SPANISH-ENGLISH BILINGUALS’ PROCESSING OF RELATIVE CLAUSES
AN ERP STUDY
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Introduction
- Bilinguals differ from monolinguals in ERP responses to linguistic stimuli based on individual factors such as age of acquisition, L2 proficiency, similarity between L1, L2, etc.
- Object relative clauses are more difficult to process than subject relative clauses in both Spanish and English.
- Previous ERP findings in monolinguals: object relative clauses elicit N400 and P600 (e.g., King & Kutas, 1995; Friederici, Schnider, Steinhauser, & Friederici, 1995).

Stimuli
- “||” marks beginning of epoch.

Temporal PCA reduces the 250 time points to clusters of virtual electrodes whose behavior is similar to high correlation between electrodes.

Design & Methods
- Participants
  - LB - Spanish-English Late Bilinguals (n=20)
  - Eng
  - Spa
  - Pathways
  - Spa Eng
- Subject relative clauses in both Spanish and English.
- Derived ERP components selected based on consistency with latency, polarity, and scalp distribution of linguistic ERP components in the literature (e.g., P600, N400, LAN).

Research Questions
1. Are ERP components which indicate processing difficulty greater for object-relatives than subject-relatives in late bilinguals?
2. Do heritage speakers process object-relatives and subject-relatives differently when compared to late bilinguals?

Analysis & Results

<table>
<thead>
<tr>
<th>Anterior</th>
<th>Marginal Means</th>
<th>Obj/Subj RC Asymmetry</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td>LB</td>
<td>HS</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>-241.1 *</td>
<td>-241.1 *</td>
</tr>
<tr>
<td>Group(HS)</td>
<td>427.9</td>
<td>427.9</td>
</tr>
<tr>
<td>RC(object)</td>
<td>-338.1 .028 *</td>
<td>-338.08</td>
</tr>
<tr>
<td>Group(RC)</td>
<td>-66.8 .003 **</td>
<td>-66.8 .003 **</td>
</tr>
</tbody>
</table>

Posterior
- Estimate  p-value
- (Intercept) | -102.58 .002 ** |
- Group(HS)  | 155.31 .003 **  |
- RC(object) | -135.92 .005 **  |
- Group(RC)  | -225.97 .002 **  |

Discussion
- PCA isolates centro-parietal P600, (consistent with previous literature), and frontal P600, an indicator of syntactic ambiguity resolution or complex syntactic integration difficulties (Friederici, yaffe, & Saddy, 2002; Kaan & Swaab, 2003).
- Greater frontal P600 amplitudes for HS than LB across condition (Subj. & Obj.) indicates increased processing load.
- HS N375 and N420 are likely constituent components which make up N400 as previously quantified.
- LB P375 and P420 are likely constituent components which make up P300/P400 as previously quantified, components caused by unexpected stimuli (e.g., Duncan-Johnson & Donchin, 1977; Aleksandrov & Makimova, 1985).
- Both groups exhibit early increased processing in object compared to subject RCs.
- Given inherent variability in ERPs of bilinguals, future work will run separate PCAs by group.

Summary of results
- LBs had a P600, HSs did not.
- Both LBs and HSs had two early components in the ~400ms region, but in opposite directions.
- HS is negative deflection for Obj compared to Subj RC.

References & Acknowledgements

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