Neurocognitive Basis of Bilingualism

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A hallmark of human experience is the learning and use of multiple languages. The scientific study of this experience provides important insights into mechanisms of the mind and the brain. In recent years a large number of studies have begun to examine the neurocognitive and neurocomputational bases of language representation, processing and learning in the bilingual context. In this lecture, I present interdisciplinary approaches towards the study of how experiences with learning a second language shape the human mind and the brain. I will first provide the background and theoretical framework for examining current issues and controversies, with specific references to dynamic emergentist perspectives of language. I then discuss studies that demonstrate how bilingual experiences impact the functional and neuroanatomical changes in the brain; in this regard, I present evidence from our short-term training and longitudinal studies of students who learn Chinese as their second language, along with findings that illustrate the effects of age, proficiency, and cognitive control on bilingual language representation and processing. Finally, I highlight some of our recent work that uses cyber-enabled technologies and computational methods to study second language learning and language representation. Our neurocognitive and computational studies help to shed light on the mechanisms of neuroplasticity (e.g., what learning experiences lead to neurocognitive changes), individual difference (e.g., how cognitive capacity correlates with learning success), and knowledge representation (e.g., how neurocognitive patterns reflect acquired knowledge in both L1 and L2).

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Biosketch

Ping Li is Professor of Psychology, Linguistics, and Information Sciences & Technology at the Pennsylvania State University, where he also serves as Director of the *Center for Brain, Behavior, and Cognition*, and Associate Director of the *Institute for CyberScience*. The goal of his research is to understand the neuro-computational bases of language learning, and its relationship with culture, brain, and technology. His recent work uses brain-based, cyber-enabled and data-intensive methods to study language learning, bilingualism, and reading comprehension. Li is Editor-in-Chief of *Brain and Language* and Associate Editor of *Frontiers in Psychology: Language Sciences*. He previously served as Editor of *Bilingualism: Language and Cognition* and *Journal of Neurolinguistics*, as President of *Society for Computers in Psychology*, and Program Director of *Cognitive Neuroscience* and of *Perception, Action and Cognition* at the US National Science Foundation. For more information about his research, visit http://blclab.org/.