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A Short Note on Emergence of Neuropsychology

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Introduction

The study of the biological processes and aspects that underpin cognition, specifically the neural connections in the brain that are involved in mental processes is the focus of the scientific field known as cognitive neuroscience [1]. It addresses the question of how brain neural circuits affect or control cognitive activities. Cognitive neuroscience is a subfield of both neuroscience and psychology that overlaps with areas like behavioral neuroscience, cognitive psychology, physiological psychology, and affective neuroscience [2]. It is based on theories from cognitive science, evidence from neurobiology, and computational modeling, and brain regions play a significant role in this field. Since the primary objective is to comprehend cognition from a neural perspective and the various lobes of the cerebral cortex, neurons play the most significant role.

Experimental Procedures

Experimental procedures from psychophysics and cognitive psychology, functional neuroimaging, electrophysiology, cognitive genomics, and behavioral genetics are among the methods utilized in cognitive neuroscience.

Investigations of patients with mental shortages because of mind sores comprise a significant part of mental neuroscience. In terms of healthy, fully functioning brains, the damages in lesioned brains provide a comparable starting point. These injuries alter the neural circuits in the brain, causing them to malfunction during fundamental cognitive processes like learning and memory. Such damage can be compared to how healthy neural circuits function in people with learning disabilities, allowing one to possibly draw conclusions about the basis of the affected cognitive processes. In the brain, Wernicke's area, the left side of the temporal lobe, and Brocca's area close to the frontal lobe are examples of learning disabilities [3]. The subfield of developmental cognitive neuroscience also studies cognitive abilities based on brain development. This demonstrates brain development over time, examining differences and suggesting possible explanations [4].

Computational neuroscience and cognitive psychology are two theoretical approaches. The mind has always piqued the interest of philosophers: From atomic theories in the fifth century B.C. to its rebirth in the works of Galileo, Descartes, and Boyle in the seventeenth and eighteenth centuries, the idea that explaining a phenomenon requires comprehending the mechanism that is responsible for it has deep roots in the history of philosophy. Descartes proposed, among other things, that human-made machines could serve as models for scientific explanation[5]. For instance, Aristotle believed that the intelligence capacity was located in the heart and that the brain was the body's cooling system. Although this has also been attributed to Alcmaeon, [6] Galen believed that personality and emotion were not generated by the brain but rather by other organs. It has been suggested that the first person to believe otherwise was the Roman physician Galen, who declared that the brain was the source of mental activity in the second century AD. The physician and anatomist Andreas Vesalius was the first to believe that the brain and nervous system are the center of the mind and emotions. Psychology is a major contributor to cognitive neuroscience. It originated from philosophical thinking about the mind [7].

There are several stages in these disciplines that have changed the way researchers approach their investigations and led to the field becoming fully established. Cognitive neuroscience is an interdisciplinary area of study that has emerged from neuroscience and psychology [8].

Albeit the undertaking of mental neuroscience is to depict the brain systems related with the psyche, generally it has advanced by examining how a specific region of the mind upholds a given intellectual capacity. However, initial attempts to divide the brain proved challenging. Since it failed to provide a scientific foundation for its theories, the phrenologist movement has been discredited. Brain mapping, which began with Hitzig and Fritsch's experiments [9] and eventually developed through methods such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI)[10] were major turning points in the creation of cognitive neuroscience as a field, bringing together ideas and techniques that enabled researchers to make more links between behavior and its neural substrates. This resulted in the rejection of the aggregate field view, which stated that all areas of the brain participated in all behavior [11].

Maybe the primary serious endeavors to confine mental capabilities to explicit areas in the mind were by Broca and Wernicke. This was mostly done by studying how injuries to different parts of the brain affected how the mind worked [12]. In 1861, the French neurologist Paul Broca met a man who had a disability but couldn't speak. He could understand the language. The man was only able to make the word "tan" sound. The man had damage to what is now known as Broca's area in his left frontal lobe, as it was later discovered. A patient was discovered by German neurosurgeon Carl Wernicke who could speak fluently but without feeling. The patient had suffered a stroke and was unable to comprehend written or spoken language. Wernicke's area, where the left parietal and temporal lobes meet, was a lesion that this patient had. The localizations view was strongly supported by these cases, which suggested that specific behavioral changes were caused by lesions. Paul Broca was also the one who discovered the learning disorder Aphasia. Johns Hopkins School of Medicine says that aphasia is a language disorder caused by damage in a part of the brain that controls language expression and comprehension [13]. This can often result in the person

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speaking words that don't make sense, which is called "word salad."

There was little interaction between neuroscience and cognitive science before the 1980s.Cognitive neuroscience began to combine approaches from experimental psychology, neuropsychology, and neuroscience with the newly established theoretical ground in cognitive science that had emerged between the 1950s and 1960s. It wasn't until 1971 that neuroscience was established as a unified field. TMS (1985) and fMRI are two new technologies that emerged in the very late 20th century and are now the foundation of cognitive neuroscience research. EEG (human EEG 1920) and MEG were earlier cognitive neuroscience techniques. Other brain imaging techniques like PET and SPECT are occasionally utilized by cognitive neuroscientists. An impending method in neuroscience is NIRS which uses light retention to ascertain changes in oxy-and deoxyhemoglobin in cortical regions. Single-unit recording may be utilized in some animals. Eye tracking, facial EMG, and microneurography are additional methods. The goal of integrative neuroscience is to unify descriptive models from a variety of fields and scales and consolidate data in databases: anatomy, psychology, biology, and clinical work.

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