The Relationship between Neighborhood Density and Age-of-Acquisition

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Introduction
- Word-forms may be organized in memory by phonological similarity
  - Neighborhood density: The number of words that are phonologically similar to a given word
  - Operational definition: All the words differing by one phoneme substitution, deletion, or addition
- Dense neighborhoods facilitate word learning in controlled conditions (Storkel, 2001; Storkel & Rogers, 2000)

Purpose
To examine the effect of neighborhood density on word learning in naturalistic samples

Naturalistic Samples
- MacArthur Communicative Development Inventory for Infants (Dale & Fenson, 1996)
  - 8–16 month old children
  - Comprehension & Production
  - N = 246 nouns
- MacArthur Communicative Development Inventory for Toddlers (Dale & Fenson, 1996)
  - 16–30 month old children
  - Production
  - N = 380 nouns
- Carroll & White (1973) Age-of-Acquisition Ratings
  - 9-point rating scale, 2 years to 13+ years
  - Age when word was first learned
  - N = 220 nouns
- Snodgrass & Yuditsky (1996) Age-of-Acquisition Ratings
  - N = 250 nouns

Linear Regression Analysis
- Independent Variables
  - Word length in segments
  - Word frequency (Kucera & Francis, 1967)
  - Neighborhood density (Luce & Pisoni, 1998)
- Dependent Variable
  - Age-of-acquisition (AoA):
    - Age when 50% of children reportedly comprehended or produced a given word
  - AoA Rating

Results
Infant Comprehension (Red = significant)
- 0.3120 Length – 0.0018 Frequency + 0.0257 Density + 12.071

Infant Production
- 0.2438 Length + 0.0011 Frequency – 0.0026 Density + 15.26

Toddler Production
- 0.4278 Length – 0.0001 Frequency – 0.0954 Density + 21.60

Carroll & White AoA
- 0.2360 Length – 0.0086 Frequency – 0.0587 Density + 3.516

Snodgrass & Yuditsky AoA
- 0.0662 Length – 0.0039 Frequency – 0.0320 Density + 3.961

Conclusions
- Early acquired words tended to have many neighbors; late acquired words tended to have few neighbors
  - Only significant for toddlers and older children, not infants
- Infant word learning may be driven by factors other than word form
- Infants may have difficulty distinguishing phonetically similar words, leading to sparse neighborhoods
- Development of dense neighborhoods may have consequences for acquisition of other language skills (e.g., phonological awareness)

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References