

Development of Phonological Knowledge in Children

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Background

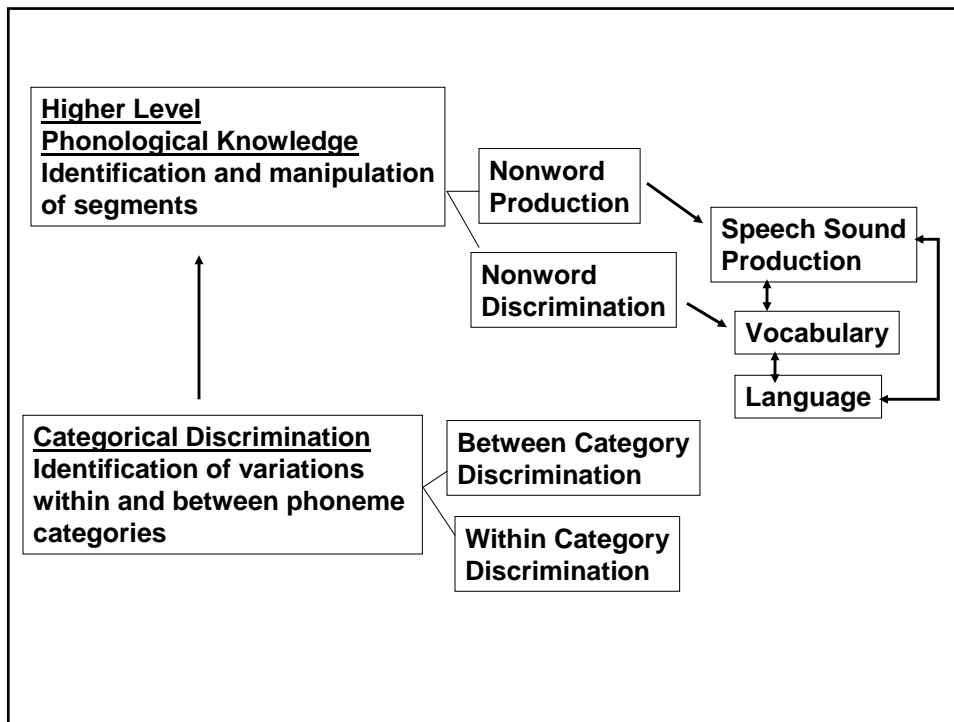
- Phonological knowledge is not monolithic
- Pierrehumbert (2003) and Beckman, Munson, and Edwards (2007) suggest that phonological knowledge involves making progressively more-abstract generalizations over detailed sensory encodings of sounds' acoustic and articulatory characteristics

Purposes of the study

1. Can we find empirical evidence that these purportedly independent levels of phonological knowledge develop independently?

Purposes of the study

2. How do tasks that tap into different levels of phonological knowledge relate to each other, and to outcome measures of speech-language skills?



Participants

- 29 children
 - 15 age 4:1 – 5:11; X = 5:0
 - 14 age 6:0 to 7:10; X = 6:6
- Monolingual speakers of English
- Screened for normal hearing
- Within +/- 1 SD of the average on standardized measures of nonverbal reasoning, speech and language

Experimental Protocol: Standardized Measures

- GFTA-2
- Raven's Matrices subtest of the K-BIT
- PPVT-III
- EVT
- PLS-3 or TOLD-P:3

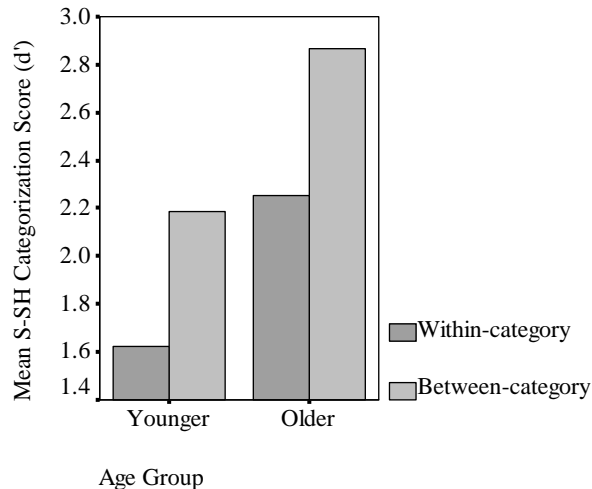
Experimental Protocol: Experimental Tasks

- /s/-/ʃ/ discrimination task
 - Within-category discrimination
 - Between-category discrimination
- Nonword repetition task
- Nonword discrimination task

Categorical Discrimination: Within-Between Category

- Three stimuli: /s/ endpoint, /ʃ/ endpoint, and an intermediate fricative (/ʔ/) presented in a real-word continuum (*sack* – *shack*)
- Change/No-Change paradigm; each pairing presented 3 times, ratio of 3:1 C:NC
 - Within-category: /s/ - /ʔ/ and /ʃ/ - /ʔ/
 - Between-category: /s/ - /ʃ/

Categorical Discrimination Results (d')



Categorical Discrimination Results

2-way, mixed effects ANOVA

Significant main effect of comparison

$$F[1,27] = 23.98, p < .001, \eta^2 = .47$$

Significant main effect of age

$$F[1,27] = 8.92, p = .006, \eta^2 = .25$$

Interaction effect not significant

$$F[1,27] = .048, p = .829$$

Nonword Repetition Task

- 20 nonword pairs

ex: /pwl**l**t/ and /twl**l**t/

/bufkin/ and /buftin/

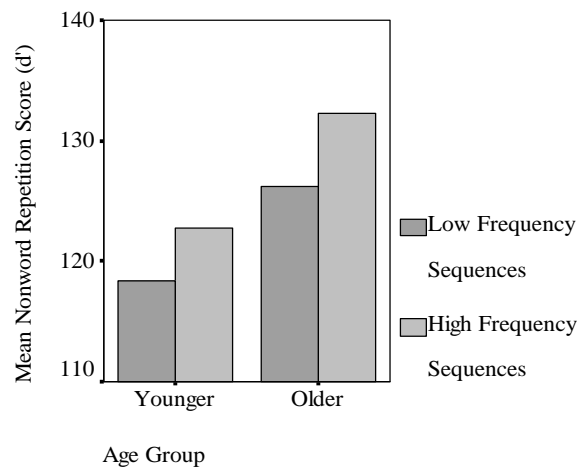
/mivam**b**/ and mivam**p**/

- A subset of high- and low-frequency sequence pairs taken from Munson, Edwards, and Beckman (2005)

Nonword Scoring

- 7 point scoring
 - 1 point each for manner, place, voicing accuracy for each member of the sequence
 - total possible points = 6
 - 1 point for prosody (both members of the sequence represented without epenthesis)

Nonword Repetition Accuracy Results



Nonword Repetition Accuracy Results

Two-way, mixed effects ANOVA

Significant effect of age $F[1,27] = 7.53, p = .011, \eta^2 = .22$

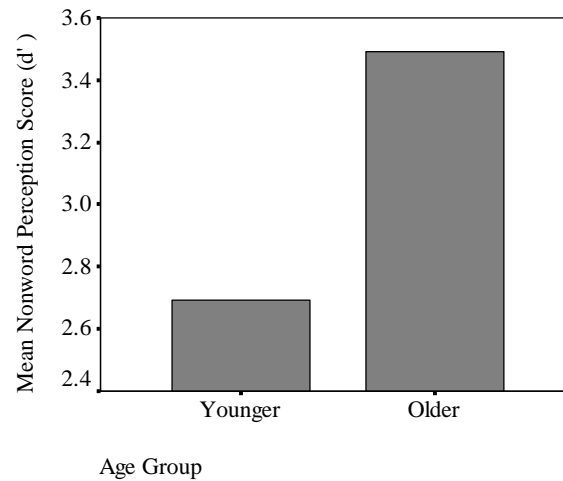
Significant effect of phonotactic probability $F[1, 27] = 18.99, p < .001, \eta^2 = .41$

Unlike previous research, there was not an interaction effect $F[1,27] = .45, p = .49$

Nonword Discrimination Task

- Presented in Change/No-Change paradigm with each stimulus presented twice in a ratio of 1:1 C:NC

Nonword Discrimination Results (d')



Nonword Discrimination Results (d')

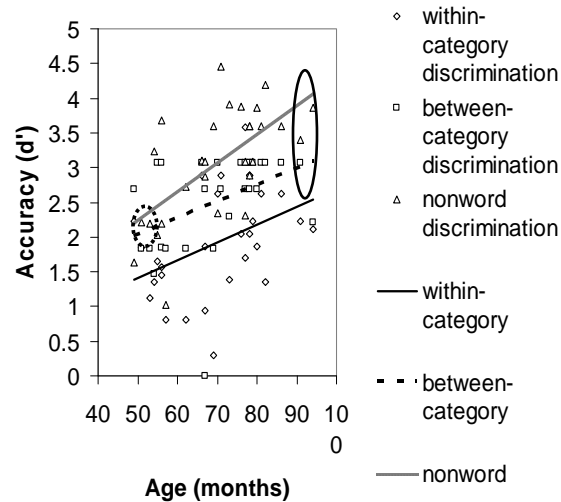
Single factor, between-subjects

ANOVA

Significant effect of age

$F[1,27] = 8.91, p = .006, \eta^2 = .25$

Question 1: Is there developmental evidence for dissociations between levels?



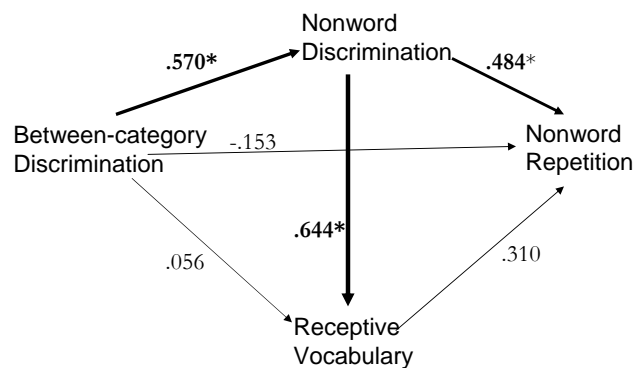
Yes

Question 2: Relationships among measures

- A series of regressions showed that nonword repetition and receptive vocabulary were both more strongly related to nonword discrimination than to categorical perception

- The other measures of language, phonology, and nonverbal IQ did not predict a significant proportion of variance beyond what was accounted for by nonword discrimination

Path Analysis



Conclusions

- The contribution of categorical perception to speech and language skills appears to be through the relationship with higher level phonological knowledge (measured by nonword discrimination)
- The ability to recognize sound patterns in novel sequences appears to support development of both receptive vocabulary and speech production skills

Handouts
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