What do linguistic and non-linguistic cognitive control have in common?

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Background

Mixed evidence on the impact of bilingualism on training of cognitive control
• cross-sectional comparisons do not always replicate "the bilingual benefit"
• no demonstrated causality of the effect (in a longitudinal design)
• cognitive and language control are not unitary constructs

Question: What aspects of cognitive control can be modulated by language control?

Methods

Non-linguistic control

Flanker task

Competition Priming task

Stroop task (in L1)

Running Span Task

Linguistic control

Competitor Priming task

Interlingual Homograph task

Language Switching task

Verbal Fluency

LexTALE task

L2 proficiency measure

Participants

63 high-school students, 16-17 years old
Native speakers of Polish
Fairly good knowledge of English (CEFL: B1/B2 - C2)
tested 3 times on the same set of tasks, across 2 years

Data analysis strategy

• All analyses conducted across the three stages, ignoring the contribution of testing stage
• All RTs logarithmized
• All indices involving substraction residualized instead (see e.g. Friedman et al 2004)
• Linear regressions used; best-fitting models shown (with the least AIC)

Results

Correlation matrix

Regression models

Running Span Task score

• predicted by letter fluency in L1 and by interference size induced by interlingual homographs
• little theoretical reason for these tasks to covary
• larger WM span promotes processing of both meanings of language ambiguous words?
superior WM capacity leads to larger homograph interference?

Stroop effect

• common variance with costs of switching to L1, suggests that switching to L1 involves inhibition of prepotent response (L2 name)
• Inhibition of prepotent response might be trainable by bilingual experience

The reported links suggest areas in which the transfer is more likely to be observed.

Discussion

• Linguistic and non-linguistic control indices are extremely noisy
• Most effects obtain only after including data from all three stages
• Linguistic and non-linguistic measures of control share little variance
• Only weak links between the non-linguistic and linguistic control measures;

Flanker effect

• the common component of the Flanker effect and L1 letter fluency: resistance to interference
• unlikely to be related to the language control mechanisms typically assessed in research on bilingualism

Acknowledgements

The research was supported by Foundation for Polish Science Subsidy and National Science Centre grant awarded to Zofia Wodniecka. We are grateful to the participants, who volunteered to take part in our study. Special thanks to Justyna Gilewskaja, Ewelina Frąckiewicz and Wiktor Czosnowski, for help with data acquisition.