

THE BIOLOGICAL BASES OF HUMAN BEHAVIOR



Maria Angela A. Mabale, MA (Nursing), RN



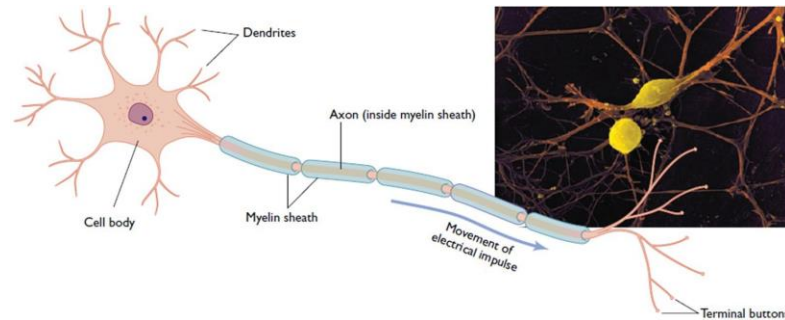
Today's Session

Learning Objectives:

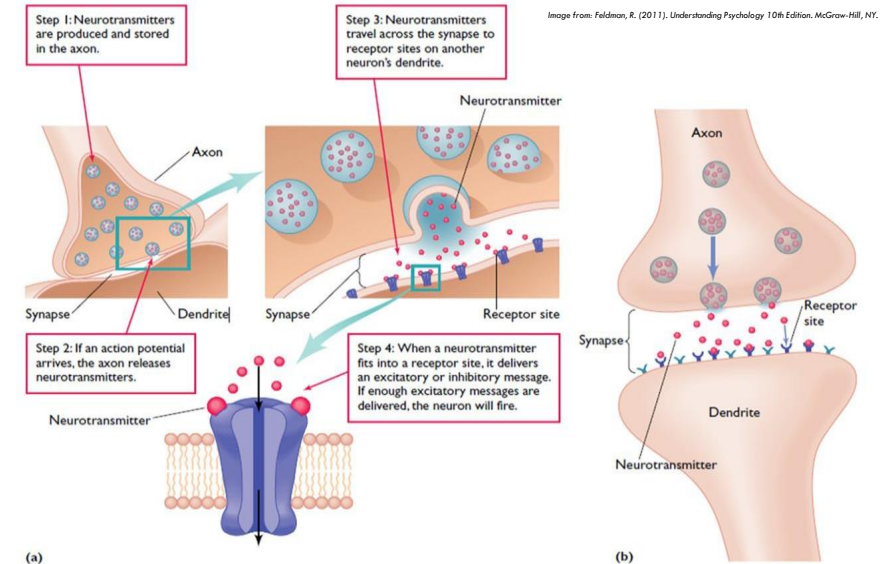
1. Describe the nervous system, neurons, and nerves, and how they relate to one another
2. Explain how neurons use neurotransmitters to communicate with each other and with the body
3. Describe the structures of the brain that control emotion, learning, memory, and motivation
4. Discuss how perception, sensory adaptation and state of consciousness affect human behavior
5. Describe the theories of lifespan development in psychology



Neurons



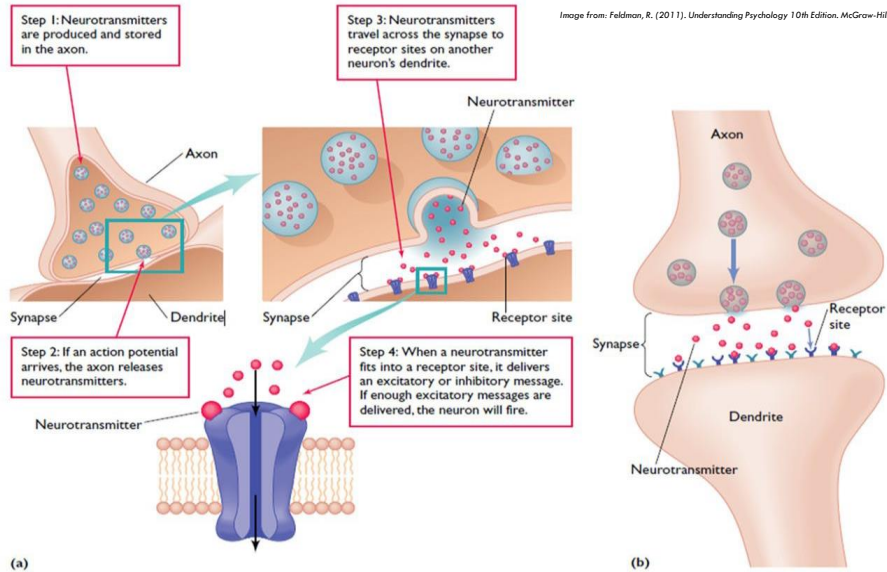
The Basic Element of Behavior



WHERE NEURONS MEET: BRIDGING THE GAP



Image from: Feldman, R. (2011). Understanding Psychology 10th Edition, McGraw-Hill, NY.



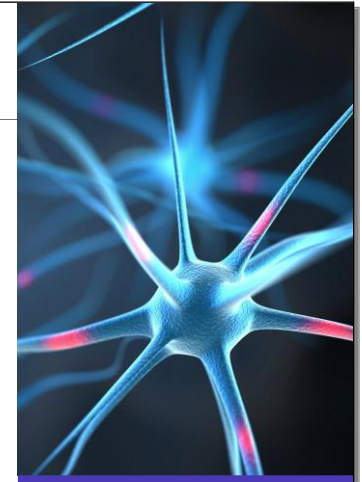
WHERE NEURONS MEET: BRIDGING THE GAP



MAJOR NEUROTRANSMITTERS

Neurotransmitter Name	Location	Effect	Function
Acetylcholine (ACh)	Brain, spinal cord, peripheral nervous system, especially some organs of the parasympathetic nervous system	Excitatory in brain and autonomic nervous system; inhibitory elsewhere	Muscle movement, cognitive functioning
Glutamate	Brain, spinal cord	Excitatory	Memory
Gamma-amino butyric acid (GABA)	Brain, spinal cord	Main inhibitory neurotransmitter	Eating, aggression, sleeping
Dopamine (DA)	Brain	Inhibitory or excitatory	Movement control, pleasure and reward, attention
Serotonin	Brain, spinal cord	Inhibitory	Sleeping, eating, mood, pain, depression
Endorphins	Brain, spinal cord	Primarily inhibitory, except in hippocampus	Pain suppression, pleasurable feelings, appetites, placebos

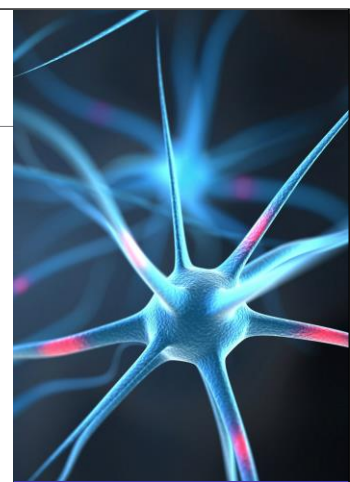
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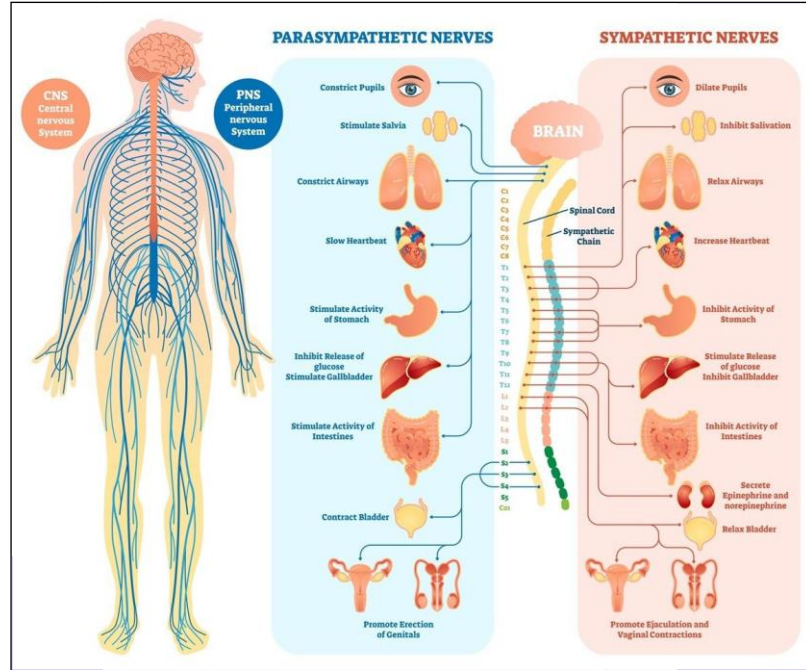
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PARASYMPATHETIC NERVES

SYMPATHETIC NERVES



Human Nervous System

"OLD BRAIN"

THALAMUS
take in sensory information related to seeing, hearing, touching, and tasting

PONS
helps coordinate several other automatic functions

BRAIN STEM
the most ancient and central core of the brain

RETICULAR FORMATION
network inside the brainstem that's essential for arousal

MEDULLA
automatically controls, the beating of hearts, the breathing of lungs, etc

CEREBELLUM
is responsible for non-verbal learning and memory, the perception of time, and modulating emotions

THE CENTRAL CORE: OUR OLD BRAIN

The Limbic System

Hypothalamus
homeostasis

Thalamus
relays information

Amygdala
emotion

Hippocampus
memory conversion

THE EMOTIONAL BRAIN

The limbic system is involved in self-preservation, learning, memory, and the experience of pleasure.

The Cerebral Cortex: Our "New Brain"

11

The Four Lobes of the Brain

Frontal lobe
decision making, impulse control, judgement, emotion control

Parietal lobe
sensory perception, movement

Temporal lobe
language, sexuality, emotion, hearing, memory

Occipital lobe
primarily vision

Cerebellum
coordination

Functional Areas of the Cerebral Cortex

- 1 **Visual Area:**
Sight
Image recognition
Image perception
- 2 **Association Area**
Short-term memory
Equilibrium
Emotion
- 3 **Motor Function Area**
Initiation of voluntary muscles
- 4 **Broca's Area**
Muscles of speech
- 5 **Auditory Area**
Hearing
- 6 **Emotional Area**
Pain
Hunger
"Fight or flight" response
- 7 **Sensory Association Area**
- 8 **Olfactory Area**
Smelling
- 9 **Sensory Area**
Sensation from muscles and skin
- 10 **Somatosensory Association Area**
Evaluation of weight, texture, temperature, etc. for object recognition
- 11 **Wernicke's Area**
Written and spoken language comprehension
- 12 **Motor Function Area**
Eye movement and orientation
- 13 **Higher Mental Functions**
Concentration
Planning
Judgment
Emotional expression
Creativity
Inhibition

Functional Areas of the Cerebellum

- 14 **Motor Functions**
Coordination of movement
Balance and equilibrium
Posture

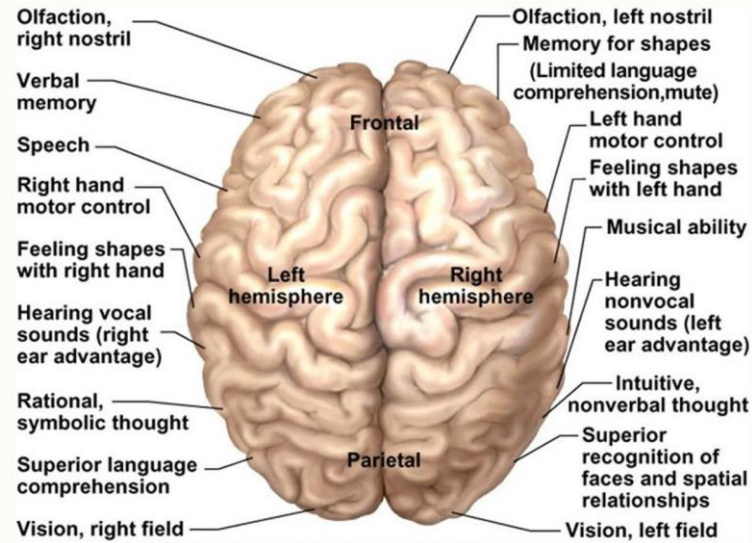
Lateral View
Labels: Frontal lobe, Cerebral cortex, Parietal lobe, Occipital lobe, Temporal lobe, Brain stem, Cerebellum

Sagittal View
Labels: Pituitary gland, Respiratory centers, Brain stem, Cerebellum

Superior View
Labels: Frontal lobe, Parietal lobe, Temporal lobe, Occipital lobe

Inferior View
Labels: Frontal lobe, Parietal lobe, Temporal lobe, Brain stem, Cerebellum

Lateralization of Cerebral Functions

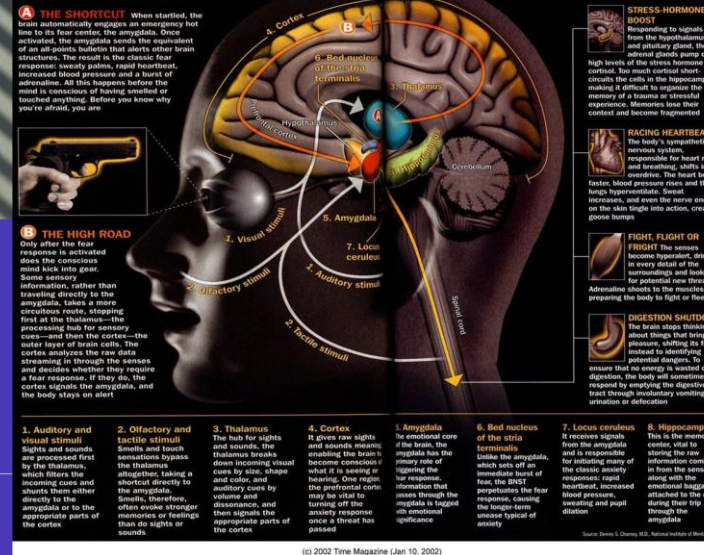


THE ANATOMY OF ANXIETY

TIME Diagram by Joe Lertola. Text by Alice Park.

WHAT TRIGGERS IT ... When the senses pick up a threat—a loud noise, a scary sight, a creepy feeling—the information takes two different routes through the brain.

... AND HOW THE BODY RESPONDS By putting the brain on alert, the amygdala triggers a series of changes in brain chemicals and hormones that puts the entire body in anxiety mode.



SENSATION AND PERCEPTION

Sensation encompasses the processes by which our sense organs receive information from the environment

Perception is the brain's and the sense organs' sorting out, interpretation, analysis, and integration of stimuli.



Sensations

- Vision
- Audition (hearing)
- Olfaction (smell)
- Gustation (taste)
- The skin senses, which include pressure, temperature, and pain



Sensations

- Sensation is often viewed as the process of detecting a signal that is embedded in noise.
- The use of signal detection theory allows the process of detecting a stimulus to be decomposed into two separate numbers: one representing the observer's sensitivity to the signal and the other representing the observer's bias to respond 'signal present'.
- Every sense modality must recode or transduce its physical energy into neural impulses.



- The stimulus for vision is light. Each eye contains a system for forming the image (including the cornea, pupil, and lens) and a system for transducing the image into electrical impulses.
- Our sensitivity to the intensity of light is mediated by certain characteristics of the rods and cones.
- Different wavelengths of light lead to sensations of different colors.

Vision: Shedding Light on the Eye



- The stimulus for audition (hearing) is a wave of pressure changes (a sound wave). Sound waves transmitted by the outer and middle ear cause the basilar membrane to vibrate, resulting in a bending of the hair cells that produces a neural impulse.
- Frequency is the number of wave cycles that occur in a second. At very low frequencies there are relatively few wave cycles per second.
- Amplitude is a feature of wave patterns that allows us to distinguish between loud and soft sounds.
- We are sensitive to broad variations in sound amplitudes. This range is measured in decibels.

Sensing Sound



- The human sense of smell (olfaction) permits us to detect more than 10,000 separate smells.
- We also have a good memory for smells, and long-forgotten events and memories—good and bad—can be brought back with the mere whiff of an odor associated with a memory
- The sense of smell is sparked when the molecules of a substance enter the nasal passages and meet olfactory cells, the receptor neurons of the nose, which are spread across the nasal cavity.

Sense of Smell



- The sense of taste (gustation) involves receptor cells that respond to four basic stimulus qualities: sweet, sour, salty, and bitter.
- Although the specialization of the receptor cells leads them to respond most strongly to a particular type of taste, they also are capable of responding to other tastes as well. Ultimately, every taste is simply a combination of the basic flavor qualities.
- The receptor cells for taste are located in roughly 10,000 taste buds, which are distributed across the tongue and other parts of the mouth and throat.
- The sense of taste differs significantly from one person to another, largely as a result of genetic factors.

Sense of Taste



- All our skin senses —touch, pressure, temperature, and pain—play a critical role in survival, making us aware of potential danger to our bodies.
- The experience of pain is not determined by biological factors alone. It is a perceptual response that depends heavily on our emotions and thoughts.

The Skin Senses: Touch, Pressure, Temperature, and Pain



- According to the gate-control theory of pain, particular nerve receptors in the spinal cord lead to specific areas of the brain related to pain. When these receptors are activated because of an injury or problem with a part of the body, a “gate” to the brain is opened, allowing us to experience pain.
- The gate can be shut in two different ways. First, other impulses can overwhelm the nerve pathways relating to pain and second, through psychological factors.

The Skin Senses: Touch, Pressure, Temperature, and Pain



- Medication
- Nerve and brain stimulation
- Light therapy
- Hypnosis
- Biofeedback and relaxation techniques
- Cognitive restructuring

STRATEGIES TO ALLEVIATE PAIN



Procedure Notes
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• Medication - Painkilling drugs are the most popular treatment in fighting pain. Drugs range from those that directly treat the cause of the pain—such as antibiotics or swelling-reducers—to those that work on the symptoms. Medication can be in the form of pills, patches, injections, or liquids. In a recent development, drugs are pumped directly into the spinal cord.

• Nerve and brain stimulation - Pain can sometimes be relieved when a low-voltage electric current is passed through the specific part of the body that is in pain. In even more severe cases, electrodes can be implanted surgically directly into the brain, or a handheld battery pack can stimulate nerve cells to provide direct relief.

• Light therapy - One of the newest forms of pain reduction involves exposure to specific wavelengths of red or infrared light. Certain kinds of light increase the production of enzymes that may promote healing.

• Hypnosis - For people who can be hypnotized, hypnosis can greatly relieve pain.

• Biofeedback and relaxation techniques - Using biofeedback, people learn to control involuntary functions such as heartbeat and respiration. In this way, individuals can learn to relax muscles, which can reduce headaches or back pain.

• Cognitive restructuring - People can be trained to think their bodies systematically. Cognitive restructuring, which involves changing the way people think about their pain, can help them manage their pain. For example, if a person thinks, "I can't walk because of my pain," they can be taught to think, "I can walk because of my pain."


• Cognitive restructuring - People can increase their sense of control and actually reduce the pain they experience.



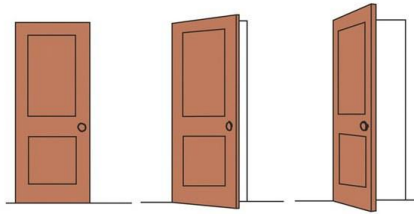
	<p>Perception is a constructive process in which people go beyond the stimuli that are physically present and try to construct a meaningful interpretation.</p>	<h2>PERCEPTION: Making Sense of our Environment</h2>	
	<p>The gestalt laws of organization are used to describe the way in which we organize bits and pieces of information into meaningful wholes, known as gestalts, through closure, proximity, similarity, and simplicity.</p>		→

	<p>In top-down processing, perception is guided by higher-level knowledge, experience, expectations, and motivations.</p>	<h2>PERCEPTION: Making Sense of our Environment</h2>	
	<p>In bottom-up processing, perception consists of the progression of recognizing and processing information from individual components of a stimuli and moving to the perception of the whole.</p>		→

	<p>The study of perception deals with the question of how organisms process and organize incoming raw, sensory information in order to:</p>	<h2>PERCEPTION: Making Sense of our Environment</h2>	
	<p>a. form a coherent representation or model of the world within which the organism dwells and</p> <p>b. use that representation to solve naturally occurring problems, such as navigating, grasping, and planning.</p>		→

	<h2>DEPTH PERCEPTION</h2>		→
		<p>The ability to perceive distance and view the world in three dimensions even though the images projected on our retinas are two-dimensional.</p> <p>We are able to judge depth and distance as a result of binocular disparity and monocular cues, such as motion parallax, the relative size of images on the retina, and linear perspective.</p>	

PERCEPTUAL CONSTANCY



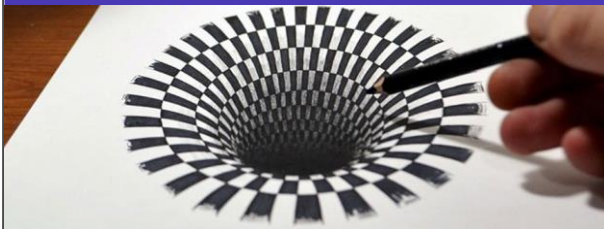
It permits us to perceive stimuli as unvarying in size, shape, and color despite changes in the environment or the appearance of the objects being perceived.

MOTION PERCEPTION



Motion perception depends on cues such as the perceived movement of an object across the retina and information about how the head and eyes are moving

VISUAL ILLUSIONS



Visual illusions are physical stimuli that consistently produce errors in perception, causing judgments that do not reflect the physical reality of a stimulus accurately.

They are usually the result of errors in the brain's interpretation of visual stimuli.

CONSCIOUSNESS

A person's perceptions, thoughts, and feelings at any given moment constitute that person's consciousness.

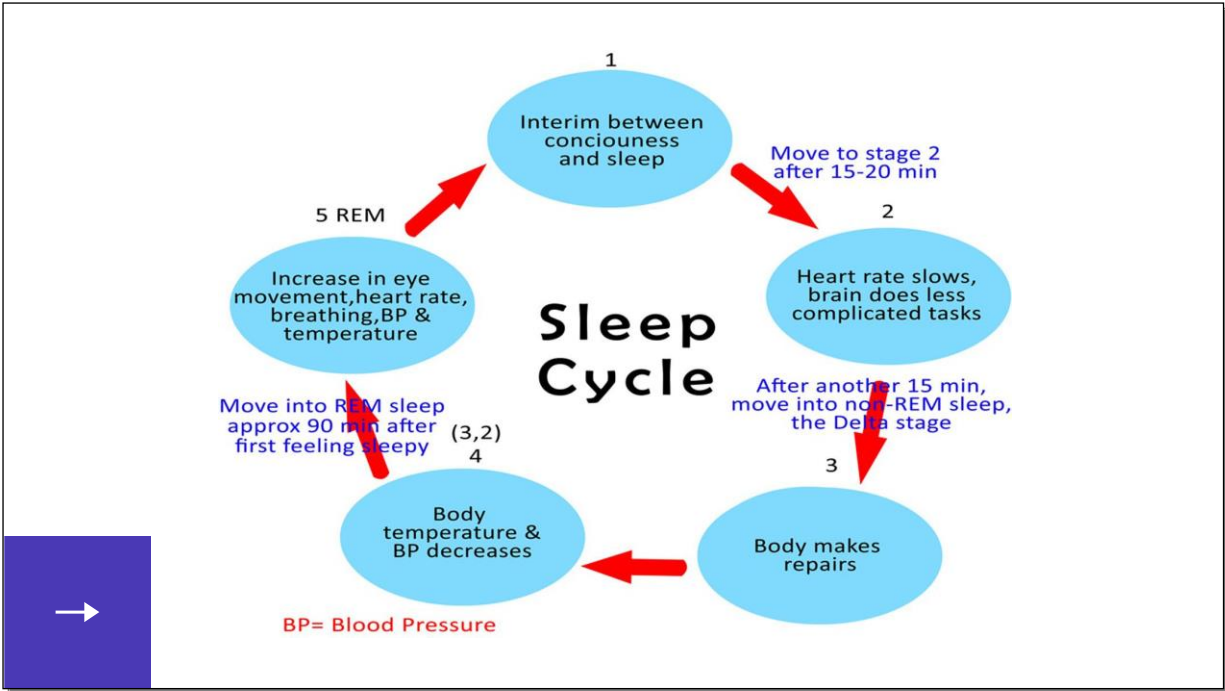
An altered state of consciousness is said to exist when mental functioning seems changed or out of the ordinary to the person experiencing the state.

Some altered states of consciousness, such as sleep and dreams, are experienced by everyone; others result from special circumstances such as meditation, hypnosis, or the use of drugs



<h1>CONSCIOUSNESS</h1> <p>The functions of consciousness are:</p>	<p>*Not all events that influence consciousness are at the center of our awareness at a given moment: preconscious and subconscious</p>
<p>a. monitoring ourselves and our environment so that we are aware of what is happening within our bodies and in our surroundings</p>	<p>b. controlling our actions so that they are coordinated with events in the outside world.</p>

<h1>CONSCIOUSNESS</h1>	<p>According to psychoanalytic theory, some emotionally painful memories and impulses are not available to consciousness because they have been repressed – that is, diverted to the unconscious.</p>
<p>Unconscious thoughts and impulses influence our behavior even though they reach consciousness only in indirect ways – through dreams, irrational behavior, and slips of the tongue.</p>	<p>The notion of automaticity refers to the habituation of responses that initially required conscious attention, such as driving a car.</p>



DREAMS

Freud attributed psychological causes to dreams, distinguishing between their manifest and latent content and suggesting that dreams are wishes in disguise. Other theories see dreaming as a reflection of the information processing that the brain is doing while asleep.

Recently some theorists have concluded that dreaming is a cognitive process that reflects the individual's conceptions, concerns, and emotional preoccupations.

What is hypnosis, and are hypnotized people in a different state of consciousness?



Presented Notes
2022-09-07 09:10:06
Hypnosis is a responsive state in which individuals focus their attention on the hypnotist and his or her suggestions. Some people are more readily hypnotized than others; although most people show some susceptibility. Characteristics of hypnotic responses include enhanced or diminished control over movements, distortion of memory through posthypnotic amnesia, and positive and negative hallucinations. Reduction of pain is one of the beneficial uses of hypnosis.

Hypnosis produces a state of heightened susceptibility to the suggestions of the hypnotist.

Under hypnosis, significant behavioral changes occur including increased concentration and suggestibility, heightened ability to recall and construct images, lack of initiative, and acceptance of suggestions that clearly contradict reality.



What are the effects of meditation?



Meditation is a learned technique for refocusing attention that brings about an altered state of consciousness by following planned rituals or exercises.

The result is a somewhat mystical state in which the individual is extremely relaxed and feels divorced from the outside world.



Lifespan Psychological Development Theories

Freud's theory of psychosexual development



Erikson's Child and adult psychosocial development



Piaget's view of cognitive development



Kohlberg's theory of moral development



ORAL

Infant achieves gratification through oral activities such as feeding, thumb sucking and babbling

0-2 years old



ANAL

2-3 years old

The child learns to respond to some of the demands of society (such as bowel and bladder control)



PHALIC

The child learns to realize the differences between males and females and becomes aware of sexuality

3-7 years old



LATENCY

The child continues his or her development but sexual urges are relatively quiet

7-11 years old



GENITAL

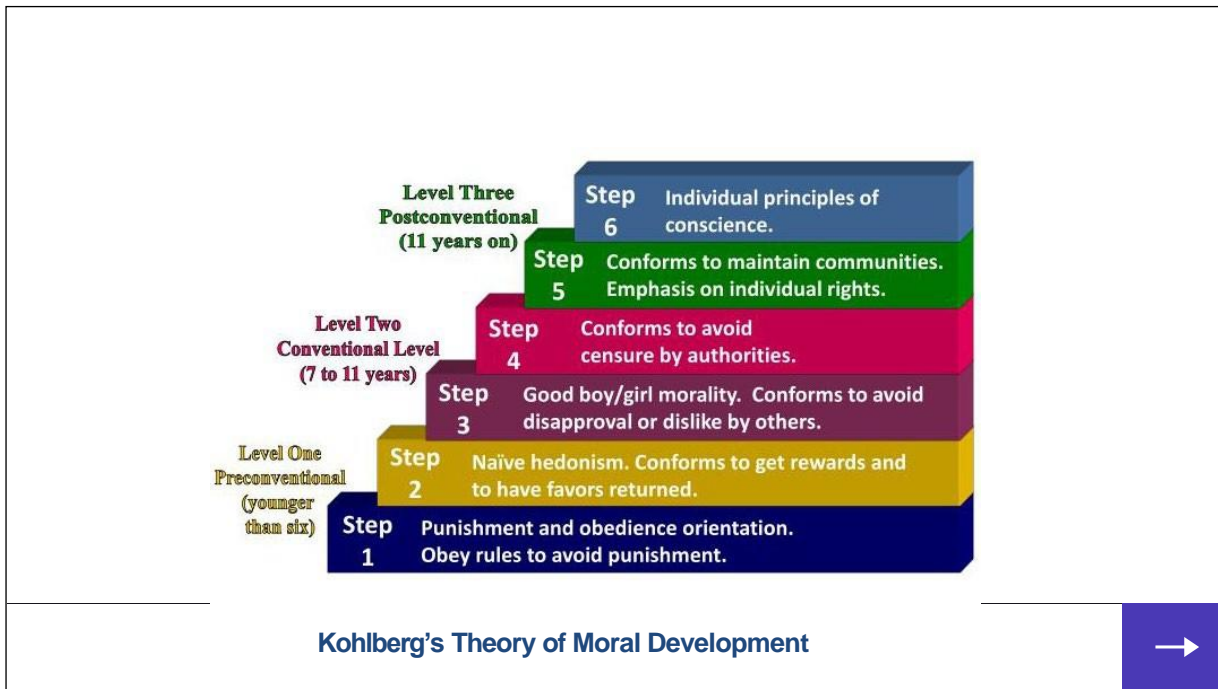
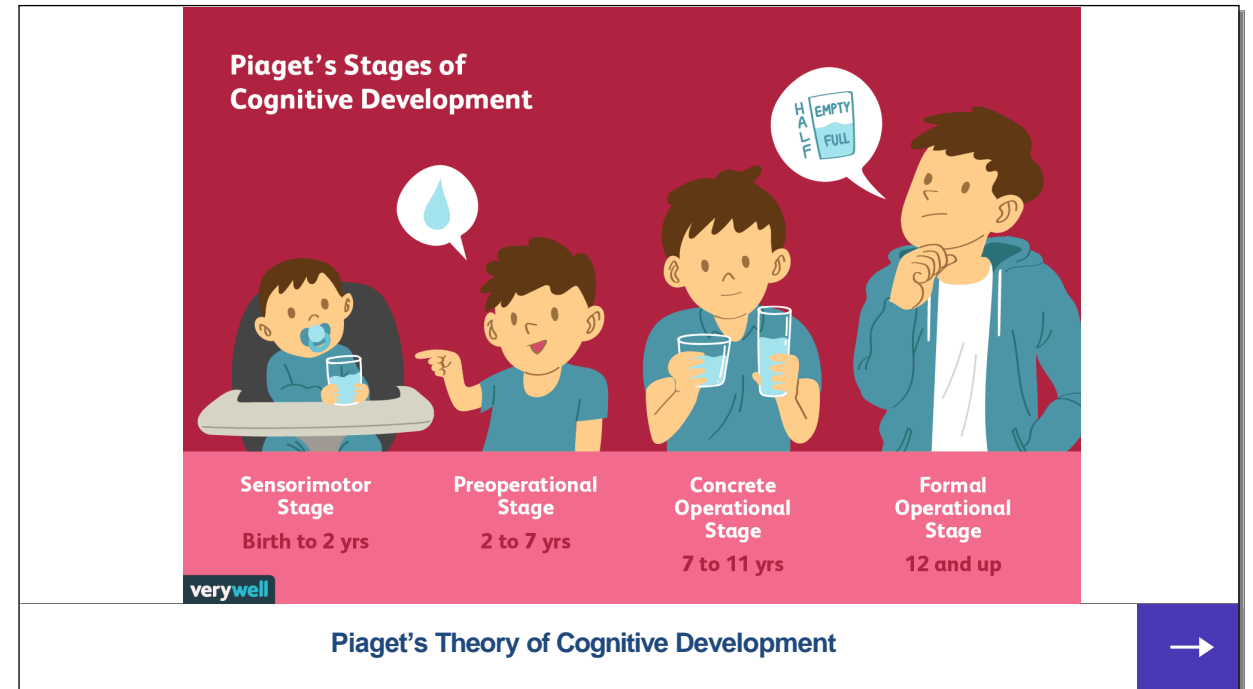
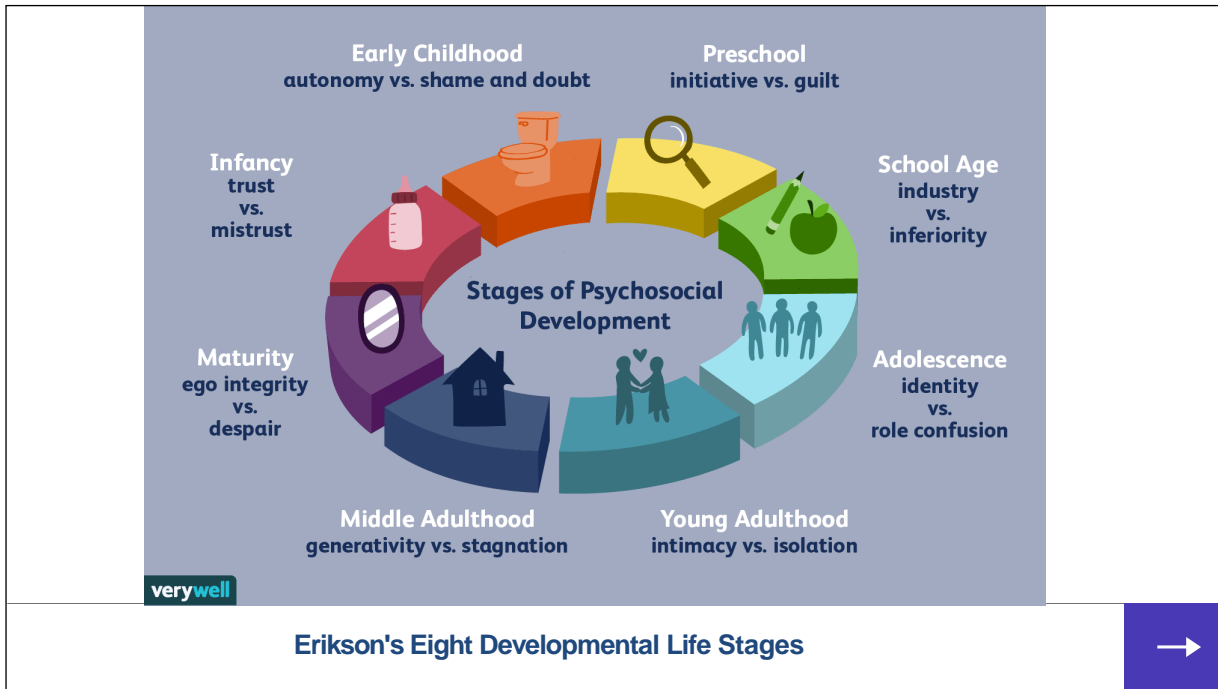
The growing adolescent shakes off old dependencies and learns to deal maturely with opposite sex

11-Adult



Freud's Psychosexual Development Stages





References:

- Nolen-Hoeksema, S., Fredrickson, B., Loftus, G., & Wagenaar, W. (2009). *ATKINSON & HILGARD'S Introduction to Psychology 15th Edition*. Cengage Learning, UK.
- Feldman, R. (2011). *Understanding Psychology 10th Edition*. McGraw-Hill, NY.

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MOST MEMORABLE LEARNING EXPERIENCE

- A. In a bond paper, draw a picture of your most memorable learning experience -- any life scene/ event that gave you valuable lesson. Digital drawing will be accepted.
- B. Narrate and discuss the events that transpired and answer the guide questions
- C. Prepare to show/present your drawing on our synchronous class on Thursday, September 22.

Activity Guide II

