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Orginal Article

Comparing the Level of Activity of Brain Structures of Reading, Writing and Speech Skills in People with Very High and Very Low Verbal Intelligence Using Functional Magnetic Resonance Imaging

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Introduction

In today's modern world where people tend to judge others by the way they speak, write, and understand words, verbal intelligence is very valuable. A literature review of 28 studies introduced the temporal cortex as the most dominant primary region for verbal intelligence. Dominant sub-regions in both the temporal and frontal cortex are critical for language processing, speech control, and speech production. Also, the temporal cortex was recognized as an important area for verbal intelligence. Since then, the neuroscience of the skills of this intelligence has been considered an important issue for psychologists and neurologists, and few studies have investigated the neuroscience of this intelligence based on its skills, and the studies have been carried out in a scattered manner. Among the research conducted on this topic, we can mention the examination of speech, writing, and reading skills.

Method

This research was among case studies. The statistical population of the

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present study was composed of 45 male and female volunteers aged 18 years and older who were referred to the National Brain Mapping Laboratory in Tehran in 2019, and among them, two subjects were selected in a targeted manner using the developmental assessment scale of multiple intelligences. Multiple intelligences developmental assessment scales were selected.

Results

The findings from data processing showed that performing the reading task was associated with the activity of the frontal and prefrontal areas as well as the temporal and fusiform gyri. Findings related to the writing task also showed that doing the task was associated with the activity of the Temporal, and Prefrontal areas, especially the inferior and middle frontal gyri. Also, the findings from data processing related to the speech task showed that the frontal and temporal regions as well as the precentral and postcentral gyrus were associated with the activity. Diagram 3 shows that the activity level of brain regions in a subject with very high intelligence is higher in all regions except for the fusiform gyrus.

Discussion

This study, like other studies, was accompanied by limitations, for example, the limitation in the number of subjects due to the high cost of fMRI and the time limit of assignments. Therefore, it is suggest to conduct research in a larger sample for better generalizability.

Keywords: Brain structures, functional magnetic resonance imaging, reading, speaking, verbal intelligence, writing

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