

**Sensorimotor impairment of speech production and motor control in post-stroke aphasia:  
Evidence from behavioral and neurophysiological biomarkers**

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**Abstract**

The present study used the altered auditory feedback (AAF) paradigm to investigate sensorimotor impairment of speech network in left-hemisphere stroke patients with aphasia. Lesion-symptom-mapping, behavioral testing, and event-related potentials (ERPs) were combined to examine the pervasiveness of speech sensorimotor deficit and its relationship with cortical damage. Sixteen patients with aphasia and sixteen neurologically intact individuals completed a speech AAF task in which the real-time auditory feedback of their vowel productions was pitch-shifted. Results indicated that compensatory speech motor responses to AAF were significantly diminished in aphasia vs. control. ERP responses to AAF were significantly reduced in the left hemisphere in aphasia vs. control whereas an opposite pattern was observed in the right hemisphere for which ERP responses were significantly enhanced in aphasia vs. control. Lesion-symptom-mapping analysis revealed that diminished responses to AAF were predicted by damage to auditory-motor networks on the superior and middle temporal gyrus, supramarginal gyrus, and inferior frontal gyrus areas in the left hemisphere. These findings suggest that patients with aphasia suffer from deficits in sensorimotor brain networks involved in speech feedback error processing and motor control. Our data provided novel biomarkers to identify brain networks and objectively quantify the degree of speech sensorimotor impairment in aphasia.