

Effects of Neighborhood Density and Phonotactic Probability on Word Learning

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Form Representation

- Sublexical representations
 - Individual sounds
 - e.g., /b/, /i/, /d/

- Lexical representations
 - Whole word form
 - e.g., /bid/

Sublexical Representations

- Influenced by 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 Representations

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

Word Learning in Children

- Examined correlated phonotactic probability and neighborhood density
- High probability/high density advantage
- Attributable to sublexical or lexical influences on word learning?

**Do both sublexical and
lexical representations
influence word learning?**

Study 1: Adult Word Learning

- 32 monolingual English-speaking adults
- 16 nonwords varying in phonotactic probability and neighborhood density
- Paired with unusual objects
- Repeated exposure-test paradigm

Results

- Main effect of phonotactic probability
 - High probability disadvantage
- Main effect of neighborhood density
 - High density advantage
- No significant interactions

Study 2: Toddler Word Learning

- Database of words known by 16- to 30-month-olds
- 680 word checklist
- Parent indicates which words child produces
- Norms from 1,800 children

Stimuli

- Restrict to nouns
- Sublexical measures:
 - Positional segment frequency
 - Biphone frequency
- Lexical measures:
 - Neighborhood density
 - Word length
 - Word frequency
 - Neighborhood frequency

Stimuli

- Semantic measures
- Nelson, McEvoy, & Schreiber (1998) discrete association norms
 - *Semantic set size*: number of neighbors
 - *Connectivity*: number of connections among neighbors
 - *Probability resonance*: number of bidirectional connections
 - *Resonance strength*: strength of the bidirectional connections

Factor Analysis

- Four factors:
 - Sublexical: positional segment & biphone frequency
 - Lexical: neighborhood density & word length
 - Semantic 1: set size & connectivity
 - Semantic 2: probability resonance & resonance strength

Regression Results

- All factors significant predictors
 - Sublexical: High probability disadvantage
 - Lexical: High density/short word advantage
 - Semantic 1: High set size/connectivity advantage
 - Semantic 2: High resonance/strength advantage

Regression Results

■ Interactions

- Sublexical x Age: No interaction
- Lexical x Age: Lexical effect decreases as age increases
- Semantic 1 x Age: Semantic effect increases as age increases
- Semantic 2 x Age: Semantic effect increases as age increases

Sublexical Effects on Word Learning

- High probability disadvantage constant across age
- Sublexical representations may aid in triggering word learning
- Low probability = unique

Lexical Effects on Word Learning

- High density advantage that diminishes across age
- Existing lexical representations may stabilize new representations
- Change in emphasis on form vs. meaning with development?
- Influence of amount of similarity?

Semantic Effects in Word Learning

- High set size advantage that increases across age
- Existing semantic representations may stabilize new representations
- Change in emphasis on form vs. meaning with development?
- Influence of amount of similarity?

Word Learning Conclusions

- Role of sublexical representations is unique
- Influence of lexical and semantic representations is similar
- Developmental changes in lexical and semantic influences warrant further investigation

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