What is word learning?

What do you have to learn to "know" a word?

Phonological Representation

koʊ f

k oʊ f
Phonological representation = Known

Lexical representation = New

Hypothesis 1:
Phonological characteristics may influence word learning

Hypothesis 2:
Characteristics of known lexical representations may influence word learning
Overview
- Focus on phonological and lexical characteristics (i.e., form)
- Study 1: Adult
- Study 2A: Preschool Children
- Study 2B: Preschool Children

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

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

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
Study 1: Storkel, Armbruster, & Hogan

Adult Word Learning

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

Procedure

<table>
<thead>
<tr>
<th>Test 0</th>
<th>Story 1</th>
<th>Test 1</th>
<th>Story 1</th>
<th>Test 2</th>
<th>Story 1</th>
<th>Test 3</th>
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<tbody>
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<td>Episode 1</td>
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<td>1 exposure</td>
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Picture Naming: score 2 or 3 phonemes correct

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

Effect of Phonotactic Probability

<table>
<thead>
<tr>
<th>Density</th>
<th>Phonotactic Probability</th>
<th>Referent</th>
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<tbody>
<tr>
<td></td>
<td>High</td>
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<tr>
<td></td>
<td>Low</td>
<td>mug</td>
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High probability

Low probability

High density

Low density
Effect of Lexical Density

![Graph showing effect of lexical density on proportion correct.](image)

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

Child Word Learning

Preliminary Findings

Quality of Representation

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

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

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

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
Low Density: Effect of Probability

<table>
<thead>
<tr>
<th>Probability</th>
<th>Low density</th>
<th>High density</th>
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Proportion Correct vs. Cumulative Exposure

Low probability advantage

Size of the advantage varies by lexical density & exposure

High density – early low probability advantage

Low density – late low probability advantage

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?
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

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

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

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)

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

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
Thank You!

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