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Neural bases of second language learning: multiple pathways to success

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Even after years of learning, many adults still have difficulty mastering a foreign language. While the learning of certain aspects of foreign languages, such as vocabulary, can be acquired with nearly native-like proficiency, foreign phoneme and grammar learning can be especially challenging. Most interestingly, adults differ to a large extent in how successfully they learn. In this presentation, I will discuss the potential neural foundations of such individual differences in language learning, including the associated cognitive, perceptual, neurophysiological, neuroanatomical, and neurogenetic factors, paying particular attention to the auditory cortex and the dopaminergic system. I will then describe a series of experiments that demonstrate that re-designing a learner's training protocol based on these markers can sometimes optimize learning. Specifically, I will discuss how repetition, trial-by-trial corrective feedback, talker variability, stimulus complexity, and sorting of stimuli can promote differing levels of success in phoneme and grammar learning, depending on the individual learner.

While research on the neuroscience of learning has been dominated by investigations on the mechanisms of neuroplasticity, this body of work has yet to explain the origins of individual differences in learning and how optimal learning can be promoted at the level of the individual. By examining a defining characteristic of humans and one that shows large individual differences, we aim to better inform mechanisms of learning and to translate such knowledge into pedagogical and clinical practices for improving language and communication in each learner.