

ABSTRACT

One of the most challenging parts of learning a foreign language in adulthood is the mastery of new speech sounds. However, little is known about how neural sensitivity to foreign-language speech sounds contributes to the aptitude for holistic foreign-language learning, particularly in the context of classroom-based training. Using fMRI, we measured both task-evoked neural responses to foreign-language speech sounds and resting-state functional connectivity in native English-speaking adults before and after an intensive classroom-based Mandarin Chinese course. Increased activation to Mandarin lexical tones after training was seen in left-hemisphere language areas, accompanied by increased resting-state functional connectivity between left and right inferior frontal gyri (IFG). Brain-behavior analysis revealed that a functional shift from the right to left hemisphere during training was associated with greater language attainment. Before learning, future learning achievement was associated with greater activation in right IFG. After learning, greater learning achievement was associated with increased left, and reduced right, frontal activation. Increased resting-state functional connectivity between left IFG and right-hemisphere language-area homologues after training was associated with superior attainment and superior long-term proficiency. These findings indicate that reconfiguration of the functional network for foreign speech processing from right to left IFG reflects successful acquisition of holistic foreign-language skills.