**BIOPSYCHOLOGY**

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**Task 1: Name The 4 Lobes of The Brain and Their Function**



***Figure 1: Lobel of the Brain***

The brain is divided into four main lobes, each having different functions as shown in figure 1 above.

The ***frontal lobe***, positioned in the front of the brain, is in responsible of higher cognitive activities like decision-making, resolving problems, and voluntary movement. It also influences social behaviour and personality (Collins & Koechlin, 2012).

The ***parietal lobe***, positioned near the top of the brain, handles sensory input from the body, such as touch, temperature, and pain. It also influences spatial orientation and perception (Vachha et al., 2022).

The ***temporal lobe***, positioned on the sides of the brain, is responsible for auditory handling, memory development, and language. It aids with the recognition of faces and objects, as well as the interpretation of spoken languages (Casillo et al., 2020).

The ***occipital lobe***, the occipital lobe, situated at the back of the brain, processes visual input from the eyes. It aids in the perception and interpretation of visual inputs, letting us recognise and identify objects, forms, and colours (Casillo et al., 2020).

**Task 1.2: Label the Sub-Division of The Brain and Their Function**



***Figure 2: Sub-division of the brain***

The brain is sub-divided into2three main regions: the forebrain, midbrain, and2hindbrain, each with distinct structures and functions.

***Forebrain***: This includes the cerebrum, thalamus, and hypothalamus. The cerebrum is responsible for higher brain functions, while the thalamus2transmits sensory2information to the cerebral2cortex, whereas the hypothalamus2controls temperature within the body, hunger, and thirst (Jernigan & Stiles, 2016).

***Midbrain***: This region is involved in motor movement, especially eye movement, as well as hearing and visual comprehension (Doherty et al., 2013).

***Hindbrain***: The hindbrain is made up of the2cerebellum, pons, and medulla2oblongata. The cerebellum is involved in coordination and balance, the pons helps coordinate movement on both sides of the body, and the medulla oblongata regulates crucial activities like respiration and heart rhythm (Doherty et al., 2013).

**Task 2: Label of Brain Components, Location and Function**



***Figure 3: Brain Components***

The ***cerebrum***, located at the top of the brain, is the biggest part is liable for higher brain activities such as cognition, action, and emotion. It is separated into two hemispheres, each of which controls the opposite portion of the human body and specific functions related to speech, movement, and sensory processing (Jawabri & Sharma, 2023).

The ***diencephalon***, which lies between the cerebrum2and the midbrain, comprises various structures, notably the thalamus2and 2hypothalamus. The thalamus transmits sensory data, whereas the hypothalamus regulates body temperature, appetite, thirst, and the rhythm of sleep and wakefulness (Chatterjee & Li, 2012).

The ***brainstem***, positioned below the cerebrum2and in2front of the the2cerebellum, connects the spinal cord to the brain. It regulates basic bodily activities that include breathing, heart2rate, blood2pressure, and cognition. It also serves as a pathway for nerve fibers traveling to and from the brain (Basinger & Hogg, 2023).

The ***cerebellum***, positioned behind and below the cerebrum, is essential for coordinating voluntary2movements, balance, and2posture. It acknowledges input from the2sensory frameworks, the spinal2cord, and other brain regions in order to effectively govern motor motions (Vachha et al., 2022).

**Task 3: Evaluation of Two Methods of Investigation of The Brain**

In this evaluation, we will look at two fundamental approaches for studying the brain: functional2magnetic resonance2imaging (fMRI) and electroencephalography (EEG). Each approach provides specific details into brain function and structure, making them useful for neuroscience studies as well as therapeutic applications.

***Functional Magnetic Resonance Imaging (fMRI)***

Functional2Magnetic Resonance2Imaging (fMRI) is a non-invasive neuroimaging technology that detects variations in blood oxygen levels to assess brain activity (Nawaz et al., 2021). fMRI, which measures changes in blood oxygenation levels, produces comprehensive images of brain areas with excellent spatial resolution. This imaging technology enables researchers to monitor brain activity during diverse tasks or in resting state situations, offering information about the brain's dynamic activity (Nawaz et al., 2021). The high spatial accuracy of fMRI allows experts to identify brain regions engaged in specific cognitive processes like language, memory, and emotion. Furthermore, fMRI has proved useful in researching neurological and psychiatric illnesses, providing vital information into the fundamental brain mechanisms (Loued-Khenissi et al., 2018). Because of its non-invasive nature and capacity to create precise functional maps of the brain, fMRI is an extremely useful technique in neuroscience research, allowing for the examination of complex brain activities in both health and disease (Stoyanov, 2024).

Functional Magnetic Resonance Imaging (fMRI) has greatly improved our awareness of brain function and disorders. Researchers used fMRI to investigate how the brain activities sensory information and reacts to stimuli, offering light on the neurological mechanisms that underpin these procedures (Acevedo et al., 2014). Furthermore, fMRI has been essential in studying the neural foundation of cognitive skills such as decision-making, attention, and memory, providing vital understanding into these complex processes (Breukelaar et al., 2019). In clinical settings, fMRI has been used to investigate neurological illnesses including Alzheimer's disease, schizophrenia, and depression, providing vital insights into the fundamental neural mechanisms and potential diagnostic indicators (Whitten, 2012). In addition, fMRI has been employed to investigate the impact of interventions such as medicine or therapy on brain function in patients with psychiatric disorders, giving useful information for treatment development and evaluation (Carmichael, 2023). Overall, fMRI has transformed neuroscience by allowing researchers to investigate the complexities of the human brain in both health and sickness, making it an essential tool in the field.

***Electroencephalography (EEG)***

Electroencephalography (EEG) is a significant neuroimaging2technique that uses scalp electrodes to record the electrical activity of the brain (Kumar & Bhuvaneswari, 2012; Binnie & Prior, 1994). Its high temporal resolution allows for millisecond-level monitoring of brain wave patterns (Beres, 2017), thus rendering it suitable for capturing rapid changes in brain activity linked with various cognitive tasks, sleep stages, and states of consciousness (Light et al., 2010). In clinical settings, EEG is used to diagnose and monitor a variety of neurological illnesses, including epilepsy and sleep problems (Rashid et al., 2020).

EEG's capacity to detect and interpret brain activity in real time has led to its application in a variety of research domains. For instance, in cognitive neuroscience, EEG is employed to investigate brain responses during activities such as decision-making, vision, and language comprehension (Tantillo et al., 2022). Researchers have also employed EEG to study brain function in illnesses including autism2spectrum disorder (ASD) and attention-deficit/hyperactivity2disorder (ADHD), revealing details about their fundamental neurological mechanisms (Roy et al., 2019).

In addition to scientific uses, EEG is important in clinical evaluations. For instance, EEG is employed to diagnose epilepsy by identifying abnormal brain wave patterns that indicate seizure activity (Beniczky & Schomer, 2020). EEG is additionally employed in sleep medicine to determine sleep stages and diagnose sleep2disorders including sleep2apnea and REM sleep2behaviour disorder (Bell & Cuevas, 2012). EEG is also used in neuropsychological examinations to test cognitive function and diagnose diseases like dementia and traumatic brain damage (Tsolaki et al., 2014). Its capacity to identify variations in brain activity linked with various disorders presents it as a useful tool in clinical settings.

Overall, EEG's superb temporal resolution and versatility allow it to be a valuable tool in both research and clinical practice. Its capacity to detect quick changes in brain activity offers essential insights into brain function and dysfunction, which helps us understand the human brain.

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