Phonotactic Probability and the Peabody Picture Vocabulary Test-3

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How do we evaluate word learning?

- Standardized tests as predictors of word learning abilities
- Not always sensitive to differences
- Examine products vs. processes (e.g., Dollaghan & Campbell, 1998)

Hypothesis

- The utility of standardized vocabulary tests may be improved if the items on the test reflected factors that have been shown to influence the word learning process (i.e., phonotactic probability)

Phonotactic Probability

- Likelihood of occurrence of a sound sequence
  - common (e.g., 'coat') vs. rare (e.g., 'watch')
- Effects on word learning
  - common learned faster than rare (Storkel, 2001, in press; Storkel & Rogers, 2000)

Questions

- Does the Peabody Picture Vocabulary Test-3 (PPVT-3, Dunn & Dunn, 1997) include a sufficient sampling of common & rare words?
- Do children show evidence of having learned more common than rare words on the PPVT-3, paralleling findings from previous empirical studies?
- Does performance on common versus rare words on the PPVT-3 accurately predict performance in a word learning task?

Does the PPVT-3 sample common & rare words?

- Are 3A and 3B equivalent?
- Are effects of phonotactic probability isolated from those of other variables?
  - Word length
  - Word frequency
  - Rated familiarity
  - Test item #

Methods

- Calculate phonotactic probability for each test item
  - Positional segment frequency =

$$\frac{\Sigma \text{ log frequency of words with target sound in target position}}{\Sigma \text{ log frequency of words with any sound in target position}}$$

- Test items placed in categories of common and rare using median-split

Results

Chi-square test

PPVT-3A	PPVT-3B
Common (88) < Rare (116)	Common (93) = Rare (111)

Correlation Analysis

Correlation with Phonotactic Probability

	PPVT-3A	PPVT-3B
Word Length	-0.30 **	-0.12
Word Frequency	-0.05	0.10
Rated Familiarity	0.04	0.07
Test Item #	-0.00	-0.10

** significant

Interpretation

PPVT-3A	PPVT-3B
• Sufficient sampling common & rare • Difficult to isolate phonotactic probability • Common & rare words evenly distributed	• Sufficient sampling common & rare • Easier to isolate phonotactic probability • Common & rare words evenly distributed

Do children show common advantage on PPVT-3?

Methods

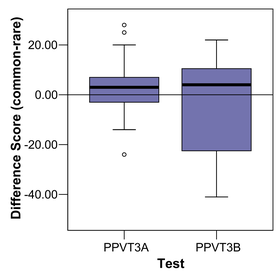
- Data from 102 preschool children (n=19 with phonological delay)
- Percentage correct for common & rare test items determined for each child

ANOVA

- 2 phonotactic probability (common vs. rare) x 2 test (3A vs. 3B)
- No significant main effects of phonotactic probability or test
- Significant interaction: phonotactic probability x test

Follow-up t-test

PPVT-3A	PPVT-3B
Significant effect of phonotactic probability	No significant effect of phonotactic probability



Interpretation

PPVT-3A	PPVT-3B
• Common sound sequence advantage • Attributable to correlation with word length?	• No common sound sequence advantage

What is the best predictor of actual word learning?

- Overall PPVT-3 score?
- % Common test items correct?
- % Rare test items correct?

Methods

- Children participated in word learning studies (Storkel, in press; Storkel & Young, in press)
- Children exposed to common and rare nonwords in a story
- Word learning examined in naming task following 0, 1, 4, 7, and 1-week post exposure

Regression Analysis

- Outcome variable: picture naming accuracy at 1-week post
- Potential predictors
  - Overall PPVT-3 score
  - % Common test items correct
  - % Rare test items correct

Nonwords	PPVT-3A	PPVT-3B
Common	Ø	% Rare test items correct
Rare	Overall PPVT score	Ø

Interpretation

PPVT-3A	PPVT-3B
• Overall score better predictor than subscale scores • In some cases, no significant predictor	• Subscale score better predictor than overall score • Effectiveness of subscale score not as expected • In some cases, no significant predictor

Conclusion

- PPVT-3 does sample both common and rare items
- Difficult to isolate phonotactic probability from other variables
- Phonotactic probability subscale scores showed promise in predicting actual word learning
- Accurate prediction of word learning remained problematic
- Further investigation warranted
  - Compare better controlled product measures to process measures
  - Manipulate phonotactic probability of the items

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