

Word Learning II: Naturalistic Learning by Children with Phonological Delays

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Phonology and Word Learning in Young Children

- Children learn spoken words based on sound regularities.
 - Phonotactic probability
 - Neighborhood density

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Phonotactic Probability

- Likelihood of occurrence of sound sequences
 - Common:
 - Sound sequences that occur in the same position frequently (e.g., "coat")
 - Rare:
 - Sound sequences that occur in the same position infrequently (e.g., "watch")

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Neighborhood Density

- The number of words (=neighbors) that differ from a target word by one phoneme substitution, deletion, or addition (Luce & Pisoni, 1998)
 - Dense:
 - Words with many neighbors (e.g., "sit")
 - Sparse:
 - Words with few neighbors (e.g., "these")

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Word Learning – Previous Studies

- Preschool children with typical development (TD) vs. children with phonological delays (PD)
- Effects of phonotactic probability and neighborhood density
 - TD: common-dense > rare-sparse
 - PD: common-dense < rare-sparse (Storkel, 2001, 2003, 2004; Storkel & Rogers, 2000)

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Limitations

- Controlled linguistic and environmental factors
- Short term learning
- Phonotactic probability and neighborhood density highly correlated

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Questions

- Do phonotactic probability and neighborhood density influence naturalistic word learning by children with phonological delays?
- Are the influences independent or combined?

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Participants

	PD (n=22)	TD (n=15)
Age in months	60 (41-79)	54 (38-68)
ROWPVT	59 (33-81)	62 (47-84)
EOWPVT	56 (34-72)	57 (34-81)
GFTA-2	35 (20-51)	8 (0-28)

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Naturalistic Word Learning Probe: Word Selection

- 121 real word nouns differing in phonotactic probability and neighborhood density
 - Correlated
 - Common-dense
 - Rare-sparse
 - Dissociated
 - Common-sparse
 - Rare-dense

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Naturalistic Word Learning Probe: Word Selection

- Factors controlled:
 - AoA (Carroll & White, 1973; Snodgrass & Yuditsky, 1996)
 - Length (in syllables, segments)
 - Canonical structure
 - Frequency (Moe, Hopkins, & Ruth, 1982)

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Naturalistic Word Learning Probe: Word Selection

Matched Variables	correlated		dissociated	
	common/dense	rare/sparse	rare/dense	common/sparse
Early AoA, high freq	car	fish	duck	pig
Early AoA, mid freq	pants	frog	swing	dress
Mid AoA, mid freq	ladder	tiger	turtle	hammer
Mid AoA, low freq	mitten	beaver	feather	hanger
Late AoA, low freq	toaster	donkey	thimble	banjo

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Naturalistic Word Learning Probe: Tasks

- Expressive task
 - Participants name each picture

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Naturalistic Word Learning Probe: Tasks

- Receptive task
 - 4 pictures on the screen while participants hear a target word

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Target = 'sheep'



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Semantically Related = 'horse'



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Phonologically Related = 'ship'



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Unrelated = 'rose'



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Analysis

- 2 group (PD vs. TD) x 2 task (expressive vs. receptive) x 2 phonotactic probability (common vs. rare) x 2 neighborhood density (dense vs. sparse) repeated measures ANOVA

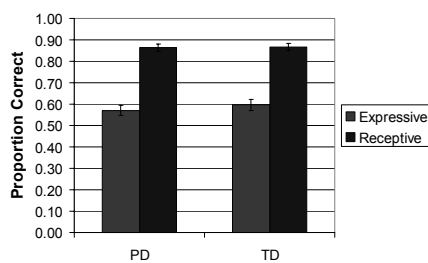
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Result

- Significant main effects of task and neighborhood density
 - Task: $F(1, 35) = 538.35, p < .001$
 - Neighborhood density $F(1, 35) = 20.49, p < .001$
- No main effect of phonotactic probability
- No main effect of group
- No interaction with group

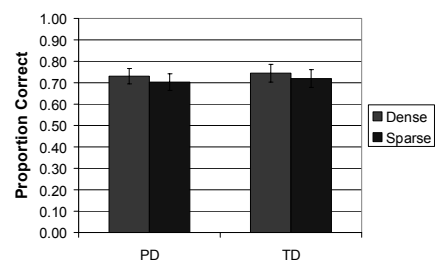
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Task



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Neighborhood Density



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Summary

- Only neighborhood density affected long term word learning
- No group difference between children with and without phonological delays

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Conclusion

- Consistent with a study of expressive vocabulary test (Storkel & Giles, in preparation)
 - common/dense > rare/dense
- Inconsistent with another empirical study of nonwords (Hoover & Storkel, 2005)

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