

Interhemispheric transfer in monolingual and bilingual young and older adults in a divided-field Stroop task

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The corpus callosum is the largest white matter structure of the human brain, which enables interhemispheric transfer of information. Research has shown that bilinguals have larger anterior regions of the corpus callosum (Felton et al., 2017; Coggins et al., 2004) when compared to monolinguals. Besides, as a potential consequence of age-related thinning of the corpus callosum and therefore less facilitated interhemispheric transfer, older monolingual adults seem to experience less interference from contradicting stimuli when bilaterally displayed (Delvenne & Castronovo, 2018). The current study aimed to investigate whether bilinguals, due to a larger corpus callosum, would experience more interference from bilaterally displayed contradicting stimuli and whether age-related decline in interference would be reduced by bilingualism. In this divided-field Stroop task, four groups of younger (18-25 years) and older (65-85 years) monolinguals and bilinguals were tested with spatially separated target and distracter stimuli in two similar online experiments. Experiment 1 used word and colour stimuli, while Experiment 2 used number and dots stimuli, to control for the language component of Experiment 1. As expected, all groups showed a significant Stroop effect across both experiments. In Experiment 1, the Stroop effect was the smallest in younger bilinguals, which is in line with the literature (Bialystok et al., 2008), suggesting that even highly fluent bilinguals may read their second language less automatically. Therefore, reading the word while reacting to the colour would not interfere as much in younger bilinguals than in monolinguals. This was confirmed by Experiment 2 when the stimuli did not include any words, as a Stroop effect for younger bilinguals was found in this task. For the older bilinguals, the Stroop effect was significantly larger in the bilateral condition than in the unilateral condition, while there was no difference between the two for all other groups. As hypothesised, this suggests that older bilinguals experience more interference from contradicting stimuli in the bilateral display when compared to their monolingual peers. This could be explained by increased white matter integrity through lifelong bilingualism (Anderson et al., 2018) and would mean that older bilinguals are less able to inhibit the distracter stimulus in a bilateral display compared to older monolinguals. However, this effect only occurs in Experiment 1, while no differences between groups for the Stroop effect are found in Experiment 2.

References

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