

Bilingualism and Working Memory Capacity: A Comprehensive Meta-analysis

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first (L1) or second (L2) language for bilinguals moderated the effect size of the bilingual advantage.

- Bilingualism has been associated with the enhancement of multiple executive functions (EFs), including cognitive flexibility, efficiency, task-switching, and conflict resolution.
- This is believed to be the result of lifelong experience managing multiple languages that compete for selection.
- Substantial evidence exists that both languages are activated in the bilingual brain even when only one language is being used.
- Managing languages that compete for selection requires resources from WM, and continual use of WM resources might lead to enhanced WM capacity over time in order to ensure the efficiency of processing in the future.
- Recent models of WM share the view that it is constructed of multiple component processes that rely heavily on selective attention.
- Learning a second language across the lifespan necessarily involves selective and sustained attention that operate on perceptual and long-term memory information.



The study

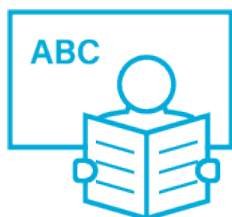
The present study performed a comprehensive meta-analysis on the effects of bilingualism on working memory capacity to reveal an estimate of the population effect size. Furthermore, the authors were able to examine age, the linguistic nature of the task, and the language in which the task was performed as potential moderating variables.

The data included a total of 88 effect sizes from 27 independent studies with a total sample involving 2,901 participants.



Findings

- The weighted mean population estimate was significant, $p = 0.20$, $X^2(1, N = 88) = 799.65$, $p < 0.001$; the 95% confidence interval was -0.253 (lower) to 0.653 (upper).
- Age moderated the findings, but type of task did not.
- The effect of age is explained by the finding that children ($p = 0.25$) showed larger effect sizes than young adults ($p = 0.03$; $t(5,411) = 3.56$, $p = 0.001$) and older adults ($p = 0.08$; $t(271) = 2.32$, $p = 0.03$).
- The analysis also revealed a significant moderating effect of whether the verbal tests were performed in the L1 or L2 for bilinguals on the population effect size, $X^2(1, N = 46) = 12.00$, $p = 0.001$.
- This is explained by the finding that when bilinguals did the WM task in their L1 ($p = 0.28$; $N = 35$) the effect size was much larger than when they did the task in their L2 ($p = -0.11$; $N = 11$), which was in the opposite direction.



Conclusions

- The authors propose that second language experience has a positive effect on WM capacity.
- The bilingual advantage appeared to be strongest in children.
- When bilinguals performed the task in their L1, they performed better than monolinguals, but when they performed the task in their L2, they performed worse than monolinguals.
- This exemplifies the importance of ensuring that both groups are performing the task in their dominant language.