Heritage Speakers’ Language Proficiency and its Relation to Executive Control

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Introduction

- Research has reported increased executive function for bilinguals compared to monolinguals (Bialystok, 2012). Executive function refers to higher-level cognitive skills that control or coordinate various other cognitive processes.
- This bilingual advantage is thought to stem from the cognitive demands placed on bilinguals to control which language they are using and to inhibit the language they are not using.
- It is unclear whether this advantage extends to heritage speakers—individuals who are raised in a home where a non-majority language is spoken and who maintain proficiency in that language.
- Proficiency in the heritage language ranges quite a bit (Montrul, 2010). Heritage speakers with high proficiency in both languages resemble the bilinguals tested in other studies and so might show better executive function than those with lower proficiency in the heritage language.
- On the other hand, heritage speakers with lower proficiency may need to use greater control when speaking in their less-proficiency language compared to those with high proficiency.
- We assessed executive function in a linguistic and non-linguistic cognitive control task.
- This is novel research extending previous findings of executive functions in bilinguals to heritage speakers at UC Riverside.

Research Questions

1. Do heritage speakers demonstrate better executive function than monolinguals?
2. Does proficiency in the heritage language predict executive function ability?

Methods

- Language History Questionnaire (LHQ): Assesses the linguistic background of participants including self-reported proficiency on a scale from 1 (poor) to 10 (excellent).
- Naming task: Measures word retrieval ability for pictures preceded by distractor words; distractors included semantically related and unrelated object names, color words that matched or mismatched the picture color, and a series of X’s (control condition). The inhibitory control effect was calculated as the difference in response times for the color-match and semantically related conditions compared to the control condition. Half of the heritage speakers did the naming task in their dominant language and the other half did the naming task in their non-dominant language.
- AX Continuous Performance Task (AX-CPT): Analyzes individual differences in cognitive control. Participants respond “yes”/“no” to a series of individual letters. Participants respond “yes” only when the letter A is followed by the letter X (70% of trials). AX trials require reactive control (inhibition) and BX trials require proactive control (monitoring).

Analysis

- For reaction times, we excluded trials from incorrect responses, trials < 100 ms, and trials longer than 3,000 ms (naming), and trials more than 2.5 SD from the participant’s mean.
- Correlation analyses was used to test the relationship between heritage language proficiency and executive function and an ANOVA was used to compare heritage speakers to English monolinguals.

Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>Heritage Speakers</th>
<th>Monolingual English Speakers</th>
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<tbody>
<tr>
<td>H</td>
<td>Age range (yrs)</td>
<td>Age range (SD)</td>
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<tr>
<td>1</td>
<td>19-23</td>
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<td>9.3 (3.9)</td>
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<td>9.9 (1)</td>
<td>11.1 (1.5)</td>
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<td>3</td>
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<td>&lt;5 years</td>
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<td>9.9 (1.5)</td>
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Results

- More errors in the AV condition reflect less reactive inhibition. There is no significant difference between groups for errors on AY trials (F = 1.24, p = 0.24).
- More errors in the BX condition reflect less proactive inhibition. There is no correlation between heritage language proficiency and BX errors (r = 0.062, p = 0.68).
- More errors in the BX condition reflect less proactive control (measuring). There is no correlation between heritage language proficiency and BX errors (r = 0.062, p = 0.68).

Discussion

- We found that heritage speakers and English monolinguals showed similar executive function abilities on the AX-CPT task. Although heritage speakers showed more errors and higher reaction times when compared to monolingual English speakers, this difference was not significant.
- Language heritage proficiency did not significantly predict executive function ability. There was a weak positive correlation between heritage language proficiency and response times on the AY condition, suggesting that heritage speakers with lower heritage language proficiency and response times on the AY condition, suggesting that heritage speakers with lower heritage language proficiency did not significantly predict executive function ability.
- Previous studies have found that bilinguals frequently display an advantage in executive function when compared to monolinguals. We found heritage speakers did not show this advantage compared to monolingual English speakers on the measures we used. Instead, heritage speakers with lower proficiency may engage executive function more in order to control their more dominant language (English) when speaking the less proficient heritage language.

Future Explorations

- Explore how the various proficiencies in the languages of heritage speakers impact performance on a wider range of executive function measures.
- Use objective measures of language proficiency instead of self-rated proficiency to better detect relationships between language proficiency and executive function.

References & Acknowledgements


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