

Neurogenetic factors underlying second language learning – implications for critical periods

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Abstract

Why is acquiring a second language early in life so much easier than acquiring one later? A growing body of literature has shown that adult human brains show neuroplasticity – they continue to make adaptive changes in response to new language learning environments well into adulthood, but also that individual differences in the ability to learn are substantial. Importantly, the magnitude of brain changes is highly correlated with individuals' learning outcomes. Why do some individuals adaptively modify their brain structures during second language learning, while others do not?

In my talk, I will describe a framework for understanding individual differences in structural modifications of brain white-matter connections and their relations to neurochemical changes in targeted brain gray-matter regions when exposed to a new language. I will describe the neurogenetic factors affecting individuals' abilities to learn a second language after the critical periods for language learning using a research strategy that integrates non-invasive diffusion tensor imaging technique, genetic variation analysis, and behavioral assessments of attention control. I will explain how genetic variants in the *COMT* gene account for a portion of the variation in learning outcomes, and discuss the brain connections that enable second language learners to switch between their 1st and 2nd languages. Finally, I will discuss a potential biological basis of critical periods for second language learning, and future extensions of my research.