KU THE UNIVERSITY OF KANSAS

Phonological and lexical characteristics of sound productions by preschool children

Su Yeon Lee, M.M.E.
Holly L. Storkel, Ph. D

Phonological Acquisition

- Influenced by phonological and lexical characteristics.
- Phonological variability: an acquired sound used correctly in some words but not others.
- What are the characteristics of the words that are vulnerable to production accuracy?

Phonological Characteristic

- Phonotactic Probability
  - Sound characteristic
  - The likelihood of occurrence of a particular sound or sound sequences in a given language (Vitevitch & Luce, 1999)
    - e.g., "sit" /s ɪ t/
    - High phonotactic probability → "sit" "coat"
    - Low phonotactic probability → "these" "watch"

Lexical characteristics

- Word frequency
  - Characteristic of whole word forms
  - The number of times that a word occurred in a language (Storkel, 2004).
    - High frequency →"these" (1,573 in 1 million of adult written words)
    - Low frequency → "sit" (67 in 1 million of adult written words)

Lexical Characteristic

- Neighborhood density
  - Characteristic of whole word forms
  - The number of words that are phonemically similar to a given word based on a one phoneme substitution, addition, or deletion (Luce & Pisoni, 1998).
    - e.g., "sit" → "sip", "spit", "it"
    - High neighborhood density: "sit" (N = 24)
    - Low neighborhood density: "these" (N = 9)

Backgrounds

- TD children recognized and produced high probability sounds more rapidly and accurately in nonwords (Edwards, Beckman, & Munson, 2004)
- TD children produced high frequency and high density in real words more accurately (Newman & German, 2002, 2005).
- No studies of phonotactic probability, word frequency, neighborhood density in real words by children with phonological delays.

Purpose of the study

- To explore influences of phonological and lexical characteristics on sound production by typically developing children and children with phonological delays.

Participants

- Selected from a larger study
- Examined PD kids with 17 – 45% accuracy on a given sound.
- Identified 9 kids for 6 emerging sounds
  - ð, ʃ, l, dʒ, f, θ
- Matched on accuracy of that sound to a TD child.
- For that sound, examined characteristics of accurate and inaccurate production.

Participants

	TD (n=9)		PD (n=9)	
	M	S	M	S
Age (months)	44	5.2	58	8.5
GFTA Percentile	39	10.2	9.7	3.7
PPVT-III Percentile	60	14	62	27
EVT Percentile	44	22	62	27

Measures

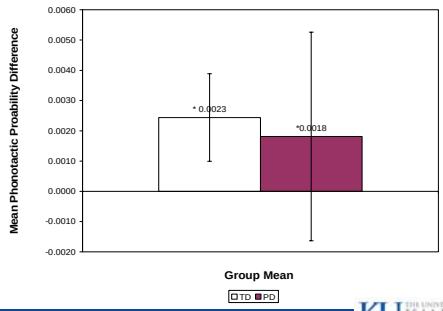
- Phonotatctic probability, frequency, neighborhood density were computed using an on-line child calculator (Jill, Storkel, & Kieweg, 2008).
- Patterns for accurate and inaccurate production were compared across groups.

Criteria for interpretation of significance

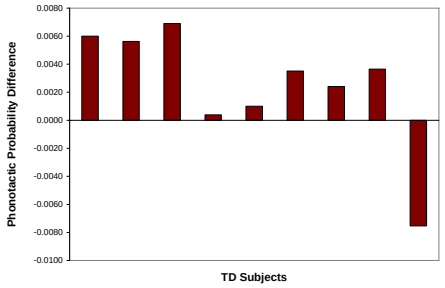
- **Meeting both criteria**
  - SEM criterion: Mean difference between accurate versus inaccurate production greater than SEM (Standard Error of Measurement).
  - Subject criterion: 5/9 subjects in the group show the same trend (i.e., low or high advantage for accurate production).

RESULT: Phonotactic Probability

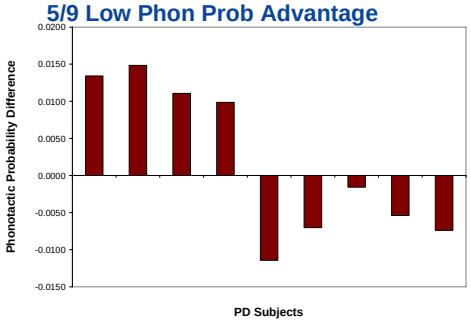
TD: High Phon Prob Effect
PD: Variable Phon Prob Effect



TD: 8/9 High Phon Prob Advantage



PD: 4/9 High Phon Prob Advantage
5/9 Low Phon Prob Advantage



Discussion: Phonotactic Probability

- **High phonotactic probability effect in TD**
  - Consistent with the previous studies in nonword repetition tasks (Edwards, Beckamn, & Munson, 2004; Munson, Edwards, & Beckman, 2005).
  - Attributed to the predictability of phonological sequence and frequency (Storkel & Rogers, 2000).

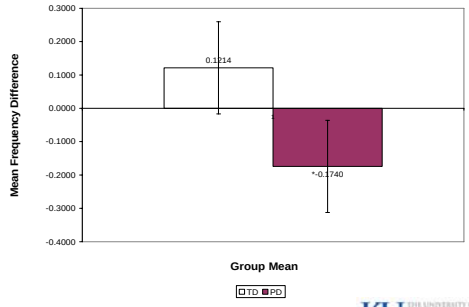
    - Facilitate the creation of association between a new lexical representation and the newly acquired phonological representation.

Discussion: Phonotactic Probability

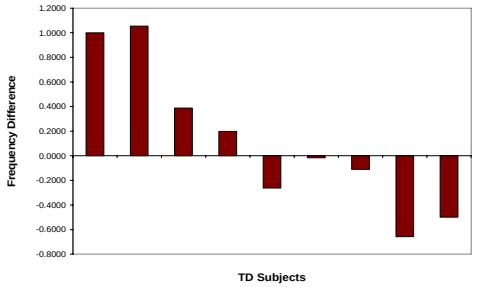
- **Variability in phon prab effect in PD**
  - **½ group performs similar to TD. (High effect)**
    - Attributed to the predictability of phonological sequence and frequency (Storkel & Rogers, 2000).
  - **½ group shows opposite effect. (Low effect)**
    - Attributed to uniqueness of sound sequences in low phonotactic probability words.
    - May imply their difficulty distinguishing common sound sequence words from other similar forms.

RESULT: Frequency

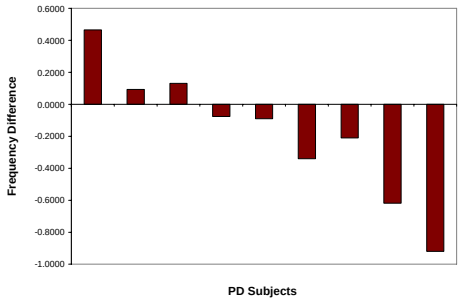
TD: Variable Frequency Effect
PD: Low Frequency Effect



TD: 4/9 High Frequency Advantage
5/9 Low Frequency Advantage



PD: 6/9 Low Frequency Advantage



Discussion: Frequency

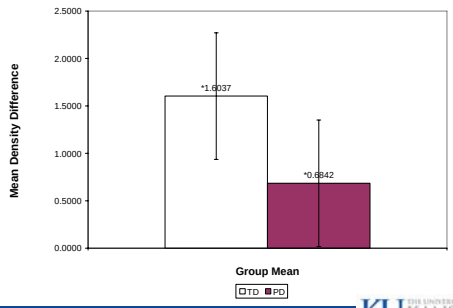
- **Variable frequency effect in TD**
  - **½ High frequency advantage**
    - Attributed to the frequent activation in recognizing, accessing, retrieving, or producing with high frequency words (Gierut, et al.,1999).
    - For the sake of communicative message (Macken & Ferguson, 1983)
  - **½ Low frequency advantage**
    - Attributed to the flexibility of underlying lexical representation in infrequent words (vulnerable to sound change)

Discussion: Frequency

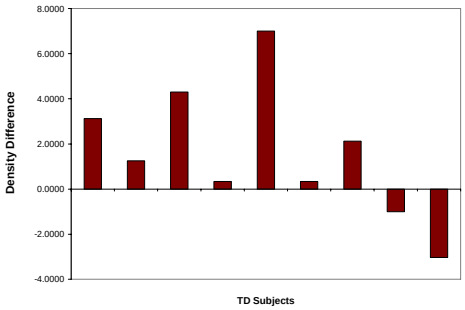
- **Low frequency effect in PD**
  - Attributed to the flexibility of underlying lexical representation in infrequent words (vulnerable to sound change).
  - More likely to show sound change in less well practiced environments.
  - Unwillingness to attempt to new sounds in a variety of phonological and lexical contexts.

RESULT: Neighborhood Density

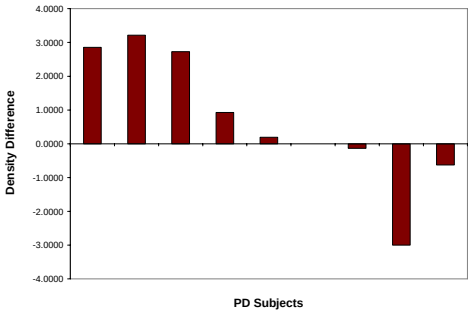
High Neighborhood Density Effect in both groups



TD: 7/9 High Density Advantage



PD: 5/9 High Density Advantage



Discussion: Neighborhood Density

- **High neighborhood density effect in both groups**
  - Similar to past study (Stokel & Gierut, 2002).
  - The more phonologically detailed representations in high density neighborhoods.
    - Facilitate association between an existing lexical representations and new lexical representations.
  - A general property of sound acquisition.

SUMMARY

- **Phonotactic Probability**
  - **High** phonotactic probability effect in TD
  - **Variable** phonotactic probability effect in PD
- **Frequency**
  - **Variable** frequency effect in TD
  - **Low** frequency effect in PD
- **Neighborhood Density**
  - **High** density effect in both TD and PD groups

CONCLUSION

- The findings from this study suggest that influences of phonological and lexical properties on sound productions may vary across TD and PD children.

Acknowledgements

- DC 06545
- Word & Sound Learning Laboratory

- Contact information:

Su Yeon Lee

suyeon@ku.edu

Thank You!