

Psychologist identifies area of brain key to choosing words

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New research by a Rice University psychologist clearly identifies the parts of the brain involved in the process of choosing appropriate words during speech.

The study, published in the current issue of the *Proceedings of the National Academy of Sciences*, could help researchers better understand the speech problems that stroke patients experience.

When speaking, a person must select one word from a competing set of words. For example, if the speaker wants to mention a specific animal, he has to single out "dog" from "cat," "horse" and other possibilities. If he wants to describe someone's temperament, he has to choose whether "happy," "sad," "ecstatic" or some other adjective is more appropriate.

Tatiana Schnur, assistant professor of psychology at Rice, wanted to determine whether one particular part of the brain, the left inferior frontal gyrus (LIFG), is necessary for resolving the competition for choosing the correct word.

She and her colleagues compared brain images from 16 healthy volunteers and 12 volunteers who suffer from aphasia, an acquired language disorder as a result of stroke. People who have aphasia frequently experience difficulty with speech.

The researchers found that while two parts of the brain, the LIFG and the left temporal cortex, respond to increased conflict among words

competing for selection during speech, only the LIFG is necessary to resolve the competition for successful word production. The LIFG includes Broca's area, named after the 19th-century French scientist Paul Pierre Broca. It is responsible for aspects of speech production, language processing and language comprehension.

The study covered two experiments where people name a series of images and conflict between words increases as more images are named. In the first experiment, healthy speakers' brain activations were measured using functional magnetic resonance imaging. The second experiment mapped performance deficits to lesion locations in participants with aphasia.

By looking at direct parallels between the healthy and aphasic volunteers, Schnur and colleagues coupled location in the brain with specific speech processes. The research found that the ability of aphasic speakers "to resolve competition that arises in the course of language processing appears to depend on the integrity of the LIFG." This result could open an exciting line of research, as damage to this mechanism may explain the hesitant, nonfluent speech exhibited by those described as Broca's aphasics.

The study, "Localizing Interference During Naming: Convergent Neuroimaging and Neuropsychological Evidence for the Function of Broca's Area," was funded by the National Institutes of Health.

Source: Rice University

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