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Brain sections: a mini-review for elementary school students

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Abstract: Neuroscience, especially visual neuroscience, is a burgeoning field that has greatly shaped the format and efficacy of education. Moreover, findings from visual neuroscience are an ongoing source of significant progress in many science branches. Elements of neuroscience are taught in elementary schools , and this extremely interesting part of the curriculum usually starts with lessons about brain sections. In this debut article, we provide brief introductory information about brain sections, intended for a beter understanding of this topic for elementary school students.

Keywords: Motor cortex; Somatosensory cortex; Parietal lobe; Cerebellum; Brain.

1. Introduction

The scientific study of the nervous system and the brain is called neuroscience. Neuroscientists, through centuries, have tried to solve the mysteries of the human brain: How is it organized? Which areas control different mental functions? [1]. This article comprehended the mysteries of the brain and the science behind it.

For the past 100 years, neuroscientists have looked at the brain like a map (Fig. 1), pinpointing its features and activities. The prefrontal cortex is known as the seat of rationality; the motor cortex coordinates movement; the somatosensory cortex and parietal lobes control how we see the world; the temporal lobes process memories, language, and emotions; the occipital lobe process and integrates visual information and the cerebellum helps us execute our body's motor commands [2,3].

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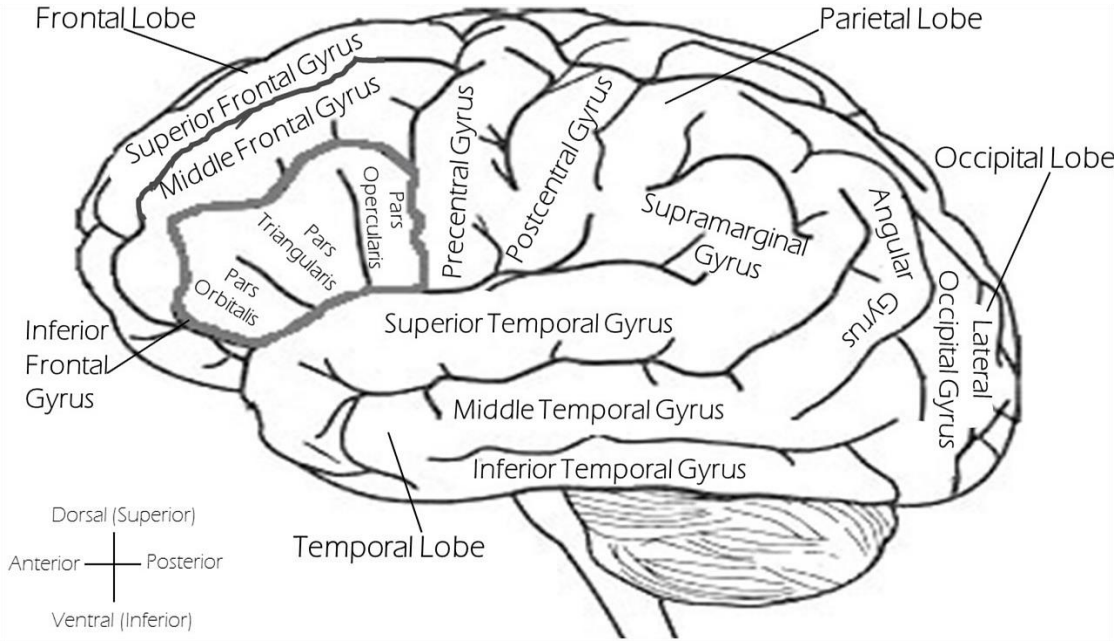

Figure 1. The parts of the brain[1]

2. The Geography of Thought

First, the prefrontal cortex (PFC) will be mentioned. The PFC is the cerebral cortex covering the front part of the frontal lobe. This brain region plans complex cognitive behavior, personality expression, decision-making, and moderating social behavior. The PFC is divided into subregions: Dorsomedial PFC, Ventromedial PFC, Orbitofrontal PFC, Ventrolateral PFC, and Dorsolateral PFC [2]. The PFC makes up a substantial proportion of the entire brain and thus is not surprisingly involved in a long list of functions. But it is most commonly associated with executive functions. There isn't a precise definition for the term executive functions. Still, it generally refers to processes that focus on controlling short-sighted behavior to be able to act with a goal in mind. This may include things like self-control, planning, decision-making, and problem-solving. Because these are complex cognitive functions, it is unlikely any one brain region is solely responsible for them and more likely, they depend on distributed networks of brain regions [4,5].

2.1. The motor cortex

Further, we will discuss the motor cortex, also known as the M1. The primary motor cortex, or M1, is located on the precentral gyrus and the anterior paracentral lobule on the medial surface of the brain. The primary function of the M1 is to generate signals to direct

[1] Figure is original work of OpenClipart-Vectors, available at Pixabay. Please consider supporting this author by visiting the following link https://pixabay.com/vectors/brain-labeled-brain-left-brain-2026346/

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the body's movement. It is part of the frontal lobe and is anterior to the central sulcus. It consists of the primary motor cortex, premotor cortex, supplementary motor area (SMA), primary somatosensory, and posterior parietal cortex [6–8].

2.2. Somatosensory cortex and parietal lobes

As part of the brain, there are also the somatosensory cortex and parietal lobes. The primary somatosensory cortex is located at the rim of the cortex called the postcentral gyrus, which is found in the parietal lobe. The parietal lobes are involved in several essential functions in the body. One of the main functions is to receive and process sensory information from all over the body. The somatosensory cortex is found within the parietal lobes and is essential for processing touch sensations. The somatosensory system in humans, located in the parietal lobe, has four regions known as Brodmann's areas [9–11]. Three anatomical boundaries define the parietal lobe: the central sulcus separates the parietal lobe from the frontal lobe; the parieto-occipital sulcus separates the parietal and occipital lobes; the lateral sulcus (Sylvian fissure) is the most lateral boundary, separating it from the temporal lobe; and the longitudinal fissure divides the two hemispheres. Within each hemisphere, the somatosensory cortex represents the skin area on the contralateral surface of the body [12].

2.3. Temporal lobe

The temporal lobe is located behind the ear. The main functions of the temporal lobes include understanding language, memory acquisition, face recognition, object recognition, perception, and auditory processing information. Temporal damage can cause loss of speaking and recognition. Frontotemporal disorders result from damage to neurons in the frontal and temporal lobes of the brain. Many possible symptoms can result, including unusual behaviors, emotional problems, trouble communicating, work difficulty, or walking [13–15].

2.4. Occipital lobe

The occipital lobe is the smallest of the four lobes of the cerebral hemisphere. It is located close to the parietal and temporal lobes and forms the brain's caudal part. Relative to the skull, the lobe lies underneath the occipital bone. They are responsible for visual perception, including color, form, and motion. Damage to the occipital lobe can include

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difficulty locating objects in the environment and identifying colors, called color agnosia [16,17].

2.5. Cerebellum

The cerebellum is part of the brain that helps coordinate and regulate many functions and processes in the brain and body. While it's minimal compared to brain overall, it holds more than half of the neurons (cells that make up nervous system) in the whole body. The three parts of the cerebellum are the cerebrocerebellum, the spinocerebellum, and the vestibulocerebellum. Cerebrocerebellum is the largest division, formed by the lateral hemispheres. If the cerebellum is damaged, there are bare chances of survival since you lose more than half of the neurons in your body [18].

3. Conclusions

Neuroscience has traditionally been classed as a subdivision of biology. These days, it is an interdisciplinary science that liaises closely with other disciplines, such as mathematics, linguistics, engineering, computer science, chemistry, philosophy, psychology, and medicine. The brain works in mysterious ways, and neuroscientists are still trying to discover its hidden secrets. As neuroscientists quote, “the brain is like a map; many parts of it aren't discovered”.

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