

COGNITIVE FUNCTIONS AND THE BRAIN

The Healthy Brain and Cognition: Abbreviation of Caring Sheet #1
From the Michigan Department of Community Health (MDCH) Dementia Care Series
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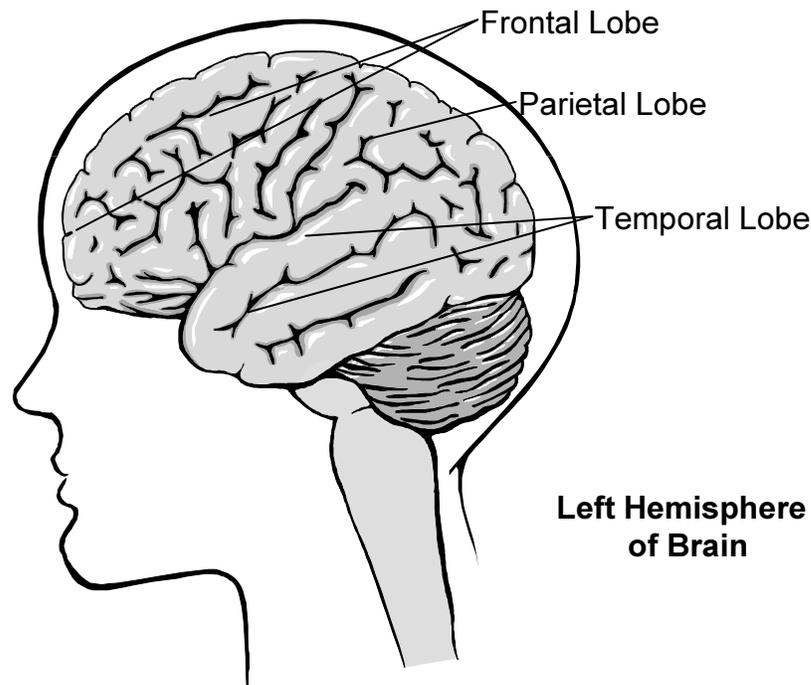


Figure 1: Left cerebral hemisphere of the brain with three of its four lobes (regions) identified. The size and position of the brain with respect to the outline of the head is not to scale. The right cerebral hemisphere is a near mirror image of the left cerebral hemisphere and has the same four lobes.

Cognitive Functions and Localization in the Brain:

Left Hemisphere (for most right handed people):

- controls sensory and motor functions of the right side of the body.
- helps the person recognize and use analytical or linear thinking, including language.
- When a person's left hemisphere is damaged the right side of the body tends to be weaker and altered in its ability to feel, notice, or recognize stimuli. The person may also have slurred speech or difficulty finding words she/he wants to use.

Right Hemisphere (for most right handed people):

- controls the sensory and motor functions of the left side of the body.
- helps the person recognize and use spatial aspects of information received from the environment.

- When the right hemisphere is damaged the left side of the body tends to be weaker and altered in its ability to feel, notice, or recognize stimuli. The person may also have difficulty locating objects in space or judging distances.

Frontal Lobe

The frontal lobe plays a major role in many cognitive functions, some of which are listed here. In general, the frontal lobe allows a person to:

- plan and organize
- make use of a pool of information or ideas, by sorting through and choosing from among them
- know when a task is done
- get started on a task
- recognize mistakes and correct them
- know how much time has passed
- recognize chronology of events in the past and put them in temporal perspective (e.g., I played as a child with my sister long before I cooked supper for my own children.)
- recognize and monitor her/his own thoughts and feelings
- discern triggers or causes of thoughts and feelings
- control impulsive responses to thoughts and feelings, by censoring, delaying, or pacing responses
- adapt to new conditions
- switch from one idea or action to another
- imagine something not visible or tangible (i.e., abstract)

Temporal Lobe

The temporal lobe, among other functions, allows a person to:

- comprehend language (in the left hemisphere)
- express language (in the left hemisphere)
- remember very recent events or information (in cooperation with the hippocampus, a structure tucked behind the temporal lobe) (e.g., it prevents a person from repeating the same story in a single conversation)

Parietal Lobe

The parietal lobe, among other functions, allows a person to:

- recognize spatial information (in the right hemisphere) (e.g., it allows a person to recognize where people or objects in a room are in relation to each other and to the person's own body)
- organize spatial information (in the right hemisphere) (e.g., it allows a person to draw, and to set the table in a spatially correct way)
- integrate and organize sensory information (particularly visual)
- write and to perform arithmetic (in the left hemisphere)
- recognize the person's own body and its left/right orientation

Other areas of the brain play a role in all of these functions, and many cognitive functions are not listed here. These are some of the most complex cognitive functions frequently impaired in brain damage or in dementia. Impairment of these functions can create or contribute to behavioral changes.

Further Reading:

- Weaverdyck, S. (1990). *Neuropsychological Assessment as a Basis for Intervention in Dementia*. In N. Mace (Ed.) *Dementia Care: Patient, Family and Community*. Baltimore, MD: Johns Hopkins University Press.
- Website for MDCH Dementia Care Series Caring Sheets: <http://www.lcc.edu/mhap>