AQA Biopsychology Practice Exam (Sample)

Study Guide

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Questions

1. What physiological changes occur in the body during a fear response?

A. Decreased heart rate and muscle relaxation

B. Increased heart rate and heightened alertness

C. Reduction in adrenaline and cortisol levels

D. Stabilization of breathing rate

2. Which area of the brain is primarily involved in decision-making?

A. Amygdala

B. Prefrontal cortex

C. Hippocampus

D. Cerebellum

3. What type of factors contribute to the development of phenotype?

A. Only genetic factors

B. Environmental factors exclusively

C. Both genetic and environmental factors

D. Social influences alone

4. Which brain structure is involved in auditory processing, specifically distinguishing sound and its location?

A. Cerebellum

B. Primary auditory cortex

C. Thalamus

D. Hippocampus

5. How does the amygdala react during stress?

A. It calms the body.

B. It activates the hypothalamus to trigger a stress response.

C. It slows down brain activity.

D. It promotes pleasure and reward.

6. What is released in the brain during the fight or flight response?

A. Adrenaline

B. Norepinephrine

C. Cortisol

D. Serotonin

7. In terms of emotional regulation, what effect does serotonin have?

A. It reduces emotional responses

B. It enhances feelings of fear

C. It stabilizes mood and reduces anxiety

D. It prevents emotional expression

8. What is a potential effect of trauma on brain function?

A. Improved memory capacity

B. Increased attention span

C. Changes in brain structure and function

D. Enhanced emotional regulation

9. What term describes the brain's ability to recover from damage by replacing lost functions?

A. Neurogenesis

B. Plasticity

C. Axonal recovery

D. Neural adaptation

10. Who identified that the left temporal lobe was responsible for the production of speech?

A. Wernicke

B. Broca

C. Sperry

D. Gage

Answers

1. B
2. B
3. C
4. B
5. B
6. B
7. C
8. C
9. B
10. B

Explanations

1. What physiological changes occur in the body during a fear response?

A. Decreased heart rate and muscle relaxation

B. Increased heart rate and heightened alertness

C. Reduction in adrenaline and cortisol levels

D. Stabilization of breathing rate

During a fear response, the body undergoes a series of physiological changes primarily driven by the activation of the sympathetic nervous system. One key change is an increased heart rate, which allows for more efficient blood flow to muscles and vital organs. This prepares the body for either a "fight or flight" reaction. Heightened alertness is also crucial during this response, as it enables individuals to react swiftly to potential threats. The release of adrenaline, also known as epinephrine, plays a significant role in enhancing these physiological changes, including raising heart rate and promoting a state of heightened awareness. In contrast, a decreased heart rate would be counterproductive during a fear response, as would muscle relaxation, since the body needs to be prepared for action. A reduction in adrenaline and cortisol levels does not align with the body's reaction to fear; these hormones are typically elevated to prepare the body to face or escape a threat. Finally, stabilization of breathing rate may not occur; instead, breathing often becomes rapid and shallow to maximize oxygen intake. These physiological alterations collectively embody the body's preparedness for survival in the face of fear-inducing stimuli.

2. Which area of the brain is primarily involved in decision-making?

A. Amygdala

B. Prefrontal cortex

C. Hippocampus

D. Cerebellum

The prefrontal cortex is primarily involved in decision-making due to its critical role in higher-order cognitive functions. This area of the brain is responsible for complex processes such as planning, reasoning, problem-solving, and social behavior, all of which are essential components of decision-making. It integrates information from various parts of the brain, evaluates potential outcomes, and helps to formulate plans based on this information. The prefrontal cortex also plays a vital role in regulating emotions and controlling impulses, which are crucial for making thoughtful decisions rather than impulsive ones. Its involvement in executive functions, including working memory and attention, further supports its centrality in decision-making processes. Overall, the prefrontal cortex's ability to assess risks and rewards significantly contributes to effective decision-making.

3. What type of factors contribute to the development of phenotype?

A. Only genetic factors

B. Environmental factors exclusively

C. Both genetic and environmental factors

D. Social influences alone

The correct answer recognizes that phenotype, which refers to the observable physical and behavioral characteristics of an organism, results from both genetic and environmental factors. Genetic factors provide the foundational blueprint for an organism's traits, influenced by the alleles inherited from its parents. However, these genetic predispositions do not act in isolation. Environmental factors, such as diet, climate, exposure to toxins, and social interactions, play a crucial role in shaping how these genetic predispositions are expressed. For example, two individuals with the same genetic makeup may develop differently if one is exposed to a nutrient-rich environment while the other is not. This interplay between genetic inheritance and environmental context is essential in understanding the complexity of phenotype development. Consequently, the synthesis of both factors leads to the diversity of traits observed in populations.

4. Which brain structure is involved in auditory processing, specifically distinguishing sound and its location?

A. Cerebellum

B. Primary auditory cortex

C. Thalamus

D. Hippocampus

The primary auditory cortex is the correct answer, as it is specifically designed for processing auditory information. Located in the temporal lobe, this area is crucial for interpreting sounds, including their pitch, volume, and location. Distinguishing sounds comes from the primary auditory cortex's ability to analyze various frequency patterns and integrate these with spatial information, allowing individuals to understand not just what they are hearing, but where the sounds are originating from. The cerebellum primarily coordinates voluntary movements and balance rather than auditory processing. The thalamus, although it plays a role in relaying sensory information, does not directly process sounds; rather, it acts as a relay station conveying sensory signals to the appropriate areas of the cortex. The hippocampus is mainly associated with memory formation and spatial navigation, rather than the direct processing of auditory stimuli. Thus, the primary auditory cortex is the key structure for distinguishing sound and its precise location.

5. How does the amygdala react during stress?

A. It calms the body.

B. It activates the hypothalamus to trigger a stress response.

C. It slows down brain activity.

D. It promotes pleasure and reward.

The amygdala plays a crucial role in the processing of emotions, particularly fear and stress responses. When an individual experiences a stressor, the amygdala is activated and signals the hypothalamus. This interaction initiates the stress response, commonly known as the "fight or flight" response. Upon activation, the amygdala sends projections to the hypothalamus, which then stimulates the release of hormones, including adrenocorticotropic hormone (ACTH) from the pituitary gland. This, in turn, leads to the release of cortisol from the adrenal glands, preparing the body to respond to the perceived threat. This function is essential for survival, as it primes various physiological systems to either confront the danger or escape. In contrast, the other options do not accurately represent the function of the amygdala in the context of stress. The amygdala does not calm the body; rather, it is part of the system that prepares the body for action. It does not slow down brain activity, as its activation leads to increased alertness and readiness to respond. Additionally, while it is involved in emotional processing, it does not promote pleasure and reward in this context; those functions are associated more with other brain regions like the nucleus

6. What is released in the brain during the fight or flight response?

A. Adrenaline

B. Norepinephrine

C. Cortisol

D. Serotonin

During the fight or flight response, the brain releases a variety of neurotransmitters and hormones to prepare the body to react to perceived threats. Norepinephrine is one of the key substances released, particularly from the locus coeruleus in the brainstem, which plays a crucial role in increasing alertness and arousal. This release enhances the ability to respond quickly to danger, as it increases heart rate, blood pressure, and energy availability. While adrenaline, also known as epinephrine, is released from the adrenal glands into the bloodstream as part of the body's overall stress response, it is norepinephrine that primarily acts as a neurotransmitter in the brain during the immediate fight or flight response. Cortisol, a hormone, is released later during prolonged stress, and serotonin is more commonly associated with mood regulation rather than immediate stress response. Thus, norepinephrine's specific role in the brain's immediate activation during stressful situations makes it particularly significant in the context of the fight or flight response.

7. In terms of emotional regulation, what effect does serotonin have?

A. It reduces emotional responses

B. It enhances feelings of fear

C. It stabilizes mood and reduces anxiety

D. It prevents emotional expression

Serotonin plays a crucial role in regulating mood and emotional responses. When serotonin levels are balanced, it contributes to a sense of well-being and emotional stability. This neurotransmitter is often referred to as a "feel-good" chemical because it helps to stabilize mood and can significantly reduce feelings of anxiety. High serotonin levels are associated with a more positive emotional state, while low levels can lead to increased anxiety and mood disorders. In this context, serotonin's role in mood stabilization is essential for effective emotional regulation. It aids individuals in managing their emotions more efficiently, promoting a calm and balanced emotional state. This is why the response regarding serotonin stabilizing mood and reducing anxiety is accurate. By facilitating these positive outcomes, serotonin contributes to healthier emotional responses in various situations.

8. What is a potential effect of trauma on brain function?

A. Improved memory capacity

B. Increased attention span

C. Changes in brain structure and function

D. Enhanced emotional regulation

Trauma can have profound effects on brain function, and one of the significant outcomes is the alteration of brain structure and function. Traumatic experiences can lead to changes in areas such as the hippocampus, amygdala, and prefrontal cortex, which are crucial for memory, emotion regulation, and decision-making. For instance, the hippocampus, associated with forming new memories, may shrink in response to chronic stress and trauma, resulting in difficulties with memory retention and recall. The amygdala, which plays a key role in processing emotions, especially fear, can become hyperactive, leading to heightened anxiety and emotional responses. Meanwhile, the prefrontal cortex, responsible for higher-order functions like impulse control and emotional regulation, may become less effective, impacting a person's ability to manage their emotions and responses to stress. These structural changes, such as neuronal loss and alterations in connectivity, can significantly influence behavior, emotional regulation, and cognitive processes, illustrating why the option regarding changes in brain structure and function is the most accurate reflection of the potential effects of trauma on the brain.

9. What term describes the brain's ability to recover from damage by replacing lost functions?

A. Neurogenesis

B. Plasticity

C. Axonal recovery

D. Neural adaptation

The term that describes the brain's ability to recover from damage by replacing lost functions is plasticity. This concept encapsulates the brain's remarkable capacity to reorganize itself by forming new neural connections throughout life. When the brain experiences injury, such as from trauma or stroke, areas that were previously dedicated to a specific function can adapt by taking on new roles or compensating for the functions that have been lost. This adaptability is crucial for rehabilitation processes and recovery, allowing individuals to regain abilities that may have been impaired due to damage. Neurogenesis refers specifically to the process of generating new neurons, which can play a role in recovery but does not encompass the broader concept of functional reorganization. Axonal recovery pertains more to the regeneration of nerve fibers after injury rather than the overall ability of the brain to adapt and reclaim functions. Neural adaptation typically refers to adjustments in response to stimuli rather than structural or functional repair following damage.

10. Who identified that the left temporal lobe was responsible for the production of speech?

A. Wernicke

B. Broca

C. Sperry

D. Gage

The identification of the left temporal lobe's role in the production of speech is attributed to Broca. Specifically, Broca's research focused on a region located in the left frontal lobe, known as Broca's area, which is crucial for speech production and language processing. His studies, particularly those involving patients with speech difficulties, demonstrated that damage to this area resulted in difficulties forming coherent speech, despite intact comprehension abilities. In contrast, Wernicke was known for his work regarding language comprehension, identifying Wernicke's area in the left temporal lobe, which is involved in understanding spoken and written language. Sperry conducted research on the split-brain phenomenon, while Gage is famous for the case study related to his frontal lobe injury, which impacted personality rather than speech production. This context helps clarify why Broca's work is specifically linked to the production of speech, positioning him as a central figure in the understanding of language in the brain.