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Authors

Clayards, Meghan
Toscano, Joseph

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Modeling age of exposure in L2 learning of vowel categories

Meghan Clayards

McGill University

Joseph Toscano

University of Iowa

Abstract: Age of exposure is known to be an important indicator of second language proficiency. Native-like phonological proficiency is attained only by learners exposed at the earliest ages. This paper examines one account of age-of-exposure effects. Two computational models (a mixture of Gaussians and a neural network) were trained without supervision on F1 and F2 tokens based on production data from two different vowel systems (Quichua and Spanish; Guion, 2003). Both models learn the individual phonological systems when trained on monolingual distributions. When exposed to bilingual data, both models also achieve varying degrees of success depending on when the second language (Spanish) is introduced in training, paralleling data from bilingual speakers with different ages of acquisition (Guion, 2003). This demonstrates that learners may be restricted in learning a second language not because of a biological critical period, but by the commitments that the system has already made to the first language.