**BACKGROUND**

Post stroke aphasia is associated with decline in sensorimotor integration during speech production. However, the underlying neural mechanisms of this impairments is not fully understood.

The auditory-motor integration model of speech consists of speech error detection and correction (Figure 1). Under altered auditory feedback (AAF), using a pitch-shift stimulus, the researchers were able to detect sensorimotor impairments by measuring the individual’s compensatory responses to external error signals.

For individuals with aphasia, research has shown that certain areas of the brain impact sensorimotor interactions for speech error processing. However, there is limited evidence regarding the relationship between underlying lesion characteristics and sensorimotor impairments for a variety of aphasias. The current study investigated the neural and behavioral correlates of impaired sensorimotor processing for speech production in aphasic patients.

**METHODS CONTINUED**

**MRI Data Analysis:** Using a 3 T Siemens Trio System and head-coil, two magnetic resonance imaging sequences were collected of the 16 aphasic patients. A univariate lesion-symptom-mapping analysis was performed. In each region of interest, a mean intensity value analyzed with voxel-based permutation thresholding to predict diminished speech compensation responses. The correlation between diminished speech altered auditory feedback response at four points in time and location of the lesion was analyzed (Figure 3).

**RESULTS CONTINUED**

Diminished speech responses were found to be negatively correlated or best predicted from damage to the superior and middle temporal gyri for the time window of 50-150 ms, to the pars orbitalis at 150-250 ms, and damage to the supramarginal gyrus at 250-350 ms.

A significant positive correlation was found between overall aphasia severity and speech responses to AAF within the peak time window. This effect is from the correlation between speech AAF responses and the WAB scores on the speech recognition task.

**DISCUSSION**

Damage to the neural networks within the superior temporal gyrus, middle temporal gyrus, inferior frontal gyrus, and supramarginal gyrus are predictive of impaired sensorimotor function for speech error processing.

Early phase of speech motor output is dependent upon input from the auditory cortex to the motor system. Deficits in rising phase of speech compensation magnitude depend on damage to the inferior frontal gyrus associated with motor planning, programming, and execution of speech.

Damage to the supramarginal gyrus damage was the best predictor of impaired sensorimotor function for speech compensation magnitude associated with impaired speech error detection and correction of intended target.

Damaged areas correlated to WAB scores for aphasia participants.

**REFERENCES**
