Neighborhood Density in Naturalistic Word Learning

Holly L. Storkel, Ph.D.
University of Kansas
Word Learning

- Children rapidly acquire new words
- Able to associate word form with the referent after 1 exposure
  - Fast mapping
- Initial representations retained and elaborated
Influence of Existing Representations

- New words learned in the context of known words
- Representations of new words must be integrated with existing representations
- Structure of memory may influence acquisition
Structure of the Lexicon

• Semantic
  – Representation of meaning
  – chair – “furniture for sitting”

• Lexical
  – Representation of whole word form
  – chair -- /ʃeɪr/
Structure

- Representations are not isolated
- Connections among related representations
- Similarity relationships may influence acquisition
Semantic Similarity

- Semantic set size
- Number of different words generated by two or more people in response to a given word
  - sit – stand, chair, down, relax, rest
- Large vs. small set size
Effect of Semantic Set Size

- **Cued recall**
  - Study a list of words
  - Recall words with the support of a cue

- **Small set size advantage**
  - Words with few associates are recalled better
Lexical Similarity

• Neighborhood density

• One phoneme substitution, deletion, addition

• Sit – pit, set, sick, it, spit

• High vs. low density
Density Effect

• Word recognition studies
  – Judge word pair as “same” or “different”
  – Lexical decision
  – Repeat the word

• Low density advantage
  – Words with few neighbors recognized faster
Does semantic and/or lexical structure influence naturalistic word learning?

- Similarity could be harmful
- Similarity could be helpful
Word Learning Database

- Mac Arthur Communicative Development Inventory Norms (Dale & Fenson, 1996)

- Infant (8-16 months)
  - 396 words
  - Comprehension
  - Production

- Toddler (16-30 months)
  - 680 words
  - Production
Variables

- **Age-of-Acquisition**
  - Earliest age when $\geq 50\%$ of children “know” word

- **Semantic set size** (Nelson, McEvoy, & Schreiber)

- **Neighborhood density**

- **Word Frequency** (Moe, Hopkins, & Rush)

- **Word length**
Results

- Linear regression
- Infant production
  - Not enough data (n=13)
- Infant comprehension
  - Semantic set size significant
Large Set Size Acquired Early

The diagram shows a scatterplot with infant comprehension on the x-axis and semantic set size on the y-axis. The data points indicate a trend where set size decreases as comprehension increases.
Results (cont)

• Toddler production
  – Semantic set size significant
  – Neighborhood density significant
Large Set Size Acquired Early
High Density Acquired Early

![Graph showing the relationship between Toddler Production and Neighborhood Density. The graph displays a downward trend as Toddler Production increases.]
Summary

• Similarity to known words influences acquisition
  – High similarity facilitates acquisition
  – Connections to many known words

• Different representations influential in development
  – Semantic influences early
  – Lexical influences later
Acknowledgements

• Funding
  – NIDCD 04781

• Contributors
  – Maki Sueto
  – Mariam Syeda
  – Michael S. Vitevitch
Contact Information

Holly L. Storkel
University of Kansas
Speech-Language-Hearing
1000 Sunnyside Ave.
3001 Dole Center
Lawrence, KS 66045

hstorkel@ku.edu