Does size matter? The influence of phonological and semantic neighborhoods on word learning by preschool children

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Mental Representation of Words

- 2 representations
  - Phonological: spoken word-form (e.g., cat)
  - Semantic: meaning (e.g., furry pet that meows)
- Similar representations grouped together forming neighborhoods
  - Phonological neighborhoods: words differing by 1 phoneme
  - Semantic neighborhoods: variety of metrics (e.g., discrete association, co-occurrence, feature analysis)
- Some words have few neighbors
  - Phonological: dog (6 neighbors)
  - Semantic: cat (3 neighbors)
- Some words have many neighbors
  - Phonological: cat (27 neighbors)
  - Semantic: bird (23 neighbors)

Components of Word Learning

- Triggering: Recognition that a word is novel and thus needs to be learned
- Configuration: Creation of a new phonological and a new semantic representation as well as a link between the two
- Engagement: Formation of links between new representations and existing similar representations

Experimental Question

- Do phonological neighborhoods influence word learning?
- Do semantic neighborhoods influence word learning?
- Does the influence of neighborhoods on word learning vary depending on the type of neighborhoods (i.e., phonological vs. semantic)?

General Methods

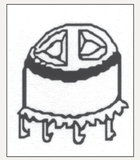
- Participants
  - Typically developing preschool children
    - n = 25 for phonological neighborhoods study
    - n = 36 for semantic neighborhoods study
- Stimuli
  - 10 nonwords paired with 10 nonobjects
  - Manipulate one variable (i.e., phonological or semantic neighborhoods)
  - Hold other variable constant
- Exposure in game format on computer
- Test naming and referent identification at 3 timepoints
  - Prior to exposure (baseline)
  - End of exposure (learning)
  - 1-week post-exposure (retention)

Exposure Example

Auditory:

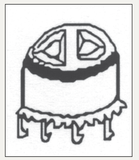
This is a goʊm. Say goʊm. [goʊm]. Yes, that's a goʊm. Remember, it's a goʊm. We're going to play a game. Find the goʊm. That's the goʊm. Say goʊm. [goʊm]. Don't forget the goʊm.

Visual:



Naming Example

Presented Item:

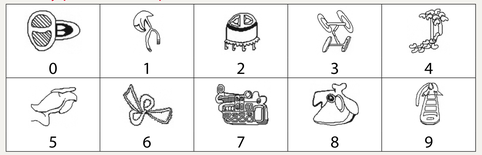


Correct child response:

goʊm

Referent Identification Example

Visually presented response choices



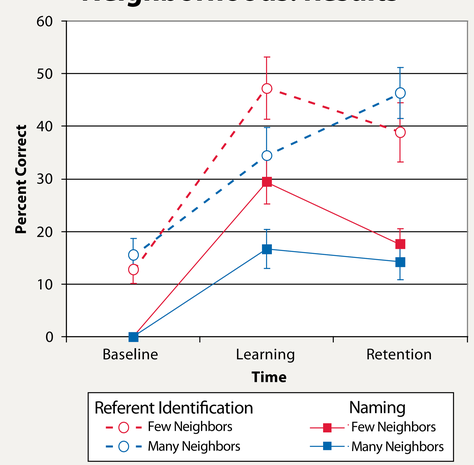
Auditorially presented item: goʊm

Correct child response: 2

Phonological Neighborhoods: Stimuli

Few Phonological Neighbors		Many Phonological Neighbors	
dɔɪk		jʌt	
gɪf		boʊg	
paɪb		tɑb	
jam		faʊn	
nɛp		wæd	
M = 5 phonological neighbors (*SD* = 1)		*M* = 12 phonological neighbors (*SD* = 2)	
M = 10 semantic neighbors (*SD* = 3)		*M* = 11 semantic neighbors (*SD* = 3)	

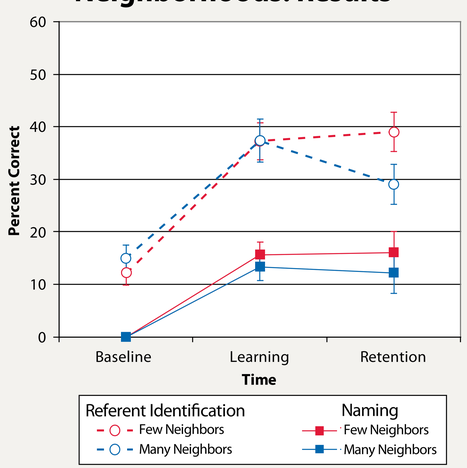
Phonological Neighborhoods: Results



Semantic Neighborhoods: Stimuli

Few Semantic Neighbors		Many Semantic Neighbors	
goʊm		boʊg	
maɪf		wun	
hɛg		pig	
jeɪn		jʌt	
fip		meɪb	
M = 10 phonological neighbors (*SD* = 2)		*M* = 11 phonological neighbors (*SD* = 2)	
M = 8 semantic neighbors (*SD* = 2)		*M* = 13 semantic neighbors (*SD* = 3)	

Semantic Neighborhoods: Results



Summary

- Phonological and semantic neighborhoods both influence learning
  - Words with few neighbors are learned better than words with many neighbors
- Timing of influence varies
  - Phonological = early (i.e., learning)
  - Semantic = late (i.e., retention)

Hypothesis 1:

Phonological and semantic neighborhoods influence different components of word learning

- Phonological neighborhoods influence early component (i.e., triggering)
  - Few neighbors = more unique
  - More obvious that phonological representation does not exist
  - Learning triggered with fewer exposures
- Semantic neighborhoods influence later component (i.e., engagement)
  - Few neighbors = less confusability with existing representations
  - Less degradation over time

Hypothesis 2:

Phonological and semantic neighborhoods affect the same component but the timing of that component varies

- Phonological and semantic neighborhoods both affect engagement but timing of engagement varies
  - Early engagement for phonological representations
    - Overlap in word learning components
  - Late engagement for semantic representations
    - Less overlap in word learning components

Future Directions

- Identify measures that are sensitive to:
  - Triggering
  - Configuration
  - Engagement
- Test the role of phonological and semantic neighborhoods in each component as well as the timing of each component

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