Effects of Bilingualism on Cognitive Control in Stroop and ANT Tasks

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Research Questions
Does bilingualism confer domain-general executive control and global reaction time (RT) advantages?

Does the degree of bilingualism (AoA and L2 proficiency) play a role?

Predicted Results
Higher L2 proficiency and earlier AoA will result in smaller overall interference effects and faster RTs in both congruent and incongruent conditions for English-French bilinguals

Bilinguals will have an advantage in controlling interference in the linguistic Stroop task and in the non-linguistic Attention Network Test (ANT)

Background
For bilinguals, both languages are active simultaneously  

Mediating between two languages requires cognitive control
  • attention, inhibition, conflict resolution
  • bilinguals may have a cognitive control advantage

Global RT advantages have been observed for the ANT task

Better inhibitory control may be an insufficient explanation for the bilingual advantage
  • bilinguals may be better overall on these tasks due to increased attentional network abilities

Inconsistent evidence for correlation among different tasks (Stroop, ANT, switch tasks, flanker tasks) of cognitive control in bilinguals

Method
Participants
English-French bilingual learners of L2 French with varying AoA and degrees of proficiency

18-35 years of age, attending or completed university

Procedure
  • Language background questionnaire and written language proficiency tests
  • Control trials followed by Stroop task and ANT trials in alternating blocks
  • 3 blocks of Stroop, 4 blocks of ANT
  • Each block preceded by practice trials and followed by a self-timed break

Stroop Task

Control Congruent Incongruent

HOUSE MAISON RED ROUGE RED ROUGE

Colour words used
English: RED, GREEN, YELLOW, BLACK, WHITE, SILVER
French: ROUGE, VERT, JAUNE, NOIR, BLANC, ARGENT

Preliminary Results and Discussion

Stroop Effect in Dominant Language in Dominant-Only and Mixed-Language Conditions

English-dominant participants
  • Low-Mid L2 French proficiency
  • Larger Stroop effect in English-only than in Mixed condition

French-dominant participants
  • Highly proficient bilinguals
  • Larger Stroop effect in French-only than in Mixed condition
  • Smaller effects even in dominant language compared to English group

- Highly proficient bilinguals show less interference effects, suggesting increased cognitive control

References


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