

Word Learning I:

*Word Learning Across
Representations & Populations*

Capone, Gray, Hogan, Storkel,
Ellis Weismer

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Simplified Word Learning Scenario



koof

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Form Representations in Word Learning by Adults and Preschool Children

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What mental representations are formed?

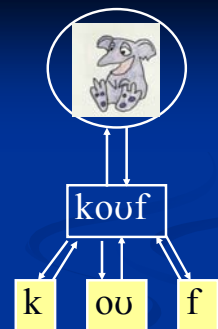
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What is word learning?

What do you have to learn to
“know” a word?

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Phonological Representation



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Phonological
representation

=

Known

7

Lexical
representation

=

New

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Hypothesis 1:

Phonological
characteristics may
influence word learning

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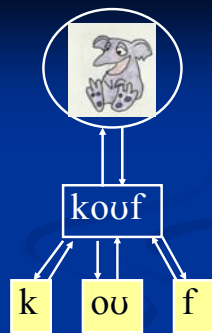
Hypothesis 2:

Characteristics of known
lexical representations
may influence word
learning

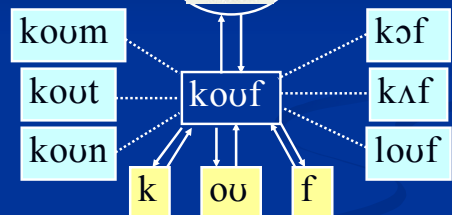
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Lexical Representation

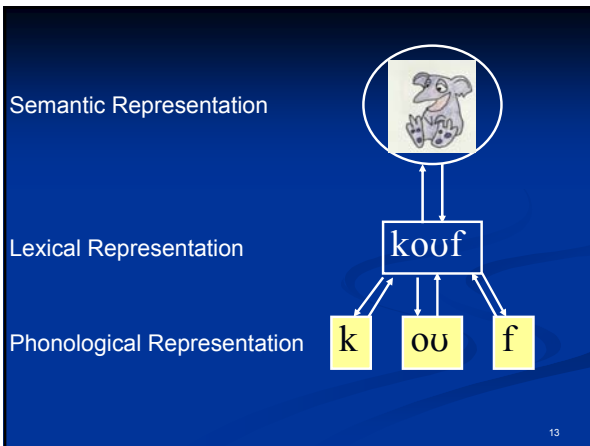
Phonological Representation



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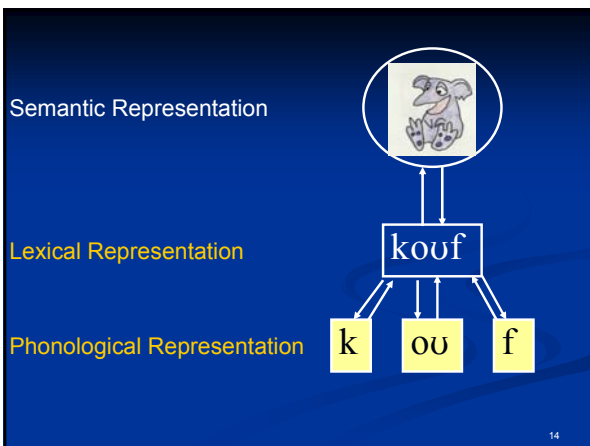
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Phonological Characteristic

- Phonotactic probability
 - Frequency of occurrence of individual sounds (i.e., positional segment frequency)
 - Frequency of co-occurrence of pairs of sounds (i.e., biphone frequency)
 - High probability advantage in recognition and production

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Lexical Characteristic

- Lexical neighborhood density
 - Number of similar sounding words
 - High density disadvantage in recognition
 - High density advantage in production and serial recall

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Overview

- Focus on phonological and lexical characteristics (i.e., form)
- Study 1: Adult
- Study 2A: Preschool Children
- Study 2B: Preschool Children

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Caveats

- Past word learning studies = children
 - What happens in the mature word learner?
- Phonotactic probability correlated with lexical density
 - High probability ~ high density
 - Low probability ~ low density
- Past word learning studies have not differentiated these two characteristics

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Study 1: Storkel, Armbruster, & Hogan

Adult Word Learning

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Procedure

Test 0 Story 1 Test 1 Story 1 Test 2 Story 1 Test 3
Episode 1 Episode 2 Episode 3
1 exposure 3 exposures 3 exposures
8 stimuli 8 stimuli 8 stimuli

Test 0 Story 2 Test 1 Story 2 Test 2 Story 2 Test 3
Episode 1 Episode 2 Episode 3
1 exposure 3 exposures 3 exposures
8 stimuli 8 stimuli 8 stimuli

- Picture Naming: score 2 or 3 phonemes correct



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Method

- 32 monolingual English-speaking adults
- 16 nonwords varying in phonotactic probability and lexical density
 - High probability/high density
 - Low probability/high density
 - High probability/low density
 - Low probability/low density

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Results

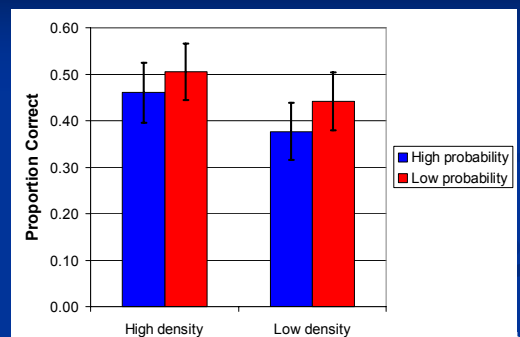
- Main effect of phonotactic probability
- Main effect of lexical density
- No significant interactions

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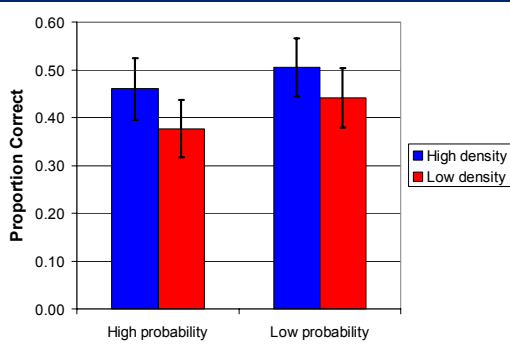
Density	Phonotactic Probability		Referent			
	High	Low	Item 1	Item 2	Item 3	Item 4
High	wæd					
	naut					
Low	paɪb					
	mug					

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Effect of Phonotactic Probability



Effect of Lexical Density



Study 2A & 2B: Storkel, Hogan, & Giles

Child Word Learning

Preliminary Findings

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Quality of Representation

- Partial: 2 of 3 phonemes correct
 - Significant low probability advantage
- Complete: 3 of 3 phonemes correct
 - Significant high density advantage

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Method

- Participants:
 - Study 2A: 31 preschool children
 - Study 2B: 32 preschool children
- Preliminary evidence using Study 1 methods suggested interactions
 - Study 2A: Density constant -- Probability varies
 - Study 2B: Probability constant -- Density varies
- Increased exposures
 - 1, 4, 7 (adult) vs. 8, 16, 24 (kids)
 - Added a 1-week post-test

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Study 1: Summary

- Independent effects of phonotactic probability and lexical density
 - Low probability advantage, especially for partial representations
 - High density advantage, especially for complete representations

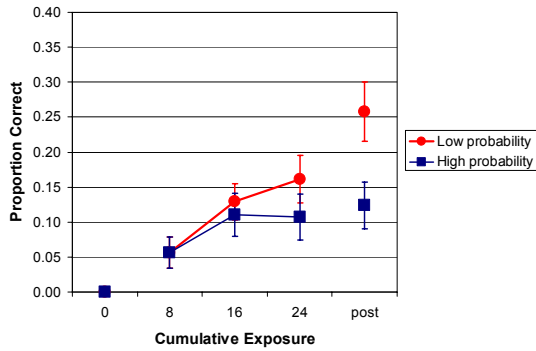
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Preliminary Results: Study 2A

- Three-way interaction significant
Phonotactic probability x density x exposure
- Effect of phonotactic probability for:
 - Low density: Significant effect of probability
 - High density: ~Significant effect of probability

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Low Density: Effect of Probability

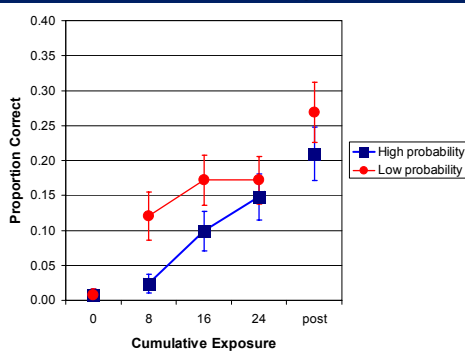


Preliminary Results: Study 2B

- Three-way interaction significant
Phonotactic probability x density x exposure
- Effect of lexical density for:
 - Low probability: Density x exposure interaction?
 - High probability: Density x exposure interaction?

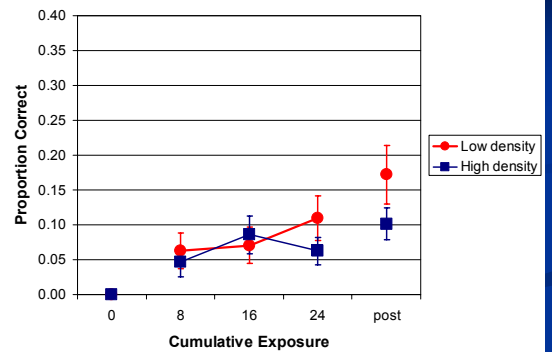
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High Density: Effect of Probability



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Low Probability: Effect of Density

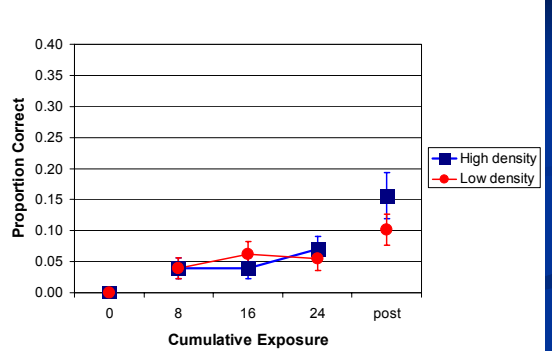


Study 2A Summary

- Low probability advantage
- Size of the advantage varies by lexical density & exposure
 - Low density – late low probability advantage
 - High density – early low probability advantage

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High Probability: Effect of Density



Study 2B Summary

- Small effect of density at post-test
- Direction of the effect varies by probability
 - Low probability – ~low density advantage at post
 - High probability – ~high density advantage at post

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Lexical Effects on Word Learning

- Lexical characteristics influence word learning
- High density advantage (but see following developmental issues)
- Existing lexical representations may stabilize new lexical representations, leading to complete representations

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Comparison x Studies

- Phonotactic probability
 - Adults: consistent low probability advantage, especially for partial representations
 - Children: variable low probability advantage
- Lexical density
 - Adults: consistent high density advantage, especially for complete representations
 - Children: variable (high & low) advantage at post

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Developmental Changes

- Phonological effect similar across age
 - Same direction (low probability advantage)
 - Similar effect sizes ($\eta_p^2 = 0.16$ adults, 0.17 kids)
- Lexical effect appears to change across age
 - Different direction (high vs. variable density advantage)
 - Different effect sizes ($\eta_p^2 = 0.27$ adults, 0.04 kids)

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Phonological Effects on Word Learning

- Phonological characteristics do affect word learning
- Low probability advantage for adults and children
- Phonological representations may aid in triggering word learning and forming partial representations
- Low probability = unique

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Developmental Hypotheses

- Change in representations involved in word learning
 - Children: phonological
 - Adults: phonological and lexical
- Not a developmental difference but a difference in the word learning stage sampled
 - Children: forming initial representations (phonological)
 - Adults: forming initial representations and consolidating these representations (phonological & lexical)
- Need to vary age but match overall accuracy to differentiate

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Thank You!

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