Predicting Word Learning by Preschool Children with Phonological Delays

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Prediction of Word Learning (Gray, 2004, 2006)
- Vocabulary test scores
- Speech production test scores
- Nonword repetition (e.g., working memory)

Children with Phonological Disorders (PD)
- Significant delay in acquisition of speech sounds with no obvious cause
- Other language skills (usually) within normal limits (Shriberg, Tomblin, & McSweeny, 1999)
- However, poorer performance on nonword repetition (Munson, Edwards, & Beckman, 2005)
- At risk for word learning deficits?

Purpose
- Compare children with PD to typically developing children (TD) on:
  - Word learning (immediate as well as retention)
  - Known vocabulary
  - Working memory (including nonword repetition)
  - Determine predictors of word learning

Participants

<table>
<thead>
<tr>
<th>Number</th>
<th>Children with Phonological Disorders (PD)</th>
<th>Children with Typical Development (TD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>4.0 (2.07) 3.5 – 6.7 3.0 – 5.8</td>
<td>4.8 (2.11) 3.5 – 6.7 3.0 – 5.8</td>
</tr>
<tr>
<td>39</td>
<td>9 (90) 23 - 51</td>
<td>9 (100) 20 - 40</td>
</tr>
<tr>
<td>6 (0)</td>
<td>64 (24) 5 - 16</td>
<td>27 (98) 1 - 16</td>
</tr>
</tbody>
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Word Learning
- 16 CVC nonwords paired with novel objects
- Nonwords varied in phonotactic probability and neighborhood density
- Collapsed across for this analysis to examine overall learning
- Exposure occurred in a game format
- Picture naming tested
  - Following 24 exposures (immediate learning)
  - After a 1-week delay without additional exposure (retention)
- ANCOVA: 2 Group (PD, TD) x 2 Time (immediate, retention) with Age as co-variate
  - Significant effect of Group

Vocabulary Probe
- Receptive and expressive
  - Words varied in phonotactic probability and neighborhood density
  - Collapsed across for this analysis to examine overall learning
- 2 ANCOVA: 2 Group (PD, TD) x 2 Test (receptive, expressive) with Age as co-variate
  - No significant effect of group

Nonword Repetition
- Repeat lists of CVC nonwords that increased in length from 1 to 4 nonwords
- Nonword Processing Task: Listen to a sentence containing a CVC nonword while viewing a picture containing a novel object
- Repeat the nonword(s)
  - Number of intervening sentences before repetition prompt varies from 1 to 4
- ANCOVA: 2 Group (PD, TD) x 2 Task (repetition, processing) with Age as co-variate
  - No significant effect of group

Nonword Processing Task
- Listen to a sentence containing a CVC nonword
- Verify whether the sentence matches the picture
- Repeat the nonword(s)
- Number of intervening sentences before repetition prompt varies from 1 to 4

Predicting Word Learning
- 2 linear regression analyses: 1 for immediate word learning; 1 for retention
  - Step 1: Age forced as predictor
  - Step 2: GFTA raw score forced as predictor
  - Step 3: ROWPVT & EOWPVT raw score added if significant
  - Step 4: Vocabulary probe & working memory raw scores added if significant
- GFTA errors decreased, immediate word learning proportion correct increased
- Nonword repetition accuracy increased, word learning retention proportion correct increased

Known Vocabulary
- Standardized Tests
  - Receptive One Word Picture Vocabulary Test (Brownell, 2000a)
  - Expressive One Word Picture Vocabulary Test (Brownell, 2000b)
- Vocabulary Probe
  - Receptive and expressive
    - Words varied in phonotactic probability and neighborhood density
      - Collapsed across for this analysis to examine overall learning
- ANCOVA: 2 Group (PD, TD) x 2 Test (receptive, expressive) with Age as co-variate
  - No significant effect of group

Summary and Conclusions
- Children with PD differ from children with TD in learning and retention of new words
  - Similar to other communication disorders (e.g., SLI)
- Children with PD were similar to children with TD in known vocabulary and working memory
  - Differs from other communication disorders (e.g., SLI)
- Immediate word learning was predicted by productive phonology
  - Immediate word learning was predicted by nonword repetition
  - Productive phonology may influence immediate processing of novel words during short-term exposure
- Word learning retention was predicted by nonword repetition
  - Phonological working memory may influence quality of newly formed lexical representations impacting retention and recall of new words
- Intact phonological working memory may help children with PD compensate for deficits in initial word learning
  - Able to take advantage of additional exposures to improve the quality of lexical representations, yielding normal vocabulary

References

Note: Difference in age was non-significant but trend for PD to be older so age used as a covariate in all analyses.
*Significant difference between groups t(38) > 28; p < 0.001

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