From executive behaviors to neurophysiological markers of executive function:
Measuring the bilingual advantage in young adults

by

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Abstract

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The ease at which individuals acquire a second language is astounding. Individuals are capable of learning a second language at any point throughout their lifespan, although it is easier to learn a second language early in life. With increasing knowledge about linguistic neural processing and the brain’s capacity for plasticity, the research on bilingualism has increased substantially. Researchers have become increasingly more interested in the long-term effects of acquiring a second language, especially the enhancement of executive function (EF). This enhancement, also known as bilingual advantage, has been studied for a range of EFs, including inhibition, attention, problem solving, and reasoning. Although this effect was first demonstrated in bilingual children, researchers have extended the quest for understanding to young, middle, and older adults; however, the research findings are mixed for young adults. In order to clarify these mixed results, the age of second language acquisition has been included as an experimental variable, producing three relevant groups: early bilinguals, late bilinguals, and monolinguals.

There are several ways in which EFs can be measured, including behavioral rating scales, computerized cognitive tasks with behavioral outcomes (i.e., response times and accuracy), and computerized event-related potential cognitive tasks. A novel multi-level approach to measuring the bilingual advantage was developed and used as a framework for the current dissertation; i.e., the bilingual advantage was measured at three levels of measurement. This approach predicts that more complex levels of measurement (i.e., executive behaviors) would produce null findings
between the three groups, while differences between early bilinguals and the other two groups would be predicted for less complex levels of measurement (i.e., neurophysiological markers). This approach predicts mixed results for levels of measurement that involve moderate complexity (e.g., computerized tasks of EF). Early bilinguals, late bilinguals, and monolinguals were compared across three hierarchical levels of measurement: (i) executive behaviors; (ii) information processing (i.e., computerized tasks of EF); and (iii) neurophysiology (i.e., event-related potential paradigm). Findings generally support the multi-level approach: no differences were found at the executive behavior level, limited and mixed differences were found at the information processing level, and differences between groups were found at the neurophysiological level.