

# Intelligibility of American English regional dialects in noise

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**THE OHIO STATE UNIVERSITY**

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# Thanks to...

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- Cynthia Clopper
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- Emily Behm
- Lindsay Brown
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- Liz Nugent

# Ohio Regional Dialect Developmental Repository

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- How does knowledge of American English regional dialects develop in Ohio?
  - What do children know about regional dialect?
  - When do they know it?
  - How does this knowledge change over time?



# Types of information in speech

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- Indexical
  - Where is the talker from?
  - What is the talker like?
  - How is the talker feeling?

# Types of information in speech

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- Indexical
  - Where is the talker from?
  - What is the talker like?
  - How is the talker feeling?
- Linguistic
  - What is the message the talker is communicating?

# ORDDR indexical perception tasks

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- Free classification (CCBS 2013, IASCL 2014, CCBS 2014, SRCD 2015)
- Locality rating (CCBS 2014, SRCD 2015)
- Language attitude rating (CCBS 2014, SRCD 2015)
- Auditory discrimination (CCBS 2014)
- Group labeling (CCBS 2014)
- Intelligibility (CCBS 2015)

# ORDDR linguistic perception tasks

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# Intelligibility

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# Intelligibility

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- What effect does a talker's regional dialect have on listeners' ability to accurately understand her?
- Generally, dialects familiar to the listener are more intelligible than less familiar dialects
  - e.g., the listener's own regional dialect (Mason, 1946; Labov & Ash, 1997)
  - e.g., regional dialects with more media exposure (Clopper & Bradlow, 2008; Floccia et al., 2006)

# Intelligibility

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- To reduce the likelihood of ceiling effects, auditory stimuli in intelligibility studies are often mixed with noise

# Intelligibility in noise

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- Cross-dialect intelligibility for Midwestern listeners (Clopper & Bradlow, 2008)
  - Midland dialect was the most intelligible to American English-speaking listeners, followed by South, followed by North, followed by Mid-Atlantic

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  - Listeners have social motivation to learn “standard” Midland dialect and much exposure via media
  - Easier versions of the task (with louder speech and quieter noise) reduced differences in performance among dialects

# Listeners

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- 144 monolingual American English-speaking visitors to COSI

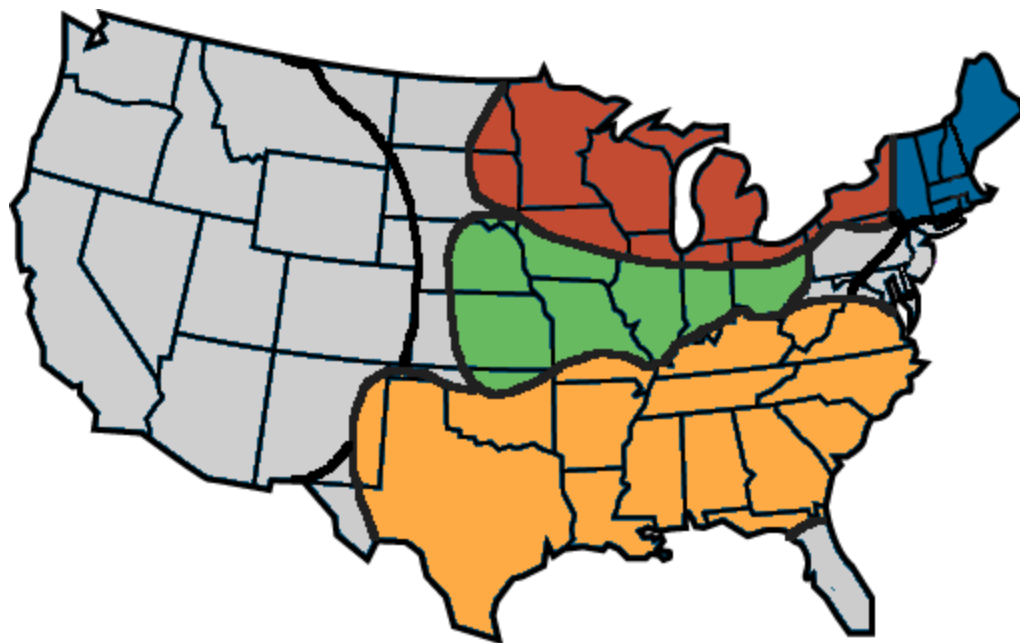
Age group	N
12-13 years old	24
14-15 years old	24
16-17 years old	24
18-34 years old	24
35-49 years old	24
50+ years old	24

Data from 4- through 11-year-olds were also collected, but are not discussed here.

# Talkers

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- 3 female talkers from each of 4 United States regions in the TIMIT Corpus
  - New England
  - South
  - North
  - Midland



# Task design





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- 2 unique 2-4 word phrases extracted from sentences produced by each talker



# Task design

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- 2 unique 2-4 word phrases extracted from sentences produced by each talker
- Each phrase selected to contain sounds revealing talker dialect affiliation
  - New England: a crab, your dark suit, ... 
  - South: pine trees, the ironing board, ... 
  - North: ten thousand, in a man's hat, ... 
  - Midland: his legs, the gorgeous butterfly, ... 









# Task design

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- Listener heard each phrase in random order and typed what they heard

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- Listener heard each phrase in random order and typed what they heard
- Auditory stimuli were mixed with speech-shaped noise (+1 dB SNR)
  - New England: yourr dark suit  
  - South: the ironing board  
  - North: in a man's hat  
  - Midland: the gorgeous butterfly  

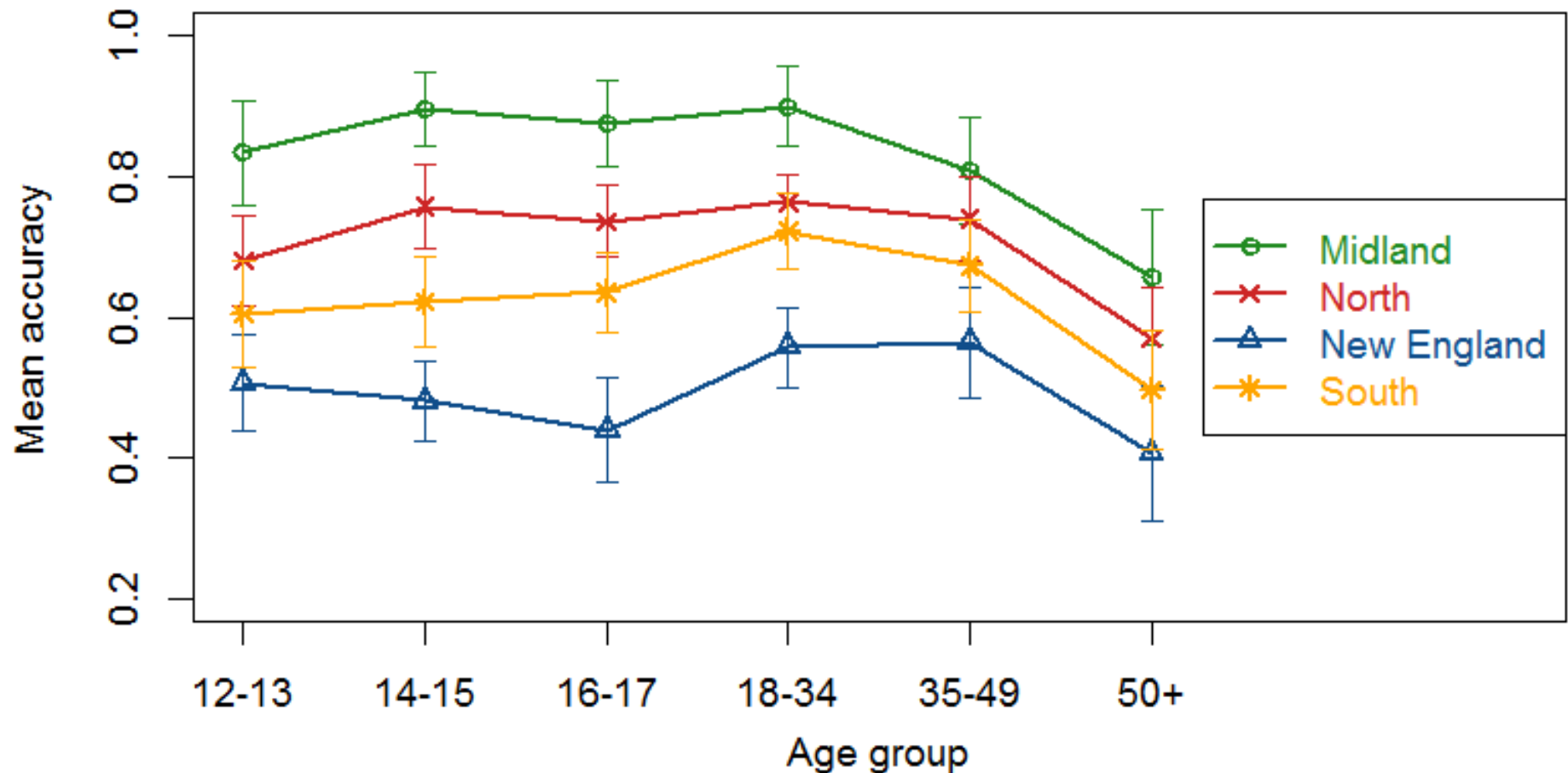
# Analysis

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- Scored accuracy for each keyword for each listener
  - Ignored *and*, articles, prepositions
  - Keywords with incorrect morphology were scored as incorrect

# Results: Age group

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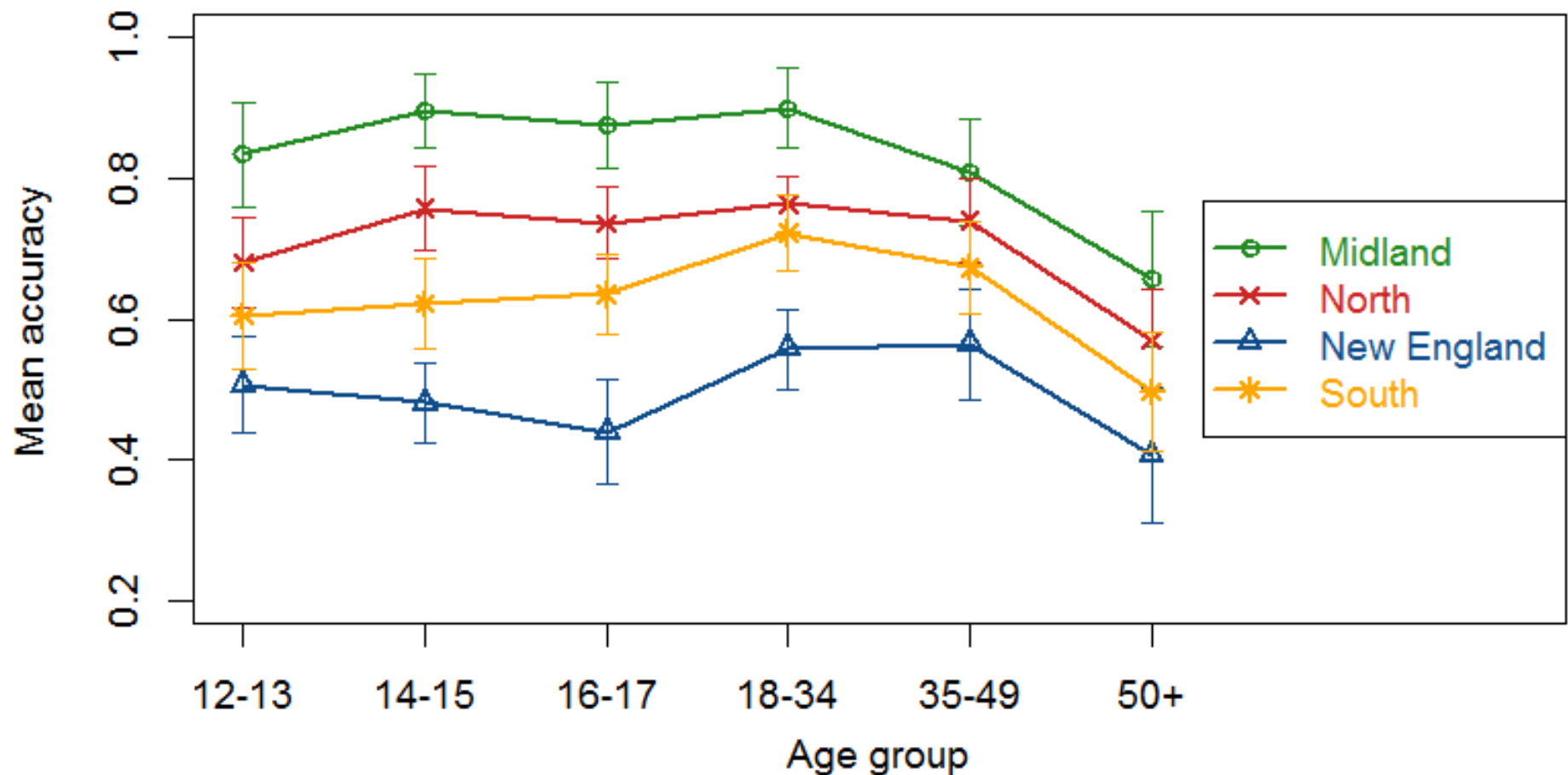
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- The main effect of age group was significant ( $F(5,138) = 6.877, p < 0.001$ )
- Listeners 50+ years old found talkers to be less intelligible than listeners of all other age groups
  - Likely due to hearing loss
  - Otherwise, listeners showed adult-like intelligibility skills by ages 12-13



# Results: Region

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- The main effect of region was significant ( $F(3,414) = 183.641, p < 0.001$ )
- 4-way distinction among dialect regions
  - The most intelligible talkers were from the Midland
  - Next were talkers from the North
  - Next were talkers from the South
  - The least intelligible talkers were from New England

# Results: Region

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- Midland > North > South > New England  
pattern is similar to previously attested  
Midland > South > North > Mid-Atlantic  
pattern (Clopper & Bradlow, 2008)
  - North-South reversal may be explained by the  
use of different auditory stimuli produced by  
different talkers

# First 4-way distinction in ORDDR

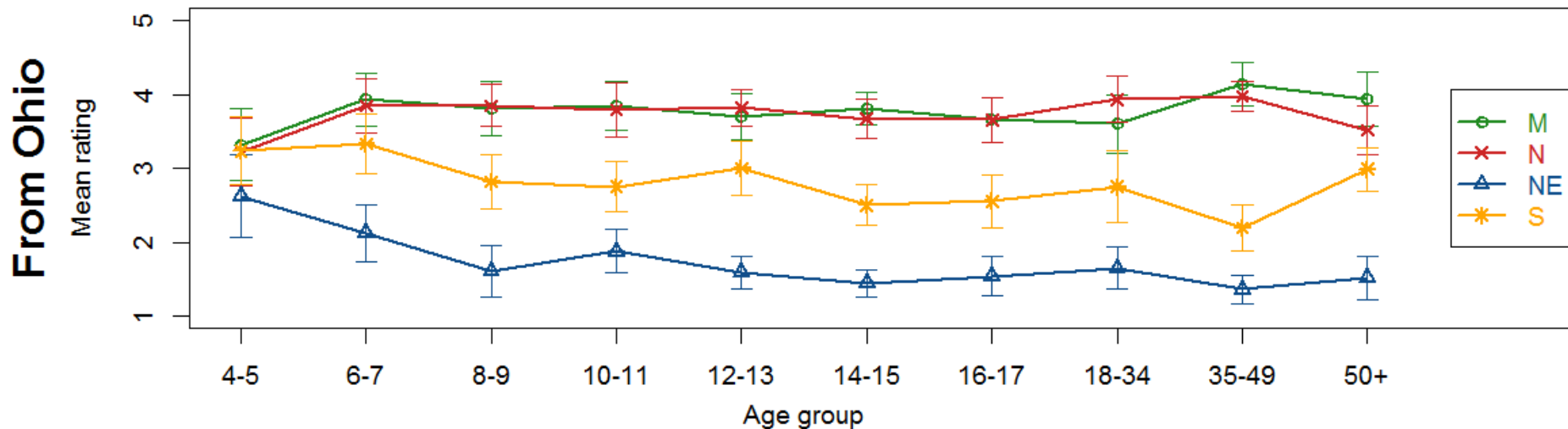
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- No other ORDDR task has revealed a four-way distinction among dialect regions

# Previously: 3-way distinction

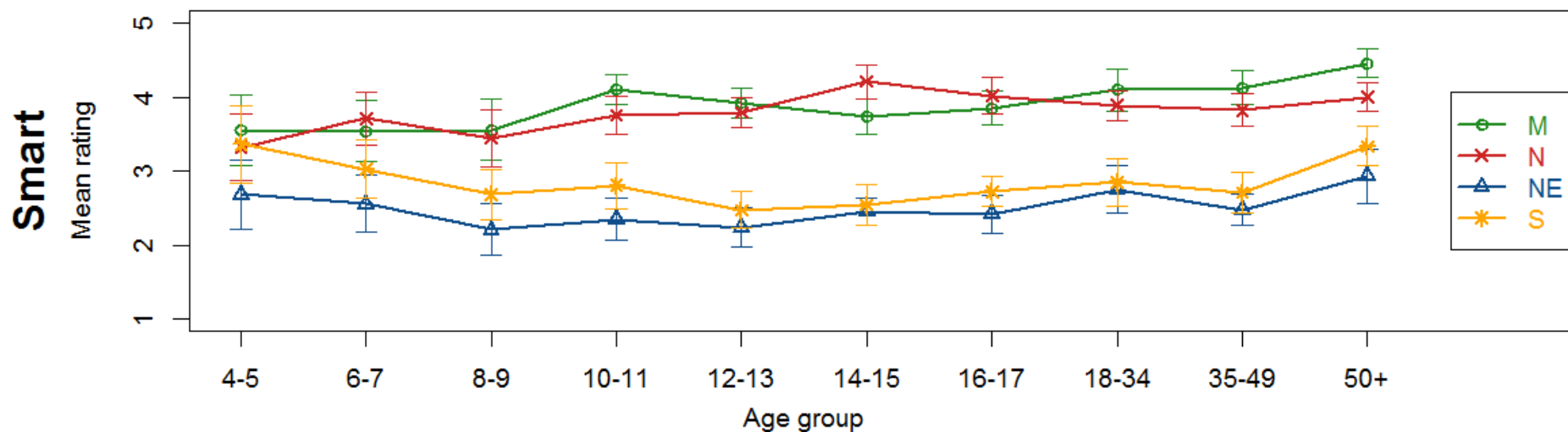
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- Listeners' ratings of whether talkers sounded likely to be "from Ohio" showed a 3-way distinction: Midland, North > South > New England



# Previously: 2-way distinctions

- Listeners' ratings of whether talkers sounded “smart,” “rich,” and “honest” showed 2-way distinctions: Midland, North > South, New England



# Previously: Midland = North

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- In **all** previous ORDDR tasks, results for talkers from the Midland were identical to results for talkers from the North



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- Are listeners at all sensitive to the acoustic phonetic differences between Midland and North?
  - These intelligibility results suggest that they are
- Why are intelligibility results different?

# Midland = North

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- Enregisterment refers to the establishment of a regional dialect as a meaningful cultural object

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- Enregisterment refers to the establishment of a regional dialect as a meaningful cultural object
- The North dialect is only partially enregistered in Ohio and is not generally stigmatized (Campbell-Kibler, 2012)
  - Thus, Midland and North talkers are not distinguished in indexical tasks due to the lack of strong social associations with the North

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- Phonetic differences between Midland and North talkers are present in the speech signal and heard by listeners
  - These differences affect their performance in a linguistic task
  - Intelligibility in noise may especially encourage attention to phonetic detail by impeding word identification

# Tasks matter

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- The speech signal carries a great deal of information, but the use of this information depends on the task presented

Thank you!