When ears collide: Mismatch and phonological development

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learning to talk

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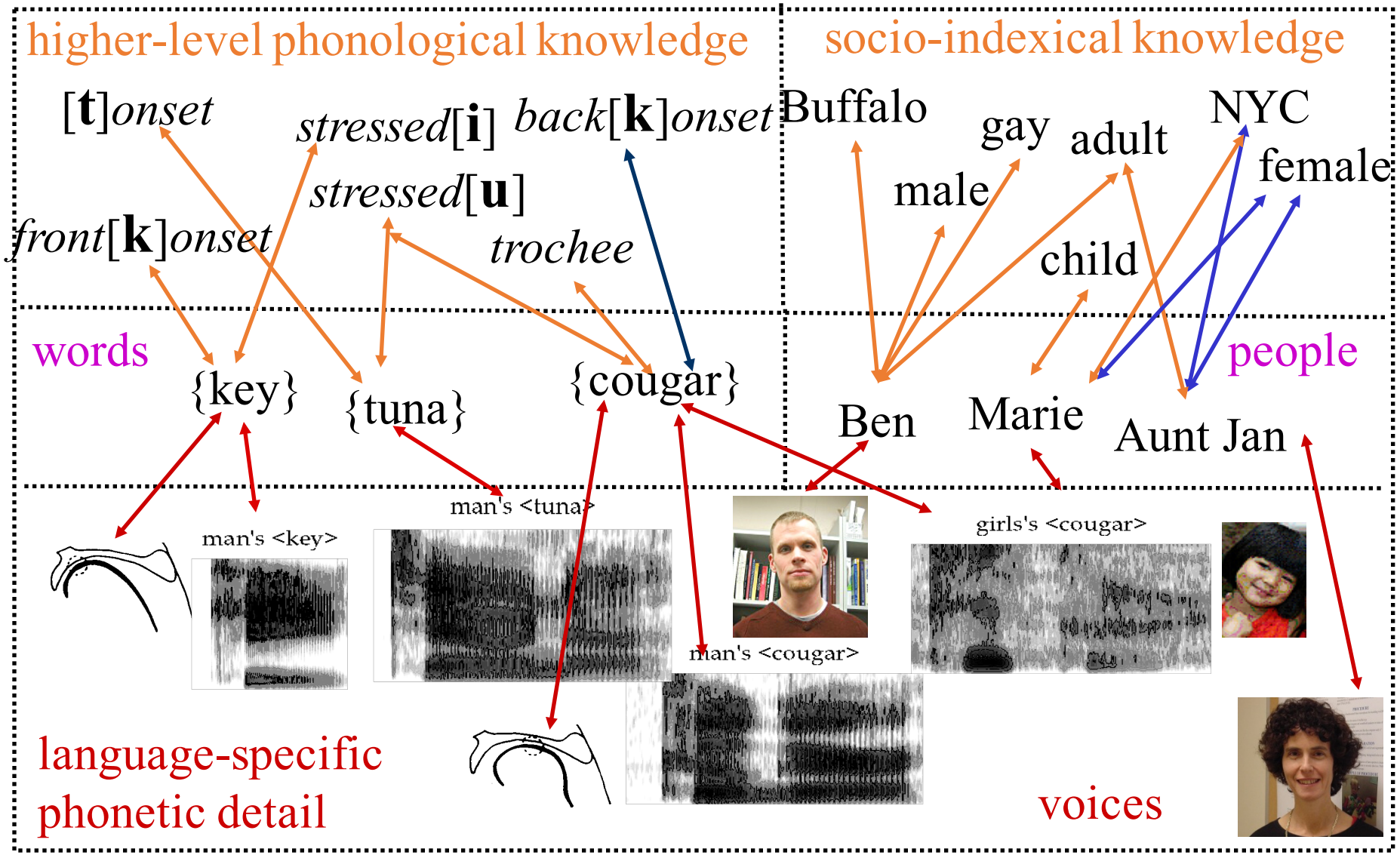
What happens in phonological acquisition?



What happens in phonological acquisition?

- Children need to figure out how to come up with discrete categories from the continuous signal that they hear.
- We assume that there is a match between the child listener and the adult speaker.
- But what if there isn't?

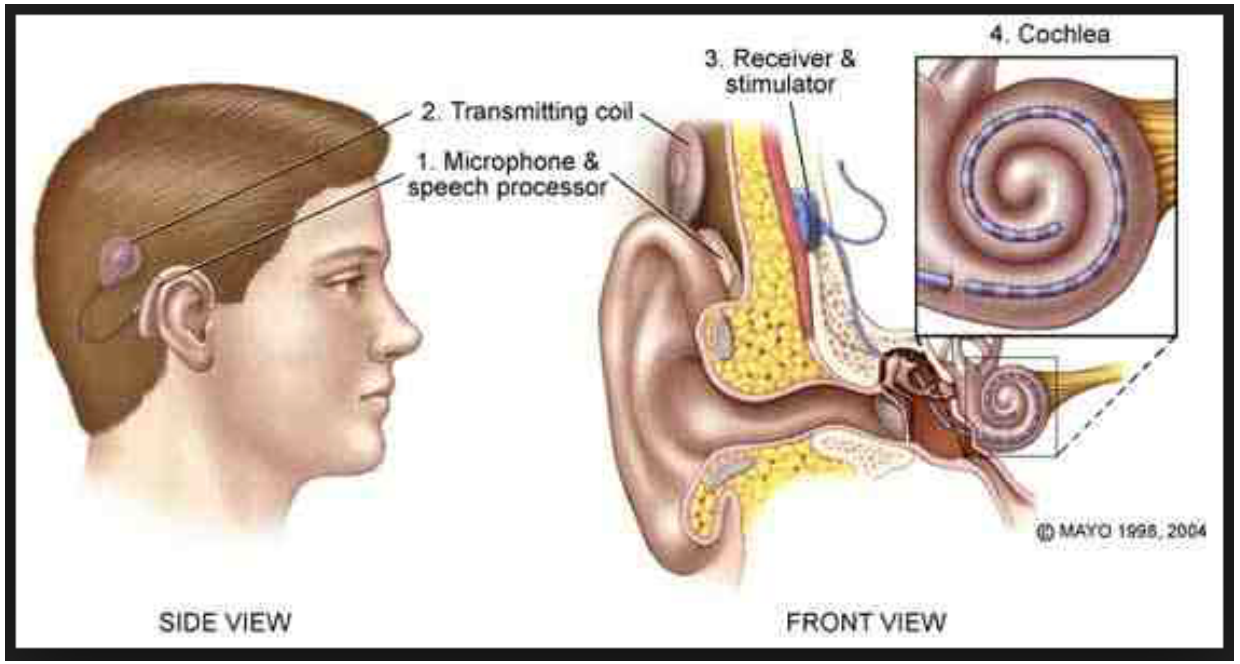
Mismatch in phonological acquisition

- Study 1: Child and adult have different hearing systems
  - Child: electronic hearing (cochlear implant)
  - (Almost) everyone else: acoustic hearing

- Study 2: Child and adult (teacher) speak different dialects.
  - Impact on literacy

Study 1: Cochlear Implants

- Recommended for individuals with severe-to-profound hearing impairment.
- Replaces acoustic hearing with an electrical signal.
- Pros: Children who are prelingually deaf do much better with a cochlear implant than with hearing aids.
- Cons: Signal is severely degraded, especially for spectral information.



A soft breeze came across from the sea.

Study 1: Electronic vs. Acoustic Hearing

- Purpose: To compare acquisition of an early-acquired contrast (/t/ vs /k/) in children with cochlear implants and their age peers with normal hearing.
  - Accuracy
  - Error patterns
- /t/ vs /k/ in normal-hearing English-speaking children
  - /t/ produced correctly by about age 3.
  - /k/ produced correctly by about 3;6.
  - [t] for /k/ substitutions are common.
- Place of articulation is a spectral contrast.
  - Difficult for children with cochlear implants.

Prompt = cup

Study 1: Electronic vs. Acoustic Hearing

- 20 children with cochlear implants (CI)
  - 8 females, 12 males
- 20 children with normal hearing (NH)
- Matched for age, sex, and maternal education

Group	**Age in months mean (SD)** n = 32	**Maternal Education** n = 20	**Vocabulary (EVT-2) mean (SD) Standard: 100 (15)** n = 32
CI	51 (10) Range = 31-69	Some college/Associate's (2-year) degree = 4 College or Graduate degree = 16	102 (15) Range = 68 - 131
NH	51 (10) Range = 31-69	Some college/Associate's (2-year) degree = 4 College or Graduate degree = 16	119 (11) Range = 90 - 137

Study 1: Methods

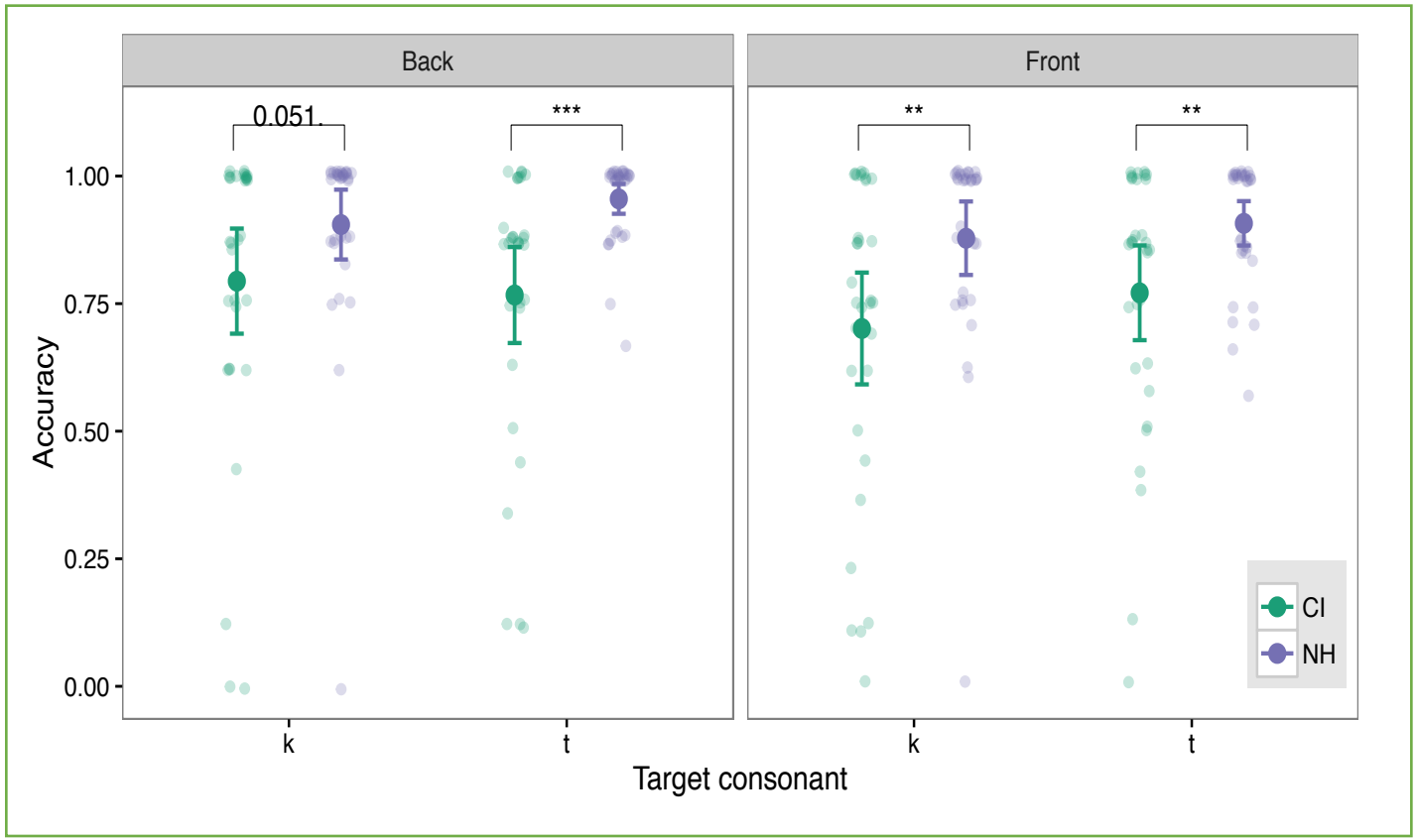
- Repetition task
- 34 productions of word-initial /t/ and /k/
- Front- and back-vowel contexts

Study 1: Transcription/Coding

Word	Target consonant	Manner transcription	Place transcription	Phonemic accuracy
tongue	/t/	Stop	[t]	1
tape	/t/	Stop	other	0
tooth	/t/	Affricate	N/A	0
tickle	/t/	Stop	[t:k]	1
kitty	/k/	Stop	[k]	1
kitty	/k/	Stop	[t]	0
cousin	/k/	Stop	[t:k]	0

Study 1: Production Accuracy

- Do children with cochlear implants produce /t/ and /k/ less accurately overall compared to their peers with normal hearing?



Accuracy ~ Group * Target Consonant + (1 + Target Consonant | ID)

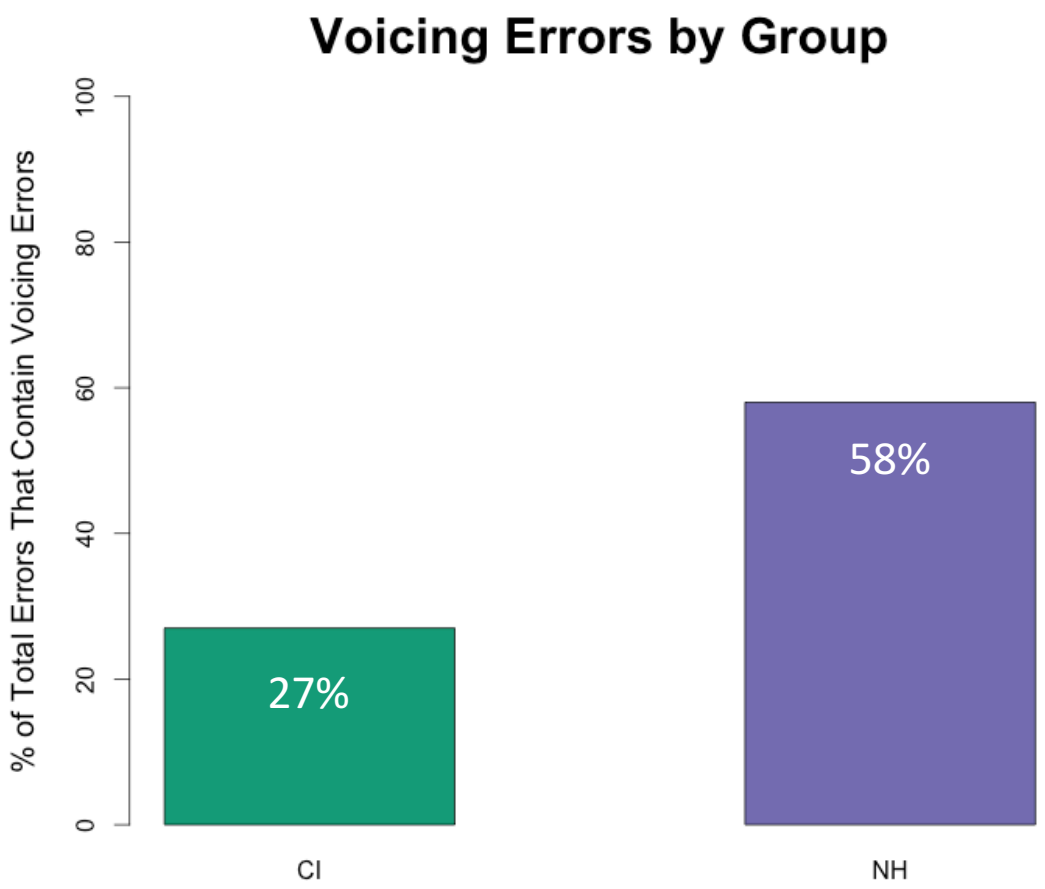
Children with CIs

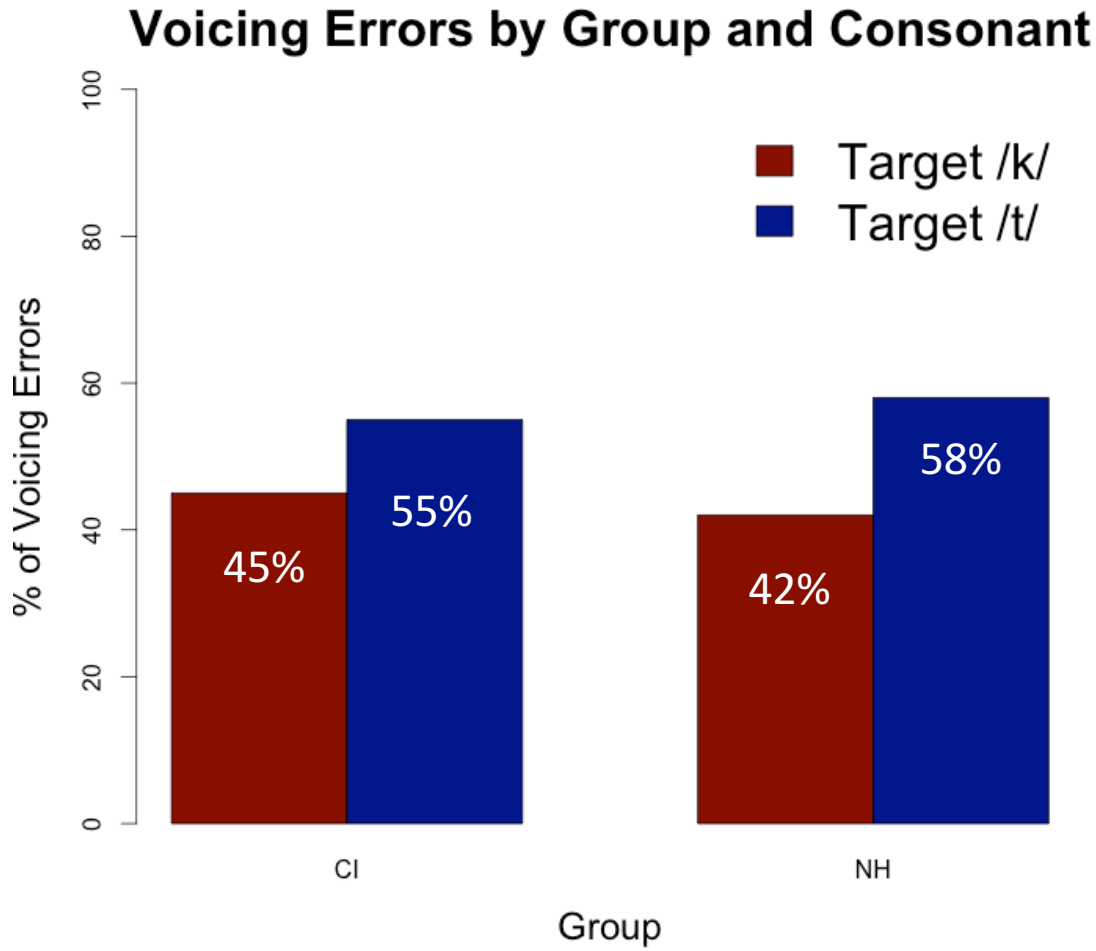
- 24% of productions were inaccurate
  - 54% of errors were on /k/
  - 46% of the errors were on /t/

Children with NH

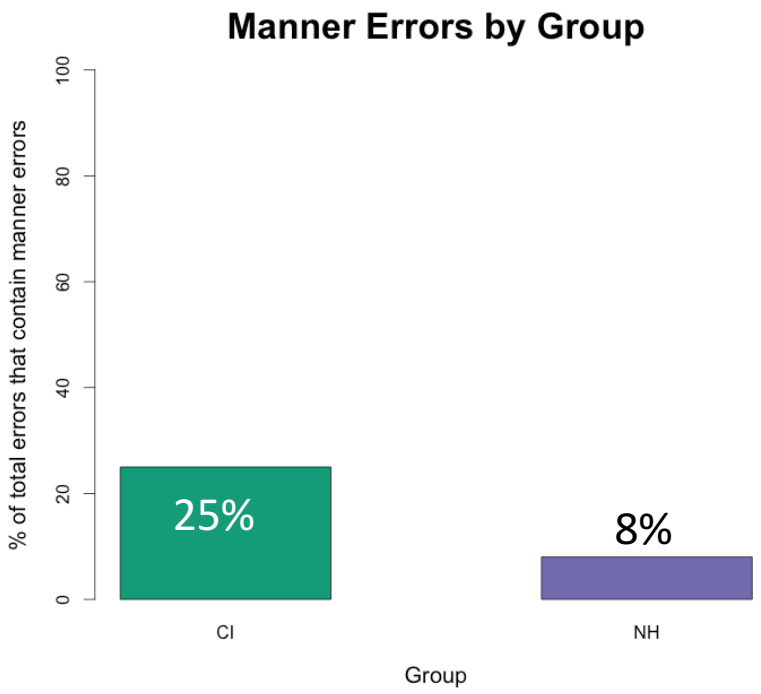
- 9% of productions were inaccurate
  - 63% of errors were on /k/
  - 37% of the errors were on /t/

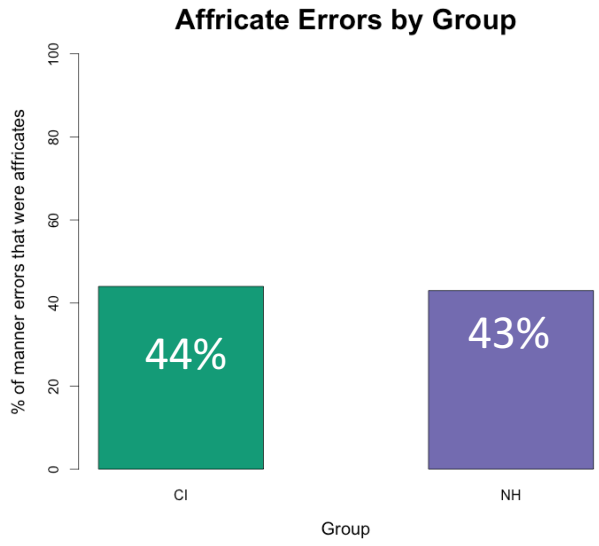
Study 1. Error patterns: Voicing errors

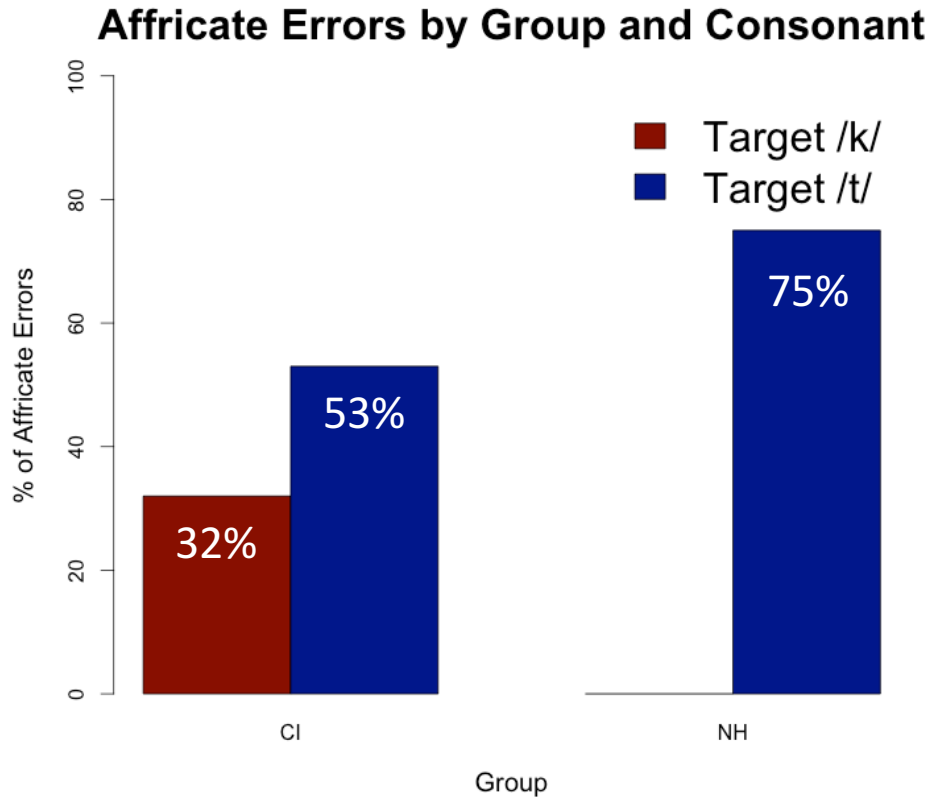




Study 1. Error patterns: Manner



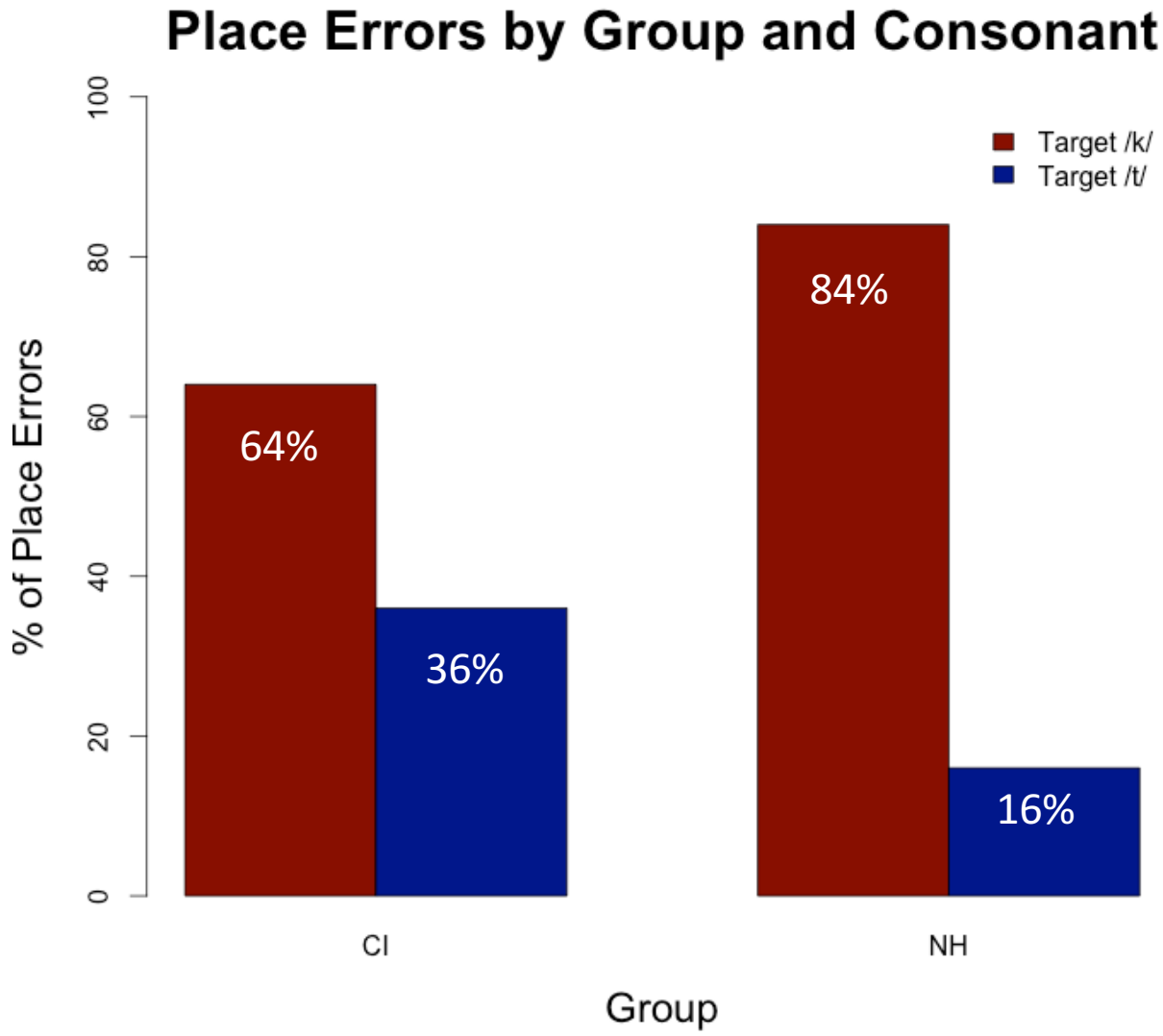




Study 1. Error patterns: Place

~50% of all errors were place errors for both groups

- Children with NH had mostly intermediate productions
- Children with CIs had mostly clear substitutions



Study 1: Discussion

- Results for children with NH are consistent with previous literature.
  - Relatively few errors.
  - More errors on /k/ than on /t/.
- Error patterns for children with CIs are best explained by perceptual difficulties.
  - Relatively higher percentage of errors for /t/
  - Relatively lower percentage of voicing errors

Study 2: Dialect mismatch

- Mainstream vs. non-mainstream dialects
  - Social capital
  - Education
  - Prestige
  - Written form

Study 2: Linguistic consequences of poverty

- In the US
  - Speaking a non-mainstream dialect
  - African American English
  - Appalachian English

- What about in Germany?
  - High vs. Low German
  - Gemischtsprechen (*Mixed Talking*)
  - Türkendeutsch (*Turkish German*)
  - Ghettodeutsch (*Ghetto German*)
  - Kiezdeutsch (*Hood German*)

Study 2: Dialect mismatch

- Dialect mismatch:
  - Home dialect ≠ School dialect
- Example:
  - Dialect of instruction = Mainstream American English (MAE)
  - Home dialect = African American English (AAE)

Study 2: Dialect mismatch and academic achievement

1. Teacher expectations
2. Cognitive resources
3. Direct impact on decoding

Study 2: African American English

- Phonological differences
- Morphosyntactic differences

The students helped themselves to breakfast.

My sister and brother was at that concert.

The boy need more money.

Study 2: Dialect mismatch and academic achievement

- Children with higher dialect density have poorer language and literacy skills.
  - Kindergarten to first grade.
  - First grade to second grade.
- Children who are less able to dialect-shift from AAE to MAE have poorer language and literacy skills.
  - Kindergarten to third grade (spoken language)
  - Third to fifth grade (written language)

Study 2: Non-mainstream dialect use and comprehension of MAE

- Does speaking a non-mainstream dialect of English make it more difficult to understand MAE?

Study 2: Dialect mismatch and comprehension

- Question: How well do AAE-speaking children comprehend words that have endings that are contrastive in MAE but not in AAE? (Edwards et al., 2015)
- Participants
  - 105 African American children
  - 4- to 8-year-olds
  - from low-SES families (mostly)

Study 2: Methods

STIMULI

- Phonological contrast:
  - Final consonant cluster deletion
  - *goal* vs. *gold*
  - /gol/ is ambiguous in AAE, but not in MAE
- Morphological contrast:
  - Plural marking
  - Plural is optional in AAE (*Fifty cent*)
  - *cat* vs. *cats*
- Stimuli recorded in AAE and MAE

Goal please (AAE)

Gold please (AAE)

Goal please (MAE)

Gold please (MAE)

Study 2: Methods

PROCEDURE

- Training phase:
  - Each target picture first named in AAE.
  - Child asked to name each target picture (*say* _____ *please*).
- Test phase:
  - Point to _____ (in MAE).

"Point to goal please"

Distracter Filler Target

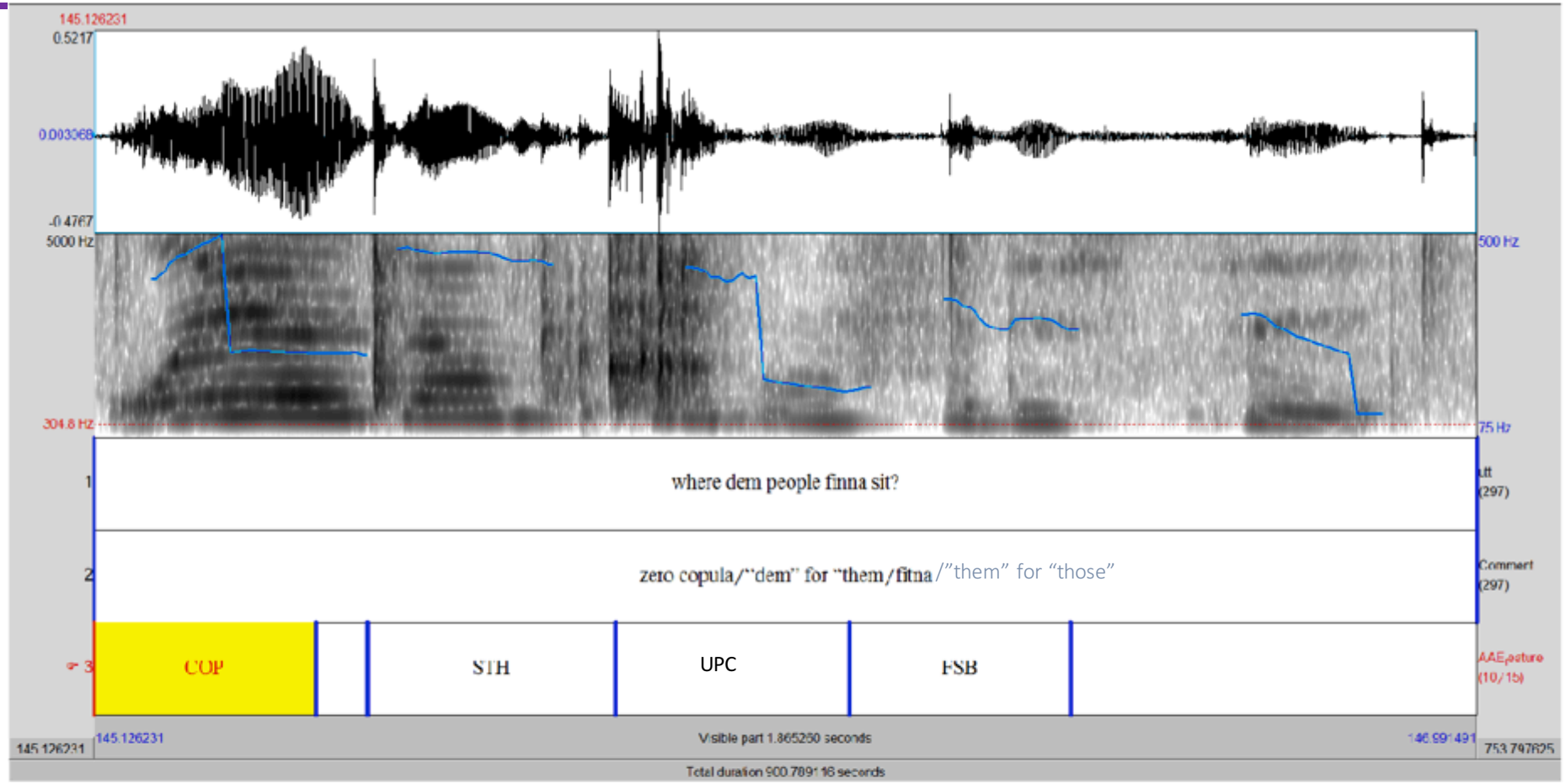
Study 2: Additional measures

- Vocabulary size:
  - Expressive vocabulary: EVT-2
  - Receptive vocabulary: PPVT-4
- Maternal education level
  - Multiple choice question on questionnaire
- Dialect density
  - Language sample
  - Frequency of non-mainstream dialect features

Study 2: Dialect density

- Dialect density
  - Measured from 50-utterance recorded language sample.
  - Sample elicited in conversation with a native AAE speaker.
  - Both morphosyntactic and phonological dialect features coded by a native AAE-speaking adult.

Study 2: Coding of AAE features



Where dem people fitna sit?
Gloss: *Where are those people going to sit?*

Morphosyntactic Features	**Explanation**	**Example from sentence**
Zero copula	is, are, am, and other forms of the verb *to be* variably included	*Where ___ those (dem)*
Undifferentiated pronoun case	Nominative, objective, and demonstrative cases of pronouns used interchangeably	*Those (dem) people*
Fitna/sposeta/bouta	Abbreviated forms coding imminent action	*Fitna sit.*
Phonological feature	**Explanation**	**Examples**
Substitutions for /ð/ and /θ/	/t/ and /d/ substitute for /ð/ and /θ/ in prevocalic position	/dɛm/ for *them*

Study 2: Dialect density

- Dialect density = number of dialect features/total number of words.
- Dialect density results:
  - range = 0 (3 children) to .28
  - mean = .06.
- Only 85 children (out of 105) produced analyzable language samples.

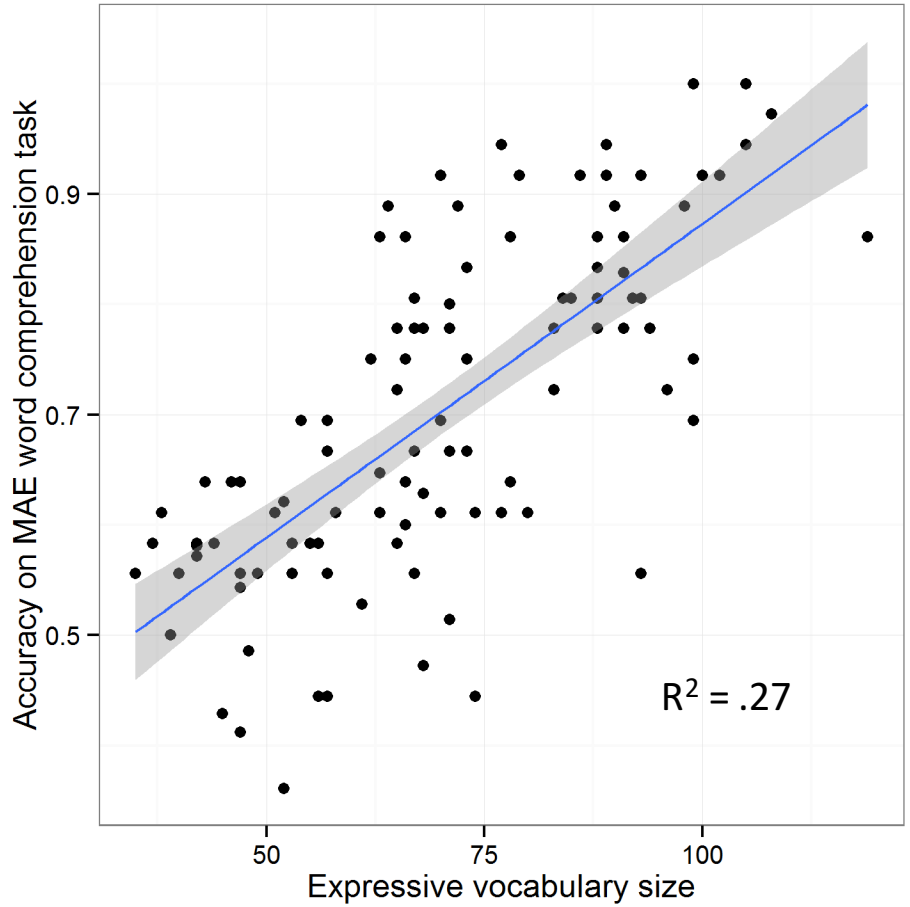
Study 2: Results

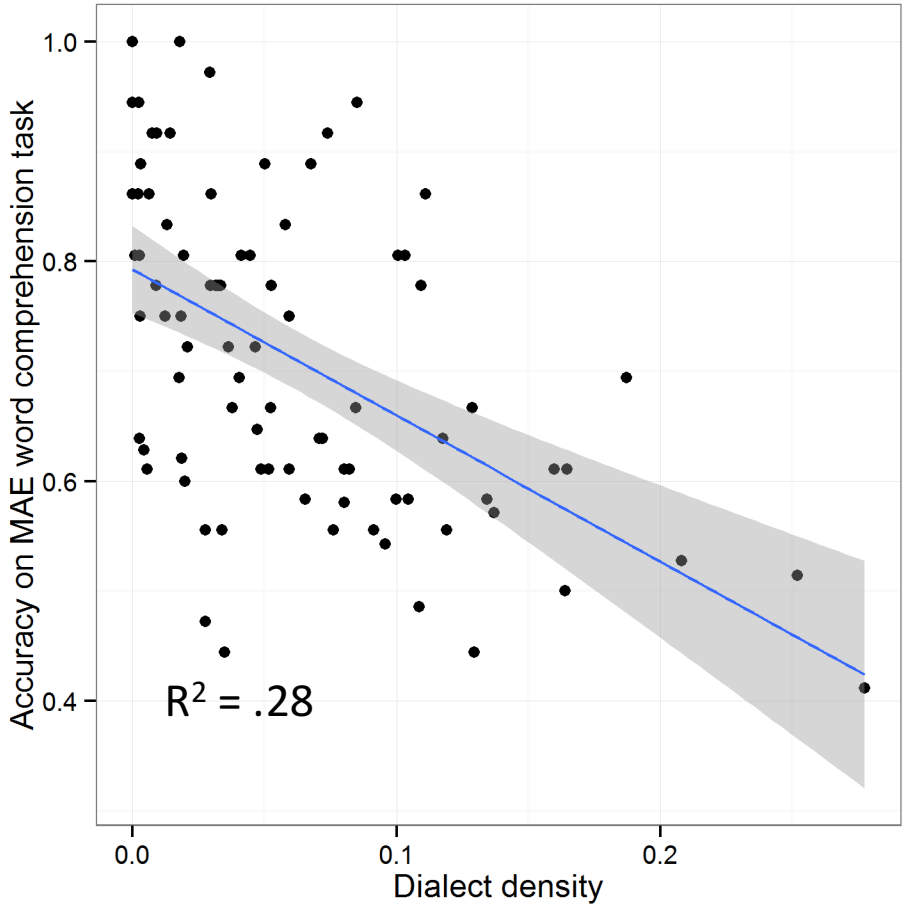
Mean percent correct by condition and contrast (SD in parentheses)

	Singleton Consonant (Ambiguous Condition)	Consonant Cluster
Phonological contrast	66 (14)	75 (15)
Morphological contrast	62 (31)	83 (16)

- Ambiguous (in AAE) conditions were the most difficult.
- Accuracy was predicted by:
  - Expressive vocabulary size
  - Dialect density

Study 2: MAE comprehension: Results



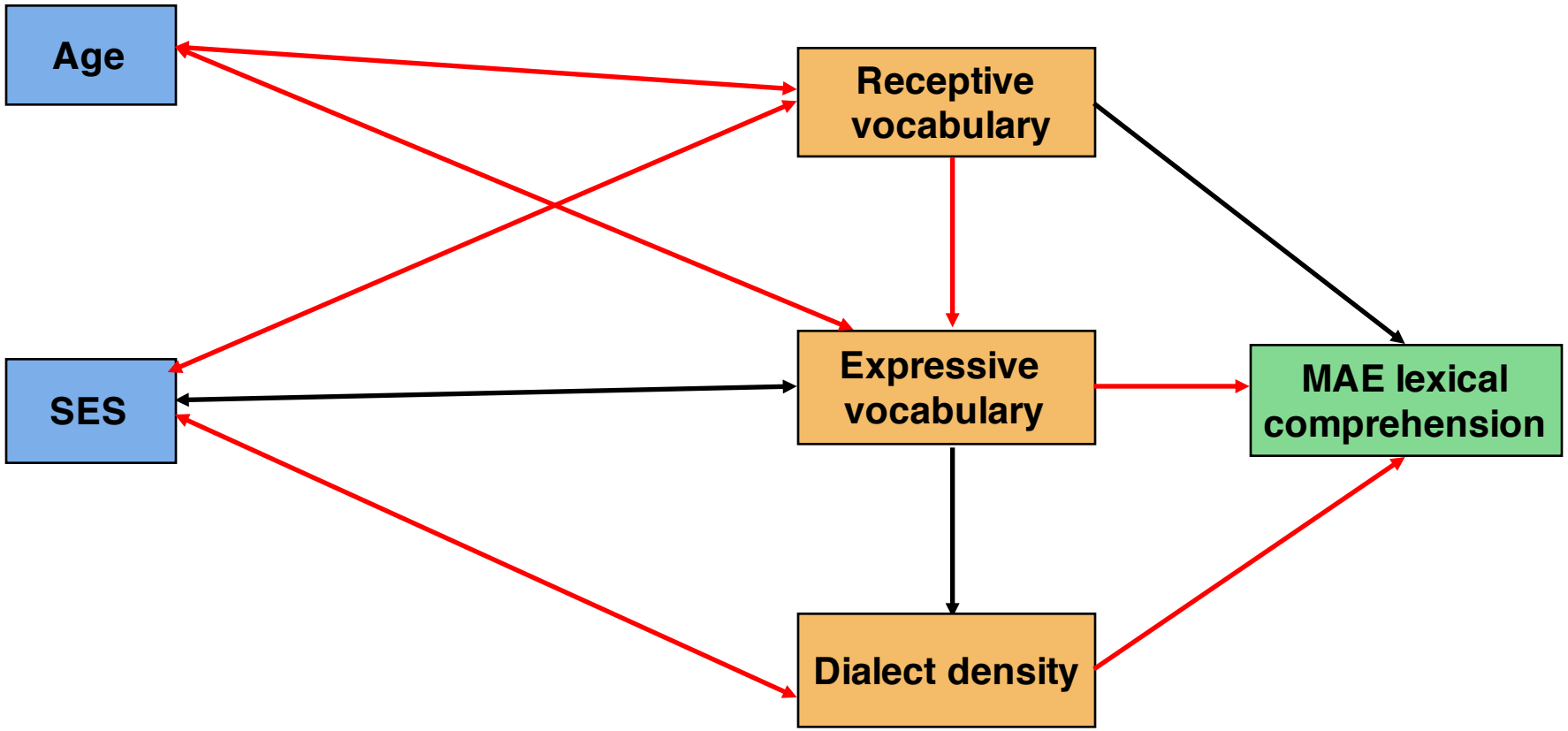


Study 2: Structural equation modeling

- What are the relationships among the measures that predict comprehension of MAE?

- Divided variables into:
  - Input variables
  - Mediating variables

Study 2: Structural equation model



Study 2: Discussion

- Non-mainstream dialect speakers *did* have difficulty understanding MAE.
- Both expressive vocabulary and dialect density *independently* predicted comprehension of MAE.
- Does it make sense to teach children how to dialect shift between the home and school dialect when they enter school?

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Both studies

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Questions?