expression of disorder
 - Symptoms similar to those produced by damage to prefrontal cortex
 - ADHD heritability = 75% - 91%
 - Medicine such as adderall can improve concentration
 - Therapies to help children exist to reward desired behaviour and ignore undesired behaviour
 - The main feature of ADHD is difficulty focusing attention

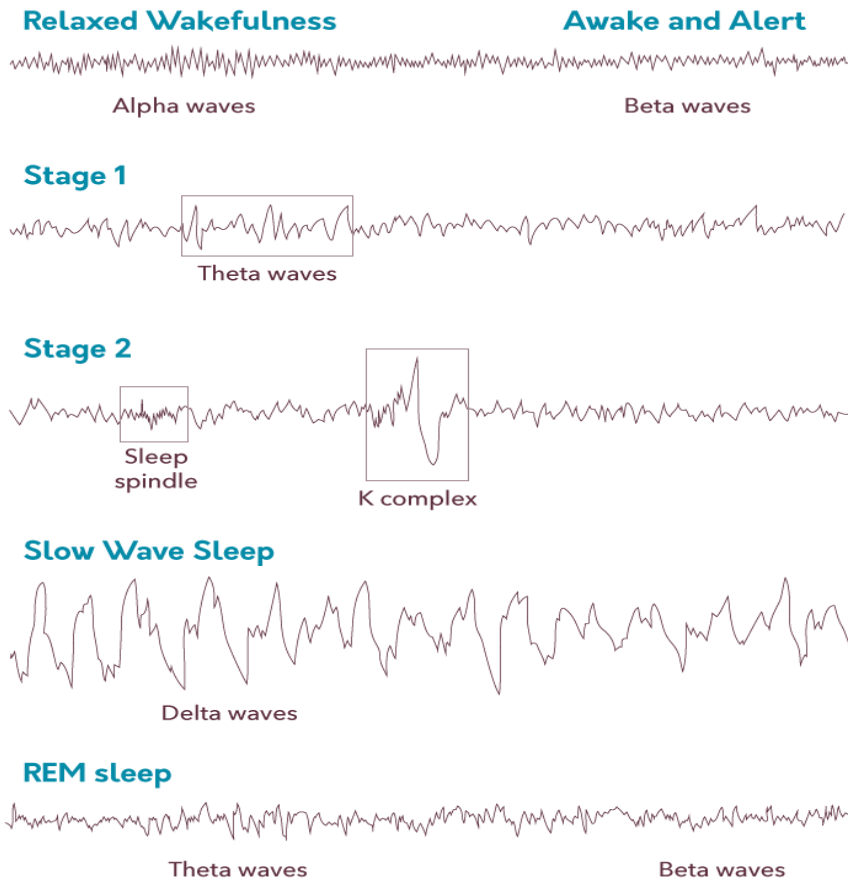
6.3 Sleep

- Altered state of consciousness
- Brain is very active during sleep
 - Besides balance, sleep is important to sensations for functioning
 - Sleep is critical for health + life
 - Disorder: fatal familial insomnia - A rare, genetic disorder affecting the thalamus, that causes individuals to die from lack of sleep
 - As it progresses, insomnia is accompanied by weight loss + inability to maintain homeostasis = death comes within 12-18 months
- Sleep lab: watch brain as someone sleeps - takes large number of recordings
 - Tool 1: electroencephalogram (EEG) -a device that measures the sum of electrical activation across the surface of the cortex.
 - Tool 2: electrooculogram - a device used to measure eye movements.

- Tool 3: electromyograms - device used to measure muscle tension around the jaw.
- Through observation brain is highly active when we sleep

6.3.1 Stages of Sleep

- Several distinct + predictable changes in brain throughout course of night



- Three features of interest:
 - Frequency of waves: measured in Hz
 - Heights (amplitudes): differ in stages of sleep
 - Pattern of activity: difference in stages
 - Regularity of wave: consistent or erratic wave is
 - Eg: slow-wave sleep as consisting of regular, high-amplitude waves that occur at a rate of less than 3.5 Hz
- While person is awake: two distinct, observable patterns to brain activity

- 1. When you are alert and engaged: beta waves - Brain waves that appear on an EEG when a person is alert and actively processing information. They also appear during REM sleep
 - Irregular, mostly low-amp, 13-30 Hz
 - Desynchronized: many diff neural circuits in brain actively processing info
- 2. Alpha activity: This brain pattern is observed when an individual is awake but relaxed. The waves themselves look far more regular and predictable and occur at 8–12 Hz. These regular, medium-frequency waves occur when a person is quietly resting and not thinking about anything too difficult or taxing.
- Transition from relaxed state → early stages: transitions from alpha waves to theta waves
 - Alpha: Brain waves that appear on an EEG when a person is relaxed
 - Theta waves: Brain waves that appear on an EEG when a person is deeply relaxed or falling asleep, although they are present throughout the sleep cycle.
 - Begin to move from a state of relaxation to early sleep = firing rate across the cortex becomes more synchronized.
 - very light stage of sleep; if startled or awoken, most people report that they were not even sleeping
- Transition from stage 1 → stage 2: appearance of sleep spindles + K-complexes
 - Theta activity, waves are irregular
 - Sleep spindles: Brief bursts of activity that occur 2-5 times per minute during Non-REM sleep - 12-14 Hz = play role in memory consolidation + higher scores on IQ tests
 - K-complexes: pattern of neural excitation followed by neural inhibition occurring during stage 2 sleep.
 - Only occurring during stage 2 once a min
 - Can be triggered by noise
 - Wave is larger period of coordinated excitation → neural inhibition
 - You are sound asleep = if awoken, you would have sense you were not asleep at all
 - These waves prepare the brain to enter delta wave activity: Brain waves that appear on an EEG when a person is deeply asleep. These waves occur during stages 3-4 (also known as slow-wave sleep)
- After 15 mins of stage 2 → slow-wave sleep (A broader name for sleep occurring in stage 3-4. During this stage, recordings on EEG show delta waves)
 - Firing across cortex - coordinated + transition to delta activity
 - Delta: regular, high-amp waves, slow 4Hz

- Slow sleep = deepest stage of sleep = strong stimulus will wake you meaning you will be groggy
- STAGES 1,2 + SWS = NON-REM SLEEP
- 45mins + = slow wave sleep, brainwaves change dramatically → REM (A stage of sleep where narrative-based dreaming occurs. During this stage, EEG recordings become highly irregular, and the sleeping person's eyes will move from side to side rapidly)
 - Desynchronized beta waves appear on EEG, eyes shift beneath eyelids
 - Brain is highly active
 - Body is quite still
 - We become paralyzed during REM sleep = rem sleep antonia
 - Easier to wake up than SWS
 - REM = vivid, dreams → psychoanalyst we recall occur here
 - Blood flow is reduced, but visual association cortex + prefrontal cortex receive large proportion of oxygenated blood
- After REM → brain returns to stage 1 sleep + cycle repeats
 - Hypnogram: graphic depiction of a person's progress through the stages of sleep over the course of a night.

14. **Question:** If Malcolm is dreaming that he is a knight riding a fire-breathing doughnut through a tunnel of Cheerios, which of the following can we also assume? Select all that apply.

14A: **Answer:** Messages sent from Malcolm's brain to his body would be reduced + Malcolm's EEG would most likely reflect beta activity.

Explanation: Because Malcom is dreaming, he is most likely experiencing REM sleep. Beta and theta activity are common in this stage, as is a reduction in signals sent from the brain to the body.

15. **Question:** If you are looking at an EEG of a participant in stage 2 sleep, which of the following would you expect to encounter? Select all that apply.

15A: **Answer:** Sleep spindles + K-complexes + theta waves

Explanation: Sleep spindles and K-complexes are far more common, but theta wave activity is still present although typically irregular.

16. **Question:** A person who is difficult to wake and is groggy and confused upon waking was most likely in _____.

16A: **Answer:** Slow wave sleep

Explanation: Slow-wave sleep is the deepest stage of sleep, and only strong stimuli will wake a person in this

stage.

- Theta waves begin in Stage 1 as brain activity begins to synchronize, followed by sleep spindles and K-complexes in Stage 2. Delta activity is characteristic of slow-wave sleep, with REM returning to desynchronized theta activity with additional blood flow to the visual association cortex.

6.3.2 Functions of Sleep

- Prolonged periods of sleep deprivation = confusion, slurred speech, irritability etc
- Restorative abilities during sleep, = resting the brain → cognitive abilities are enhanced
- Sleep is important for cognitive functioning

6.3.2.1 Functions of Slow-Wave Sleep

- One night of sleep deprivation may not impede performance on physical tasks however cognitive function was different
- During SWS: metabolic rate + blood flow to cortex decline vs. when awake
 - Regions have highest acidity during waking hours = greatest reduction in metabolic activity + most delta activity during slow-wave sleep = brain is resting

6.3.2.2 Functions of REM

- rebound phenomenon suggests there is a need for a certain amount of REM
- During periods of intense brain development = increase in percentage of time spent in REM
- Sleep is important for consolidation long-term memories

6.3.3 Dreams

- We are unaware of the content of the unconscious
- Identifying messages seen in dreams = common patterns of anxiety, childhood trauma, etc
- Problems: individuals do not always remember dream, limited evidence that symbols from dreams translate between conscious + unconscious processes
- We also experience dreams NON-REM = nightmares during slow-wave
- activation-synthesis hypothesis: hypothesis about dreaming that suggests that dreams do not serve a purpose, but rather are the consequence of other processes that occur during sleep.
- evolutionary hypothesis of dreams: hypothesis about dreaming that suggests that dreams have biological significance.

17. **Question:** Imagine you are preparing to take a history exam. Based on what you know about sleep, it is probably in your best interest to follow which plan of action?

17A: **Answer:** Be sure to get plenty of slow-wave sleep; REM sleep is less important in this case.

Explanation: While REM is important (for the consolidation of skills), slow-wave sleep seems to be most important for maintaining explicit memories.

18. **Question:** Katerina will be trying out for her college basketball team tomorrow. She has been practicing a new technique to approach the basket to set up her shot. According to research, before she tries out, it would be in her best interest to do which of the following?

18A: **Answer:** Make sure she gets REM sleep before tryouts.

Explanation: The REM phase is most important for the consolidation of skills, of which basketball is one.

19. **Question:** Maggie has been having a terrifying reoccurring dream that the genetics lab on campus released several super-sized tigers on campus, and they are chasing her. If you were to use an evolutionary hypothesis of dreams to understand her experience, you would point out that which of the following is true?

19A: **Answer:** It is typical to dream about threats that were relevant in our ancestral past, such as threats of predation.

Explanation: Predation is an example of an ancestral threat, which dreams may have evolved to help us model how to solve.

6.3.4 Disorders of Sleep

- Two categories:
 - Dyssomnias: quality of sleep
 - Parasomnias: disturbances that occur

6.3.4.1 Dyssomnias

- Insomnia: The inability to fall asleep or stay asleep.
- sleep hygiene: series of behavioral practices that promote the ability to fall and stay asleep.
-

6.5 Summary

In this chapter, you learned:

- Consciousness is referred to as having content (your immediate subjective experience) and state (the level of arousal and attention you are currently able to bring to bear on a situation).
- Split-brain patients illustrate how our brains have a hemispheric specialization, with the left hemisphere responsible for much of what we would consider conscious verbal thought.
- Attention can be either active or passive, referring to directed goal-driven (top-down) efforts to process the environment and the ability to respond to demanding characteristics of the environment (bottom-up efforts), respectively.
- When something captures attention because it influences our bottom-up passive attention system, this is due to stimulus salience: bold text, sudden loud noises, and contrasting “popping” colors are examples of this phenomenon.
- Selective attention occurs when resources are devoted to processing one piece of information about the environment at the expense of other information and can lead to us “missing” information in the environment because we did not process it effectively.
- Dichotic listening is an example of a selective attention task in which you attend to information presented to one ear and ignore information presented to the other; some of the unattended information can be consciously processed, however, such as when you hear your name in a crowded room.
- Divided attention occurs when two (or more) things in your environment must be done or processed simultaneously; people typically perform poorly in these situations unless one of the tasks is automatic (requiring little processing effort).
- Attentional “errors” can occur when we are processing information: inattentional blindness and studies of intentional change detection illustrate some of these.
- Cases of visual neglect illustrate how the parietal lobe is involved in attentional processing; parietal lobe damage can lead to people being unable to process parts of the world around them.
- Attention deficit hyperactivity disorder (ADHD) is a disorder of attention in which focused attention becomes difficult and impulsivity/hyperactivity increase; it can be manageable with medication.
- Sleep is divisible into four stages plus rapid eye movement (REM) stage sleep; techniques, including electroencephalography, are used to delineate these stages from one another, while hypnograms plot out how long a person spends in each stage of sleep.

- Brain activity during sleep becomes progressively more coordinated across the cortex as sleep moves from earlier stages into later slow-wave sleep stages; various wave types show this progression (desynchronized alpha and beta waves when awake moving to slower and more regular theta and delta activity).
- REM-stage sleep is an exception to the typically slow brain activity seen during sleep and is when dreams occur; REM is also thought to be one of the most important parts of sleep for improving cognitive functioning and performance.
- Freud thought dreams were a manifestation of the unconscious mind; however, modern psychologists are more likely to endorse the activation-synthesis hypothesis of dreaming or the evolutionary hypothesis of dreaming.
- Dyssomnias are a class of sleep disorder related to the quality of sleep a person gets, including various kinds of insomnia, hypersomnia, apnea, and narcolepsy.
- Parasomnias are a class of sleep disorder related to disturbances that can occur during sleep and include REM sleep behavior disorder, bedwetting, night terrors, and somnambulism (sleep walking).
- Circadian rhythms, also known as biological clocks, help us regulate our sleep/wake cycle and can be influenced by things like jet lag and melatonin; the suprachiasmatic nucleus appears to regulate circadian rhythms.
- Psychoactive drugs, including stimulants, depressants, and hallucinogens, can alter the state of consciousness a person is in, changing levels of arousal and ability to attend to the world around them.
- Depressants include drugs such as alcohol and barbiturates, which influence the level and effectiveness of neurotransmitters such as GABA, glutamate, and dopamine. Depressants slow reaction time and reduce wakefulness.
- Stimulants include drugs like caffeine, nicotine, cocaine, and amphetamines and typically act on the neurotransmitters adenosine, acetylcholine, and dopamine to increase arousal and alertness, while also reducing feelings of hunger and fatigue.
- Hallucinogens (or “psychedelics”) include drugs such as LSD and mescaline. They typically act on the neurotransmitter serotonin and their effects include hallucinations and other breakdowns in a person's conscious experience, such as an “out-of-body” feeling.

Glossary: States of Consciousness

A

acetylcholine A neurotransmitter that often creates an excitatory effect in the brain.

activation-synthesis hypothesis A hypothesis about dreaming that suggests that dreams do not serve a purpose, but rather are the consequence of other processes that occur during sleep.

active attention Occurs when attentional priorities are set by the top-down goals of an individual.

adenosine A neurotransmitter that often creates an inhibitory effect in the brain.

alpha waves Brain waves that appear on an EEG when a person is relaxed.

attention The process of selecting information from the internal and external environments to prioritize for processing.

attentional capture Occurs when attention is diverted because of the salience of a stimulus.

automaticity Refers to fast, effortless processing of information without conscious thought.

B

barbiturates A group of drugs that cause sedation and induce sleep, historically prescribed for anxiety disorders.

benzodiazepines A group of drugs primarily used for treating anxiety. These drugs are known for being fast-acting and also highly addictive.

beta waves Brain waves that appear on an EEG when a person is alert and actively processing information. They also appear during REM sleep.

biological clocks Internal clocks that prepare the body for daily, seasonal, and annual rhythms.

C

cataplexy Most commonly associated with narcolepsy, it is the experience of muscle weakness or muscular paralysis during the waking hours.

circadian rhythms Daily body clocks that tell the body when to sleep and wake.

cocktail party effect Describes a situation associated with selective attention. At a party, a person can be engaged in a conversation and suppress/ignore all the information going on around them and attend to the conversation.

conditioned insomnia A form of insomnia that occurs when cues that are usually associated with falling asleep, like your bed, instead cause feelings of anxiety surrounding the inability to fall asleep.

conscious content The subjective experiences of your internal and external world.

corpus callosum The band of axons that connects the two hemispheres of the brain.

D

delta waves Brain waves that appear on an EEG when a person is deeply asleep. These waves occur during stages 3-4 (also known as slow-wave sleep).

dependence Occurs when an individual requires a drug to maintain normal functioning. Should the individual refrain from taking the drug, they will experience symptoms associated with withdrawal.

dichotic listening An attention task where one stream of information is presented to one ear, and a different message is played in the other ear. The participant is asked to attend to only one message. Later the participant is asked information about the unattended message.

divided attention Occurs when a person engages in two or more tasks at once.

dopamine A neurotransmitter that has been implicated in the rewarding effects of some drugs.

drug tolerance The increased ability to tolerate a specific drug. This occurs after repeated ingestion of the substance. When this occurs, a larger dose of the drug is required to achieve the desired effects.

E

electroencephalogram (EEG) A device that measures the sum of electrical activation across the surface of the cortex.

electromyogram A device used to measure muscle tension around the jaw.

electrooculogram A device used to measure eye movements.

evolutionary hypothesis of dreams A hypothesis about dreaming that suggests that dreams have biological significance.

F

fatal familial insomnia A rare, genetic disorder affecting the thalamus, that causes individuals to die from lack of sleep.

flicker task A change attention task used to study intentional change detection and inattentive blindness.

G

GABA A neurotransmitter that often creates inhibitory effects in the nervous system.

glutamate A neurotransmitter that often creates excitatory effects in the nervous system.

H

hemispheric specialization Refers to the idea that the two hemispheres in your brain (right and left) have different functions.

hypersomnia A symptom of several different conditions and generally refers to excessive need for sleep or sleepiness in the daytime hours.

hypnagogic hallucination Vivid sensory hallucinations that occur right before the onset of sleep.

hypnogram A graphic depiction of a person's progress through the stages of sleep over the course of a night.

hypnopompic hallucinations Vivid sensory hallucinations that occur right before waking.

I

idiopathic insomnia Also known as child onset insomnia. It is a neurological condition resulting in the inability to sleep.

inattentive blindness Refers to the tendency to miss changes to some kinds of information when your attention is engaged elsewhere.

inhibition The process of actively reducing processing of some information while the brain attends to a specific task.

insomnia The inability to fall asleep or stay asleep.

intentional change detection An attention task that requires the participant to actively search for a change made to the stimulus.

J

jet lag The phenomenon that occurs when you travel to a different time zone, and your body is out of sync with the time cues from the external world.

K

K-complexes A pattern of neural excitation followed by neural inhibition occurring during stage 2 sleep.

N

narcolepsy A rare genetic neurodegenerative disorder characterized by several symptoms, most notably a sudden and extreme need to sleep.

night terrors Generally considered a disorder of slow wave sleep (SWS). These experiences consist of frantic, panicked screaming but often little or no memory of what caused the episode once the individual is roused.

P

passive attention Occurs when attentional priorities are set by bottom-up information from the environment.

psychedelic drugs Psychedelic drugs directly influence the sensory systems and our interpretation of reality.

psychoactive drugs Psychoactive substances from the environment, other than food, that influence mood, thoughts, or behavior.

R

REM (rapid eye movement) A stage of sleep where narrative-based dreaming occurs. During this stage, EEG recordings become highly irregular, and the sleeping person's eyes will move from side to side rapidly.

REM sleep atonia REM sleep atonia is the experience of temporary paralysis that occurs during REM sleep.

REM sleep behavior disorder A neurodegenerative disorder that results in the inability of the brain to effectively paralyze the body during sleep.

S

selective attention A form of attention that occurs when a person attends to some information while ignoring other information.

serotonin A neurotransmitter that is often implicated in mood, but also in the organization of sensory information.

sleep apnea A medical condition where the patient stops breathing during the night. Carbon dioxide builds up in the bloodstream, as a result, the patient wakes up. This disorder results in a poor night's rest and can cause long term health problems.

sleep hygiene A series of behavioral practices that promote the ability to fall and stay asleep.

sleep spindles Brief bursts of activity that occur 2-5 times per minute during Non-REM sleep.

slow-wave sleep (SWS) A broader name for sleep occurring in stage 3-4. During this stage, recordings on EEG show delta waves.

somnambulism Also known as sleepwalking, it is a disorder of slow wave sleep (SWS). During these episodes, people are not acting out dreams, but rather are able to execute complicated behaviors, such as walking, cooking, and driving, while unconscious.

split brain A type of surgery that cuts the connections between the two hemispheres of the brain.

states of consciousness Refer to the different levels of arousal and attention an individual can experience.

stimulants Drugs that increase the activity of the nervous system.

stimulus salience Refers to the idea that some stimuli in the environment capture attention by virtue of their physical properties.

subaudible messages Auditory messages that are played too quietly or in such a way that the brain cannot be consciously aware of the content.

subconscious processing Occurs when we are aware of information from the environment but are not aware that it is influencing our behavior.

subliminal stimulus A sensory stimulus that is processed, but does not reach the threshold for conscious perception.

subvisual messages Visual images that are presented too quickly for the brain to perceive in conscious awareness.

suprachiasmatic nucleus (SCN) The structure in the brain, next to the optic chiasm, that sets the body's circadian clock.

synesthesia An experience where the senses seem to merge.

T

theta waves Brain waves that appear on an EEG when a person is deeply relaxed or falling asleep, although they are present throughout the sleep cycle.

W

withdrawal Symptoms of distress, restlessness, and irritability associated with reduction or discontinuation of an addictive substance or behavior.

Z

zeitgebers Cues from the environment that set the biological clocks.