Phonological & Lexical Cues in Word Learning by Preschool Children

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Word Learning

- Children learn words rapidly
  - ~1 - 10 words day (Bloom, 2000)
  - Fast mapping of novel words after limited exposure (e.g., Dollaghan, 1985)
- An array of cues are available and used by children in their word learning
  - e.g., linguistic, social
- Although available to all word learners, these cues are utilized differently across development (Hirsh-Pasek, Golinkoff & Hollich, 2000)

Phonological Characteristic

- Phonotactic Probability (Vitevitch & Luce, 1999)
  - Sound characteristic
  - The frequency with which a particular sound or sound pattern occurs in a language
    - e.g., /ʃ i t/
    - Common → “coat”
    - Rare → “watch”

Lexical Characteristic

- Neighborhood Density (Luce & Pisoni, 1998)
  - Characteristic of whole word forms
  - The number of similar sounding words based on a one sound substitution, addition, or deletion.
    - e.g., /ʃ i t/ → /ʃ i t/ /ʃ i t/ /f i t/ /ʃ t/ /ʃ i t/
    - Dense → “sit”
    - Sparse → “these”

A Relationship Exists

- Phonotactic probability and neighborhood density are correlated (Vitevitch et al., 1999; Storkel, 2004).
  - Common sound sequences ~ dense neighborhoods
    - e.g., “coat” “sit”
  - Rare sound sequences ~ sparse neighborhoods
    - e.g., “watch” “these”
**Child vs. Adult Word Learning**

- Preschool word learning (Storkel, 2001, 2003, 2004; Storkel & Rogers, 2000)
  - Common/dense > Rare/sparse
- Adult word learning (Storkel, Armbruster & Hogan, 2006)
  - Rare sound sequences > Common sound sequences
  - Dense > Sparse

**Purpose**

- To examine the unique and interactive contributions of phonotactic probability and neighborhood density to word learning by including correlated and dissociated stimuli
- To uncover the individual effects of phonotactic probability and neighborhood density across development

**Participants**

- 3 year olds (N=17; 43 months)
- 4 year olds (N=31; 54 months)
- 5 year olds (N=20; 62 months)
- Monolingual native English speakers
- Normal hearing
- Children scored WNL on standardized measures of articulation, receptive and expressive vocabulary

**Stimuli**

<table>
<thead>
<tr>
<th>Correlated</th>
<th>Dissociated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common-Dense</td>
<td>Rare-Sparse</td>
</tr>
<tr>
<td>paun</td>
<td>wap</td>
</tr>
<tr>
<td>jæt</td>
<td>nib</td>
</tr>
<tr>
<td>mid</td>
<td>tæm</td>
</tr>
<tr>
<td>woon</td>
<td>hub</td>
</tr>
<tr>
<td>Rare-Dense</td>
<td>Common-Sparse</td>
</tr>
<tr>
<td>pæb</td>
<td>hæn</td>
</tr>
<tr>
<td>jaun</td>
<td>jæm</td>
</tr>
<tr>
<td>meb</td>
<td>hæud</td>
</tr>
</tbody>
</table>

**Procedure**

- Nonword stimuli were paired with novel object referents from 4 semantic categories
  - Toys, pets, candy machines, horns
- Embedded in the context of a three-episode story
- Number of exposures increased with each story episode
- Learning was measured via picture naming after 24 exposures

**Results**

- 2 neighborhood density x 2 phonotactic probability x 3 age repeated measures ANOVA
  - Significant neighborhood density x age interaction
    - $F(2, 65) = 3.3, p = .044$
  - Significant phonotactic probability x age interaction
    - $F(2, 65) = 4.0, p = .024$
3 year olds

- No significant main effects of phonotactic probability or neighborhood density

4 year olds

- No significant main effect of phonotactic probability
- Significant main effect of neighborhood density
  - $F(1, 30) = 9.7$, $p = .004$
  - Dense advantage

5 year olds

- Significant phonotactic probability x neighborhood density interaction
  - $F(1, 19) = 4.6$, $p = .044$
- No main effect of neighborhood density
- Significant main effect of phonotactic probability
  - $F(1, 19) = 10.8$, $p = .004$
  - Rare sound sequence advantage for sparse nonwords only
Summary

<table>
<thead>
<tr>
<th></th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
<th>Adults (Storkel et al., 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonotactic Probability</td>
<td>NS</td>
<td>NS</td>
<td>Rare &gt; Common (Sparse only)</td>
<td>Rare &gt; Common</td>
</tr>
<tr>
<td>Neighborhood Density</td>
<td>NS</td>
<td>Dense &gt; Sparse</td>
<td>NS</td>
<td>Dense &gt; Sparse</td>
</tr>
</tbody>
</table>

Conclusions

- The use of phonological and lexical cues in word learning changes from 3- to 4- to 5-years
- Adults use phonological and lexical cues in tandem (Storkel et al., 2006)
- Ongoing Research:
  - Change in the use of phonological, lexical, and semantic cues across preschool, school-age and adult word learners

Thank you!

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