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Individual Differences in Executive Function Modulate Bilingual Between-Language Activation during Reading in Healthy Older Adults: Evidence from Eye-tracking

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Introduction

Older adults have special difficulty resolving lexical ambiguity (*minute* – small/unit of time) during language understanding, an issue potentially caused by age-related decline in executive function (Dagerman, MacDonald & Harm, 2006). These linguistic challenges may be even greater for bilingual older adults who face both within- and between-language ambiguity (*four* – oven in French vs. a digit in English) (Dijkstra & Van Heuven, 2002). However, benefits in executive function brought about by life-long bilingualism may counter any age-related declines in bilingual lexical ambiguity resolution (Bialystok, Craik & Freedman, 2007). Here, we investigate two questions about bilingual language in older adults. First, do older adults show greater difficulty in resolving between-language lexical ambiguity compared to younger bilinguals? Second, do individual differences in executive function (inhibition or working memory) predict between-language lexical ambiguity resolution performance in older adults?

Method

We monitored the eye movements of 24 French-English healthy older and 24 younger bilinguals, matched on second language (L2) proficiency, as they read sentences in English containing lexically ambiguous words: cognates (*piano*) or interlingual homographs (*four*). Participants also completed an executive function battery and L2 questionnaire. We constructed linear mixed effects models for early and late reading measures using word type (*target* vs. *control*), sentence context (*biased* vs. *unbiased*), L2 proficiency, inhibitory capacity, working memory span, and L1 ability as fixed effects, subject and item as random effects.

Results & Discussion

Older bilinguals read more slowly than younger bilinguals. However, there were no age-related differences in cognate facilitation and homograph interference (indicators of between-language activation) for early reading measures (first fixation and gaze duration). However, older adults showed greater between language activation for both word types for later reading measures (go-past, total reading time, and number of regressions) as a function of L2 proficiency and context. Further, increased working memory among older bilinguals was associated with greater cognate facilitation, which is presumably helpful for language understanding. In contrast, decreased inhibitory capacity among older bilinguals was associated with greater homograph interference, which is presumably disruptive to language understanding. Thus, bilingual lexical ambiguity resolution is

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disproportionately more difficult for older vs. younger bilinguals. Moreover, individual differences in working memory and inhibition are significant predictors of bilingual language performance in older adults, consistent with the presumed link between bilingualism and executive function.

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