Introduction

- Code-blending, simultaneous production of signs and words, presents a unique opportunity to study the costs of dual lexical access versus language inhibition
- Bimodal bilinguals prefer code-blending over code-switching (Emmorey et al., 2008)
- Code-blending facilitates semantic comprehension (Emmorey et al., 2012), which could reflect cross-linguistic integration at phonological and/or semantic levels.

Research questions

1. Do meaning-based and form-based lexical tasks yield differential patterns of code-blend integration in bimodal bilinguals?
   - Do form cues from one language constrain form recognition in the other? If yes, this suggests integration at the phonological level
   - Does simultaneous comprehension of lexical items from two languages speed semantic processing? If yes, this suggests integration at the semantic level

2. Do early and late bimodal bilinguals exhibit different patterns of code-blend integration?

Participants

<table>
<thead>
<tr>
<th></th>
<th>Early bilinguals (CODA, n=16, 8 F)</th>
<th>Late bilinguals (L2 learners, n=15, 13 F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>24.2 (5.3)</td>
<td>32.1 (6.3)</td>
</tr>
<tr>
<td>Years of education</td>
<td>14.4 (1.6)</td>
<td>17.4 (2.5)</td>
</tr>
<tr>
<td>Age of exposure to ASL</td>
<td>—</td>
<td>17.2 (5.4)</td>
</tr>
<tr>
<td>% Time ASL use</td>
<td>34.4 (17.5)</td>
<td>37.0 (13.9)</td>
</tr>
<tr>
<td>% Time ASL exposure</td>
<td>41.2 (21.5)</td>
<td>31.2 (17.0)</td>
</tr>
<tr>
<td>ASL proficiency (self-rating, 1-7 scale)</td>
<td>6.4 (7.4)</td>
<td>5.9 (7.7)</td>
</tr>
</tbody>
</table>

Tasks

1. Semantic Decision
   - *Is this item (ASL sign, English word, ASL-English code-blend) concrete or abstract in meaning?*

2. Lexical Decision
   - *Is this form (ASL sign, English word, ASL-English code-blend) a real lexical item?*

Stimuli

- 120 items (75 concrete, 45 abstract) recorded as audiovisual English words, ASL signs and ASL-English code-blends
- Stimulus lists (40 items per list) were controlled for English frequency (SubtLex-US) and counterbalanced such that all items were viewed in each language condition, but no participant saw the same item twice

Procedure

- Order of semantic and lexical decision tasks and presentation modality within each task counterbalanced across participants

Analysis

- Reaction times for ASL and English analyzed separately in 2 x 2 ANOVAs with bilingual group (early, late) and presentation condition (alone, code-blend)

Results

Semantic Decision

- Early bilinguals responded faster than late bilinguals (F(1,29)=5.74, p<.05, η²= .27), and both groups responded faster for code-blends than signs alone (F(1,29)=19.59, p<.01, η²= .40)
- ENG vs CB: Faster responses for code-blends than words alone, but only for early bilinguals (F(1,29)=3.89, p=.07, η²= .13)

Lexical Decision

- *Lexical items*
  - ASL vs CB: Faster responses for code-blends than signs alone (F(1,29)=27.55, p<.01, η²= .49)
  - ENG vs CB: Similar response times for code-blends and words alone (F < 1)
- *Pseudo-items*
  - ASL vs CB: Faster responses for code-blends than signs alone (F(1,29)=46.11, p<.01, η²= .60)
  - ENG vs CB: Faster responses for code-blends than words alone (F(1,29)=25.33, p<.01, η²= .49)

Code-blend facilitation

- Evidence for cross-linguistic integration at a semantic level in early bimodal bilinguals, but not in late bimodal bilinguals
- Early bilinguals recognize ASL signs more quickly than late bilinguals, which speeds recognition of English words in code-blends
- Lack of code-blend facilitation in lexical decision for English lexical items suggests cross-linguistic integration is weak or absent at the phonological level
- Evidence for cross-linguistic integration in lexical decision was limited to pseudo-items and appeared stronger for late bimodal bilinguals
- Early and late bilinguals may be differentially sensitive to the morpho-phonological variation that is allowed in ASL

These patterns of facilitation suggest simultaneous activation of semantic representations from two languages and indicate cost-free dual lexical access

Discussion

- Evidence for cross-linguistic integration at a semantic level in early bimodal bilinguals, but not in late bimodal bilinguals
- Early bilinguals recognize ASL signs more quickly than late bilinguals, which speeds recognition of English words in code-blends
- Lack of code-blend facilitation in lexical decision for English lexical items suggests cross-linguistic integration is weak or absent at the phonological level
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References