Word Learning II:
Experimental Word Learning in Children with Phonological Delays
Jill R. Hoover, Holly L. Storkel, & Andrea N. Giles
University of Kansas

Phonological Characteristic
• Phonotactic Probability (Vitevitch & Luce, 1999)
  – Characteristic of individual sounds
  – The frequency with which a particular sound or sound pattern occurs in a language
  • Common → “coat”
  • Rare → “watch”

Phonotactic Probability
• Positional Segment Frequency:
  • The likelihood of occurrence of individual sounds in a given word position
    – e.g., /f i t/
• Biphone Frequency:
  • The likelihood of occurrence of a pair of sounds
    – e.g., /fi t/ or /fi t/

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., /fi t/ → /ti t/ or /fi 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”

Preschool Word Learning
• Previous studies using correlated stimuli have found different results for different groups of children
Typical Language Development

• Typically developing (TD) children learn common/dense > rare/sparse (Storkel, 2001, 2003, 2004; Storkel & Rogers, 2000)

Phonological Delay

• Phonological Delay:
  – Breakdown in production and/or knowledge of the sound system with otherwise typical development

• Children with phonological delays (PD) learn rare/sparse > common/dense (Storkel, 2004)

Purpose

• To examine the unique contributions of phonotactic probability and neighborhood density to word learning by including correlated and dissociated stimuli
• Further investigate differences between TD and PD groups
  – Effect of neighborhood density?
  – Effect of phonotactic probability?

Participants

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>GFTA Raw Score</th>
<th>ROWPVT Raw Score</th>
<th>EOWPVT Raw Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>+*PD (N=22)</td>
<td>60  (41-79)</td>
<td>35  (20-51)</td>
<td>59  (33-81)</td>
<td>56  (34-72)</td>
</tr>
<tr>
<td>+TD (N=15)</td>
<td>54  (38-68)</td>
<td>8   (0-28)</td>
<td>62  (47-84)</td>
<td>57  (34-81)</td>
</tr>
</tbody>
</table>

*Children in the PD group scored WNL on an omnibus language test, oral motor test, and nonverbal IQ

Stimuli

<table>
<thead>
<tr>
<th>Correlated</th>
<th>Correlated</th>
<th>Dissociated</th>
<th>Dissociated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common-Dense</td>
<td>Rare-Sparse</td>
<td>Common-Sparse</td>
<td>Rare-Dense</td>
</tr>
<tr>
<td>jaet</td>
<td>nib</td>
<td>paib</td>
<td>haud</td>
</tr>
<tr>
<td>woun</td>
<td>hub</td>
<td>jan</td>
<td>nad</td>
</tr>
<tr>
<td>paun</td>
<td>tom</td>
<td>meb</td>
<td>wud</td>
</tr>
<tr>
<td>nd</td>
<td>wap</td>
<td>hun</td>
<td>jeim</td>
</tr>
</tbody>
</table>

Procedure

• Nonword stimuli were paired with novel object referents from 4 semantic categories
  – Toys, pets, candy, musical instruments
• Embedded in the context of a three-episode story
• Number of exposures increased with each story episode
• Picture Naming
Preliminary Results

• 2 neighborhood density x 2 phonotactic probability repeated measures ANOVA
• Near significant main effect of phonotactic probability
  – $F(1, 35) = 3.147, p = .08$
  – Common > Rare
• No interaction with group
• No effect of neighborhood density

Phonotactic Probability

![Graph showing proportion correct for Common and Rare sounds across groups PD and TD.]

Neighborhood Density

![Graph showing proportion correct for Dense and Sparse neighborhood density across groups PD and TD.]

Preliminary Conclusions

• Phonotactic Probability
  – Common sound sequence advantage across both groups
  – Children with TD & PD use phonological information in an immediate word learning context

• Neighborhood Density
  – No effect of neighborhood density across groups
  – More important to long term as opposed to immediate word learning

Integration with Previous Research (Storkel, 2004)

• Correlated stimuli $\rightarrow$ group differences
  – TD: Common/Dense > Rare/Sparse
  – PD: Rare/Sparse > Common/Dense

• Dissociated stimuli $\rightarrow$ no group differences
  – TD & PD: Common > Rare with no effect of neighborhood density
Storkel (2004) vs. Current Study

- Phonological similarity of stimuli
  - Storkel, 2004 → phonologically similar stimuli
    • 4 repeated onsets per story
    • 0 unique onsets per story
    • Same onsets repeated across stories
  - Current study → phonologically dissimilar stimuli
    • 2 repeated onsets per story
    • 4 unique onsets per story
    • Different onsets repeated across stories

Acknowledgements

- NIDCD 06545, 00052
- Contributors: Teresa Brown, Jennie Fox, Andrea Giles, Stephanie Gonzales, Junko Maekawa, Mariza Rosales, Katie Shatzer, Maki Sueto, Courtney Winn, Allison Wade
- Contact Information: Jill R. Hoover
  jrhoover@ku.edu
  www.ku.edu/~wrdmln