

DEVELOPMENT OF AMERICAN ENGLISH REGIONAL ACCENT PERCEPTION

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Variation in the speech signal

The speech signal involves phonetic variation in many dimensions.

- Some of this variation tells us which sounds we're hearing.
- Some of this variation tells us indexical information about the talker.
 - Is the talker a native speaker of this language?
 - Where is the talker from?
- Some variation is random, not tied to any categorical difference.
 - No two productions of a given target, even by the same talker in the same context, are phonetically identical.

How do listeners cope?

How do listeners interpret phonetic variation?

- Which dimensions communicate information about native speaker status? about region of origin? etc.
- How is meaningful variation distinguished from random variation?

How and when do listeners **learn** to interpret phonetic variation?

- Language acquisition (L1)/learning (L2) is a complex task. How and when is phonetic variation interpreted as reflecting indexical information about the talker?

Foreign versus regional accents

Foreign accents and regional accents are said to arise from different acquisition/learning situations.

- A non-native speaker of the language may have a **foreign accent**.
- A native speaker of the language from a particular place may have a **regional accent**.

They are usually thought of as different phenomena, and they are often studied by different people.

Foreign versus regional accents

I am especially interested in the phonetic differences (or lack thereof?) between foreign accents and regional accents.

It may be that they are actually quite similar, despite having different names.

What's in a name?



Referee and **umpire** are different terms used in different contexts, but fundamentally, referees and umpires are quite similar.

Foreign versus regional accents

Of course, particular accents of either sort may be associated prominently with particular dimensions, some of them well-studied and/or stereotyped.

(photo from Boston)



But in general, do foreign versus regional accents...

- Involve variation on different dimensions?
- Involve different degrees or patterns of variation?
- Not differ predictably in qualitative or quantitative ways?

Focusing on regional accents

We know that adults can use regional accent to...

- Group people by where they are from
 - Clopper & Bradlow (2009), Clopper & Pisoni (2007)
- Identify where someone is from
 - Clopper & Pisoni (2004), Williams et al. (1999)
- Judge people
 - Cheyne (1970), Ladegaard (1998), Luhman (1990)

We know that children are not adult-like on these tasks.

- Floccia et al. (2009), Girard et al. (2008), Kinzler & DeJesus (2012), Wagner et al. (2013), Williams et al. (1999)

Focusing on regional accents

However, the development of regional accent perception is not yet well understood.

- Different experimental tasks are used for populations of different ages.
- Older children are not well-represented in such studies.

How do listeners cope?

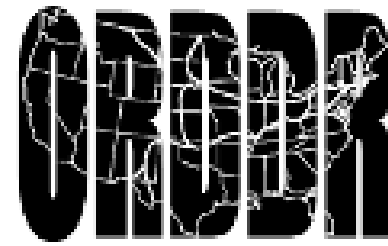
How do listeners interpret phonetic variation?

- Which dimensions communicate information about native speaker status? about region of origin? etc.
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Ohio Regional Dialect Developmental Repository



The ORDDR is a forthcoming database of United States regional dialect perception and production, collected from monolingual English speakers in central Ohio.

- 4-year-olds through 94-year-olds complete the same tasks.
- Several major regional dialect areas are represented in and near Ohio (Midland, North, South).



Participants of many ages

To examine developmental patterns, ORDDR includes equal numbers of participants in each of 10 age groups, with dense sampling during childhood.

Children

4-5 years old
6-7 years old
8-9 years old
10-11 years old
12-13 years old
14-15 years old
16-17 years old

Adults

18-34 years old
35-49 years old
50+ years old

Language Pod data collection

ORDDR studies are conducted in the Language Sciences Research Lab (“Language Pod”), which is located in a science museum in Columbus, Ohio.



Language Pod data collection

Museum visitors are invited to take part in a language-related study on the spot, and many enthusiastically accept.

This arrangement makes it easy to get a lot of participants of a variety of ages.

However, this arrangement imposes practical limitations on how long each participant is willing to spend doing the study.

- Complex studies work better with between-subject designs rather than within-subject designs.

Pilot studies

We ran a number of (large) pilot studies to test our methods prior to beginning the main repository study.

Today I will discuss the results of 3 pilot tasks:

- Discrimination
- Labeling (2-alternative forced-choice classification)
- Free classification

Auditory stimuli

All the tasks discussed today used the same auditory stimuli.

- *She had your dark suit in greasy wash water all year* produced by 12 female talkers from the TIMIT Corpus.

This stimulus sentence offers many opportunities for producing and perceiving regional variation.

- The talkers chosen were from 4 regions:
Midland, North, South, and New England.

Accent perception by children

5- through 7-year old children have difficulty distinguishing between regional varieties of their native language.

- Floccia et al. (2009), Girard et al. (2008), Wagner et al. (2013)

However, children at these ages are much better at distinguishing foreign-accented talkers from native talkers.

Accent perception by children

These results seem to suggest an inherent difference between regional and foreign accents, but...

- There isn't much data, period.
- The tasks used might be hard for children.
- The range of regional and foreign accents studied has been very limited.

Are all regional varieties equally challenging?

Task 1: Discrimination

In this task, each listener heard two talkers and was asked whether they were from the **same** place as one another or **different** places.

- Listeners who did not pass a pretest about “same” and “different” were not included in the data set.

Each listener heard only two accents during the task.

- New England and Midland, New England and North, etc.

720 listeners participated.

- These listeners were evenly distributed among 10 age groups and 6 accent pairings (12 per combination).

Discrimination analysis

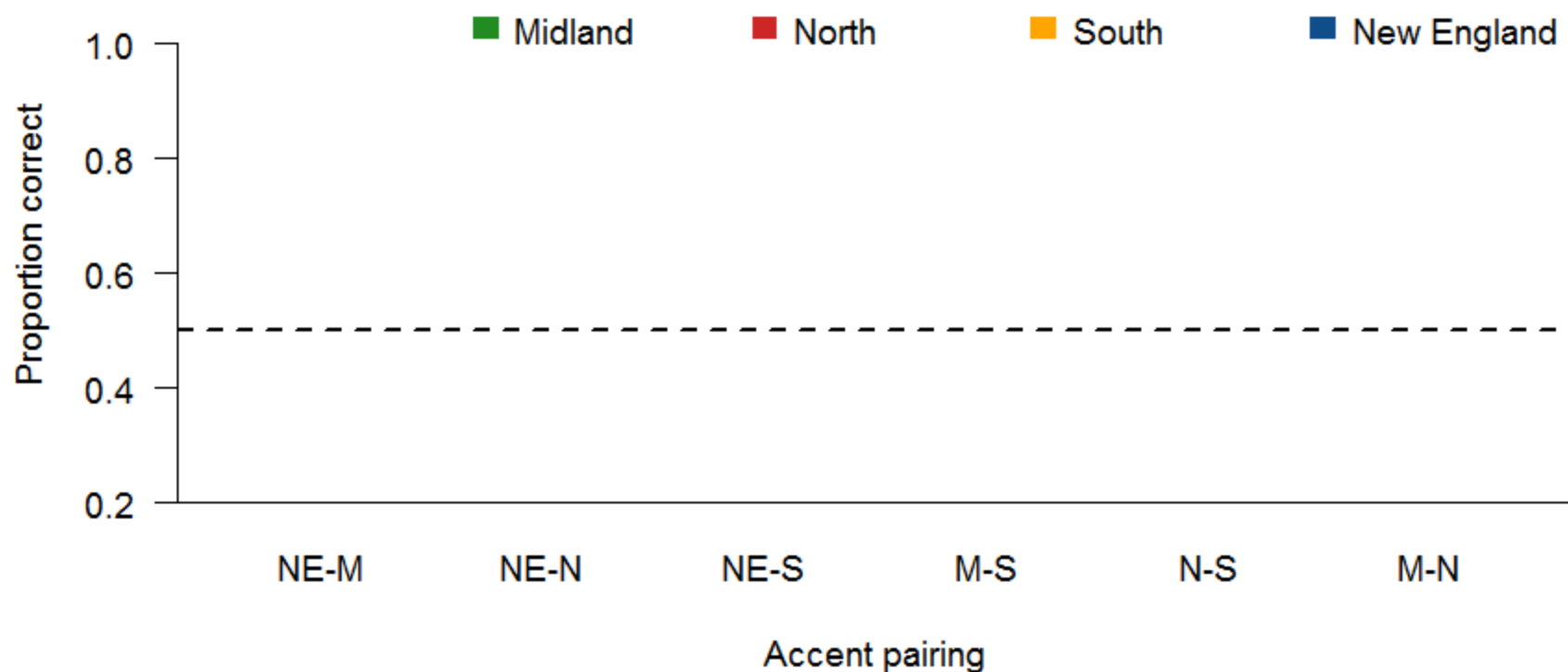
Establish adult baseline performance.

- Which accent pairings did 35- to 49-year-olds discriminate at above chance levels?

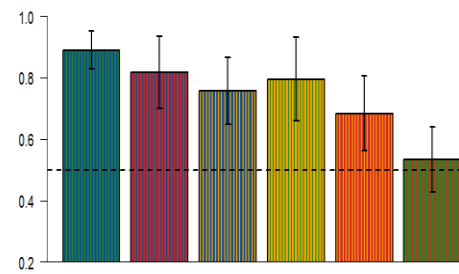
Compare the performance of each age group to the adult baseline.

- For each accent pairing, did this age group perform at the same level as the adult baseline?
- If not, did they perform above chance?

Discrimination results

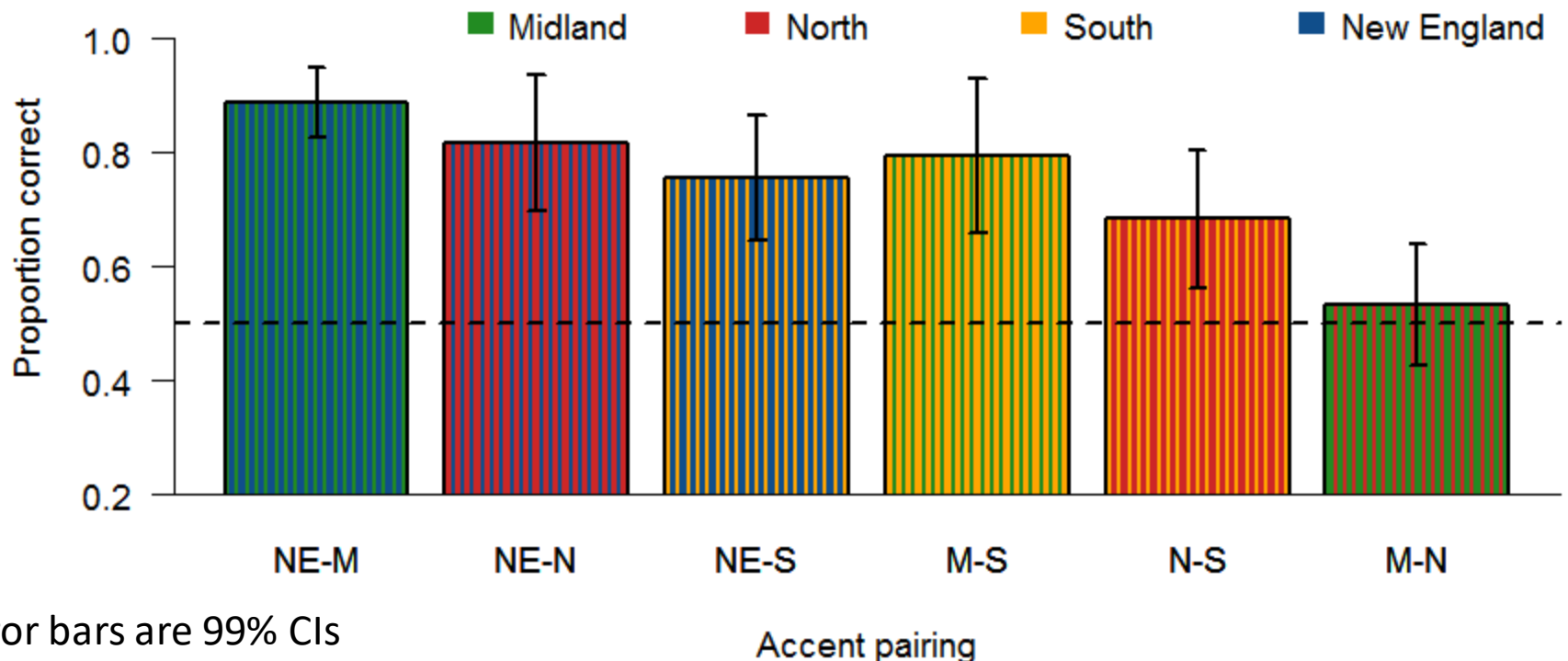


Discrimination, ages 35-49



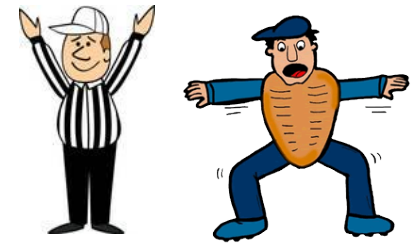
Adults performed above chance on all accent pairings except **Midland-North**.

- The **North** accent is not stigmatized in Ohio and is not consistently noticed by listeners (Campbell-Kibler, 2012).



error bars are 99% CIs

Discrimination scorecard



Accent pairing

New England-Midland

New England-North

New England-South

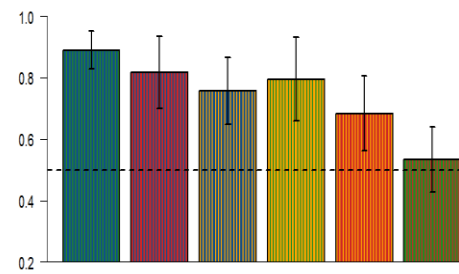
Midland-South

North-South

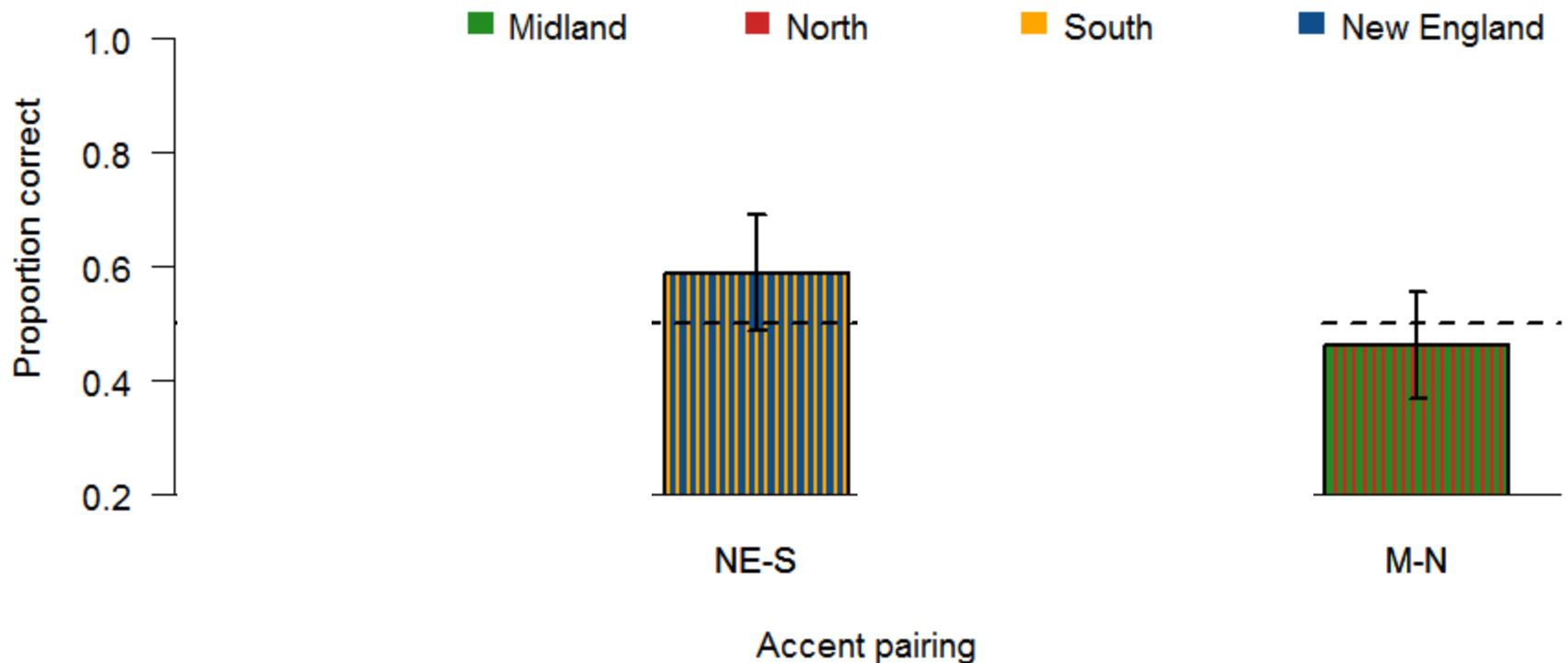
Midland-North

Adult-like at...

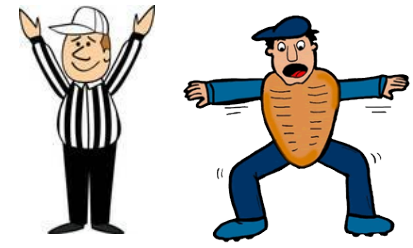
Discrimination, ages 4-5



4- and 5-year-olds had adult-like performance on **New England-South** and **Midland-North**.



Discrimination scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

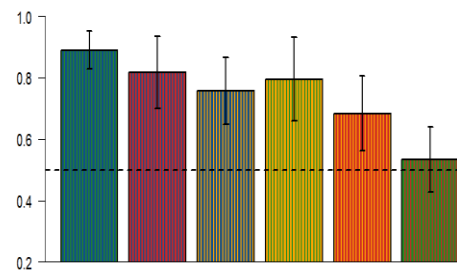
Midland-North

Adult-like at...

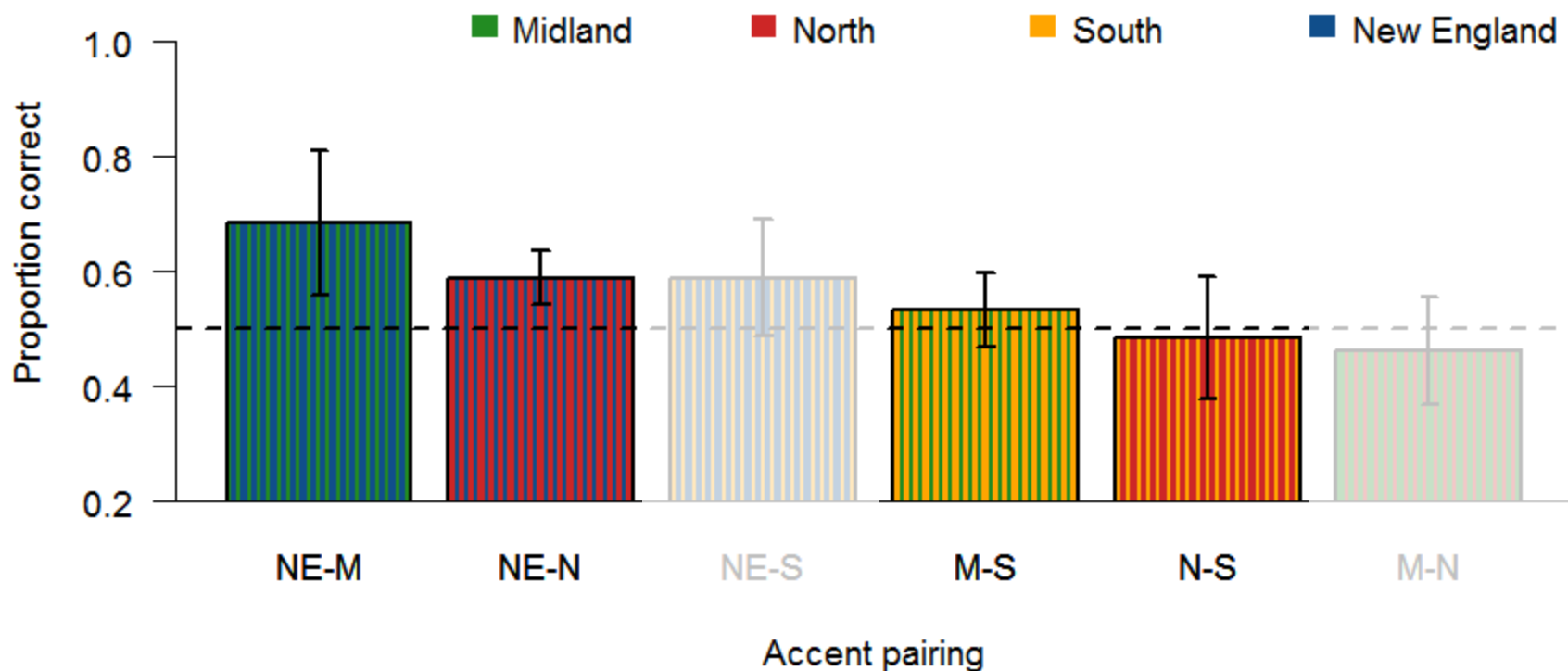
4-5 years

4-5 years

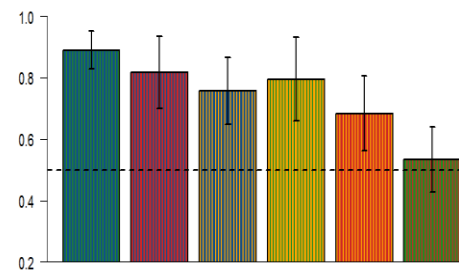
Discrimination, ages 4-5



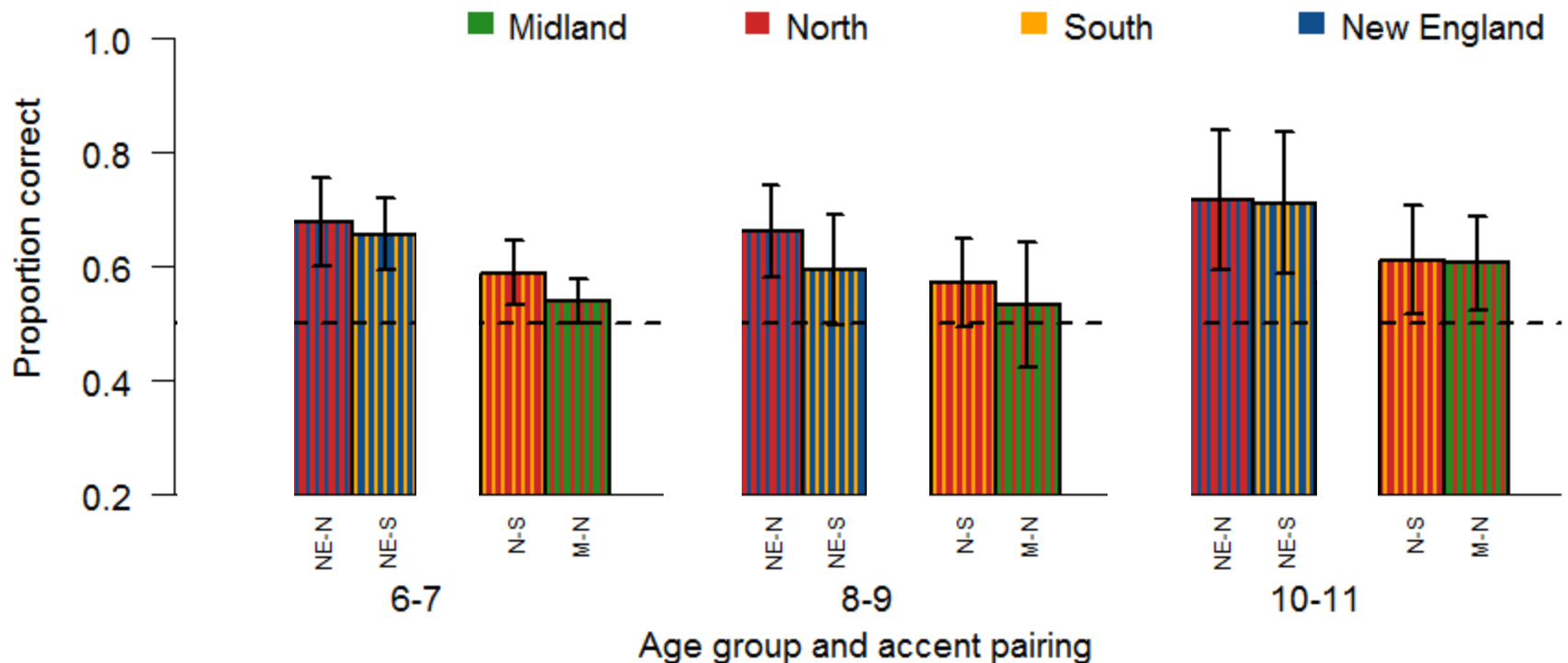
Their performance on all other pairings was lower than adults', though above chance on **New England-Midland** and **New England-North**.



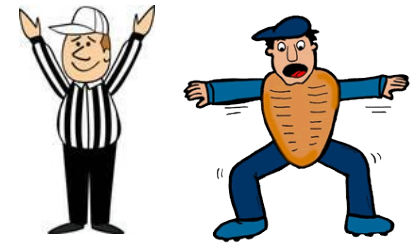
Discrimination, ages 6-11



6- through 11-year-olds had adult-like performance on many accent pairings.



Discrimination scorecard



Accent combination

Adult-like at...

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

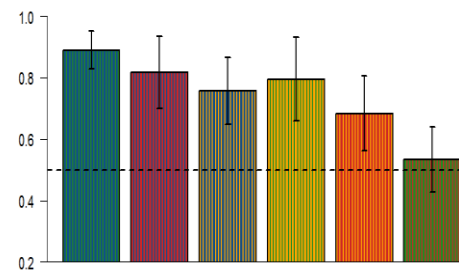
6-7 years

4-5 years

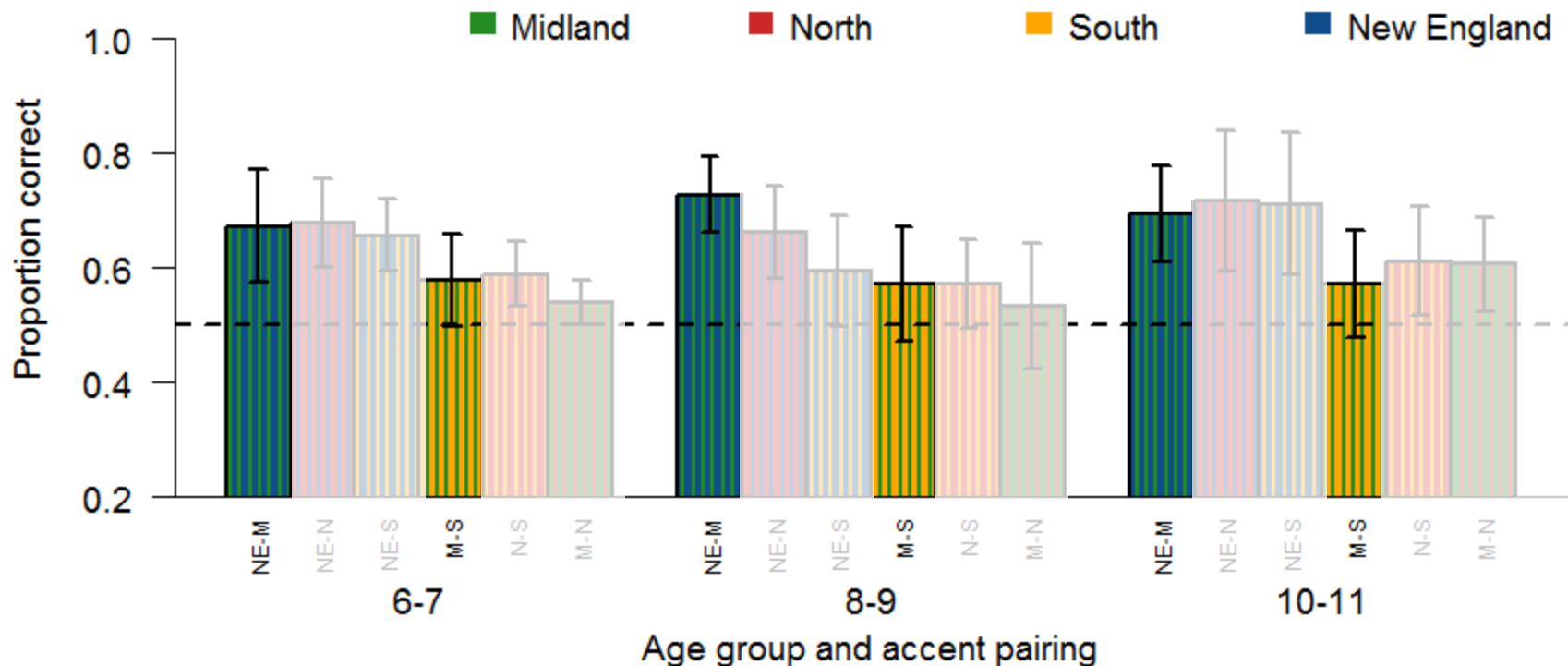
6-7 years

4-5 years

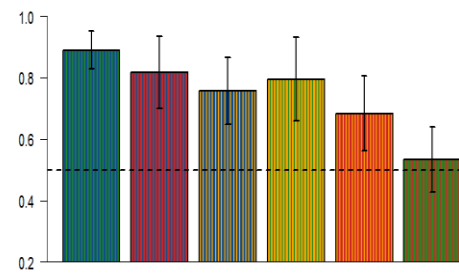
Discrimination, ages 6-11



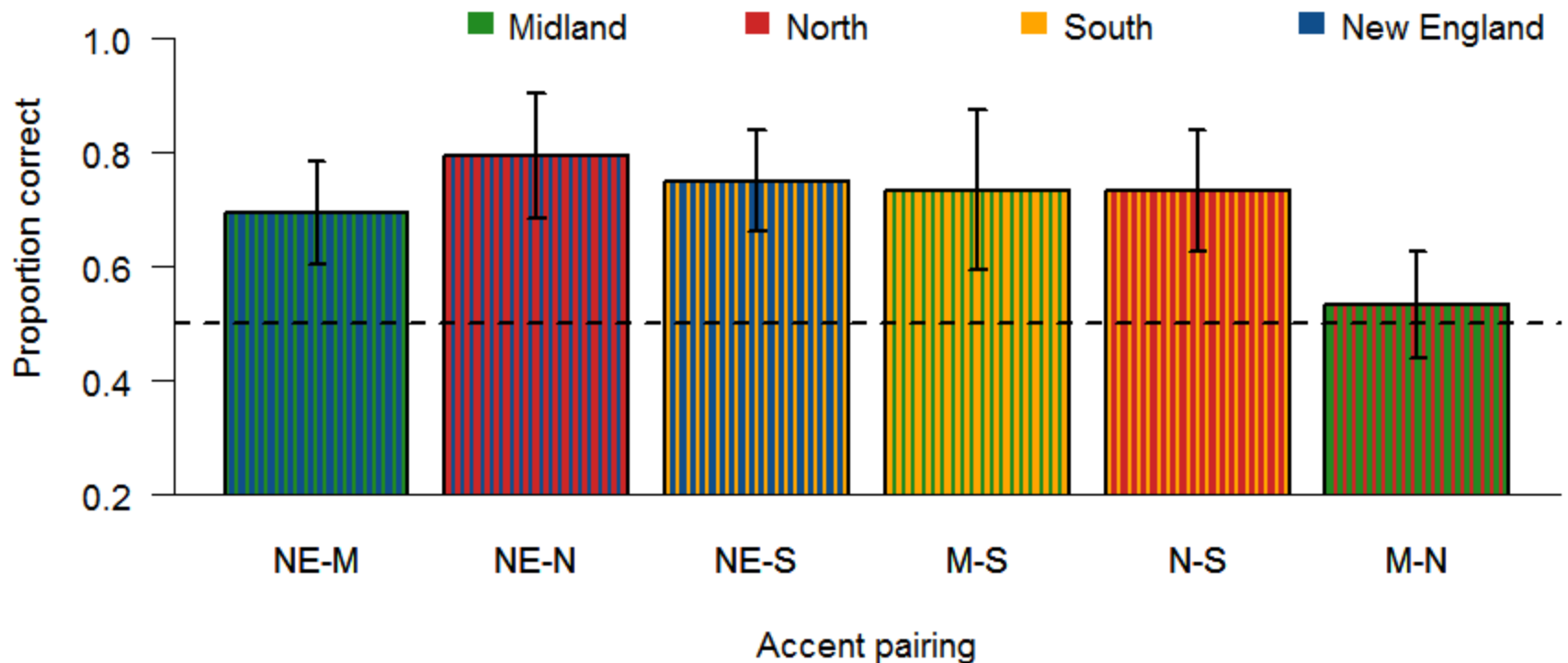
However, their performance on **New England-Midland** and **Midland-South** was lower than adults', and on **Midland-South** did not exceed chance.



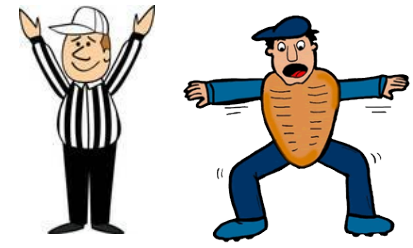
Discrimination, ages 12-13



12- and 13-year-olds had adult-like performance on all pairings except **New England-Midland**, which still exceeded chance.



Discrimination scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

Adult-like at...

6-7 years

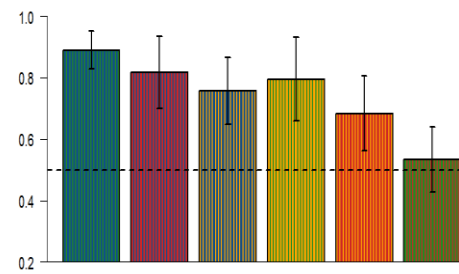
4-5 years

12-13 years

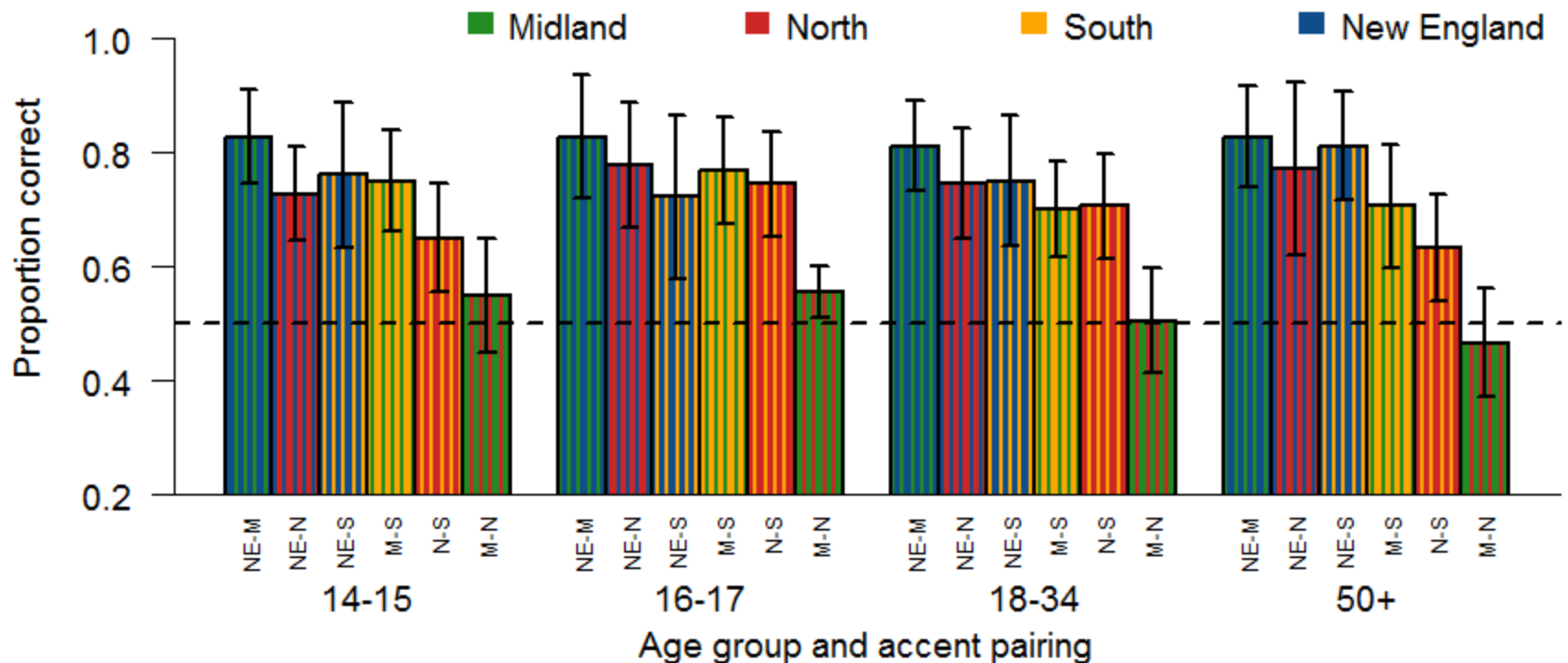
6-7 years

4-5 years

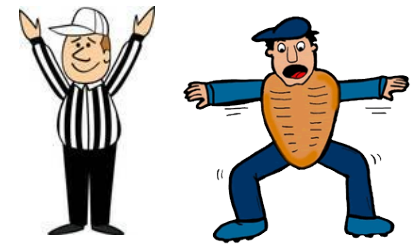
Discrimination, ages 14+



Beginning at age 14, all groups showed adult-like performance.



Discrimination scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

Adult-like at...

14-15 years

6-7 years

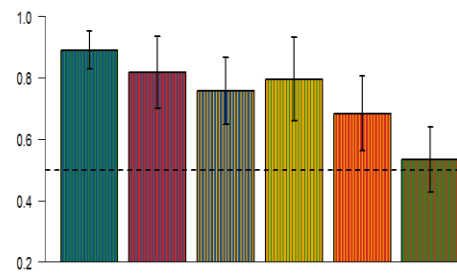
4-5 years

12-13 years

6-7 years

4-5 years

What discrimination tells us



Experience matters.

- The **Midland-South** pairing was only successfully discriminated beginning at age 12.
- **New England-Midland** improved until age 14.

Not all regional accents are treated equally.

- **New England** stands out.
 - Even 4- and 5-year-olds know that **New England** talkers are from different places than **Midland**, **North**, and **South** talkers.

But this is a relatively easy task.

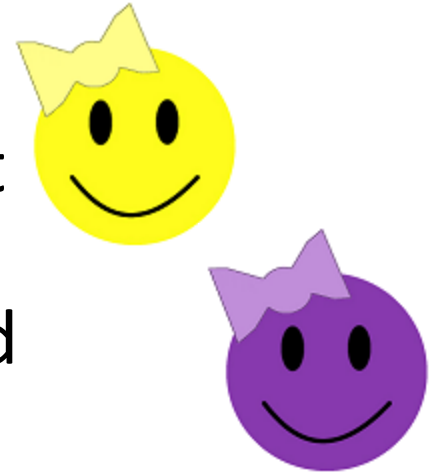
In previous work, children have had more difficulty using regional accent differences in categorization tasks than in discrimination tasks.

- Floccia et al. (2009), Girard et al. (2008),
Wagner et al. (2013)

What happens with these American English regional accents in a categorization task?

Task 2: Labeling

In this task, accents were assigned to colors. Each listener was trained on what yellow and purple talkers sounded like, and then heard new talkers and identified whether each one was **yellow** or **purple**.



Participants were the same 720 listeners from Task 1.

- These listeners were evenly distributed among 10 age groups and 6 accent pairings (12 per combination).

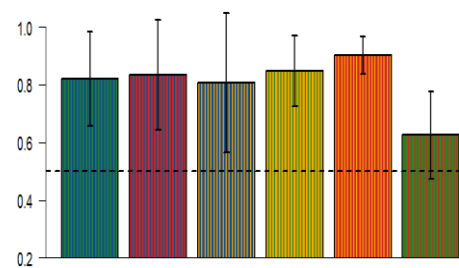
Each listener heard the two accents that s/he hadn't heard during Task 1.

Labeling analysis

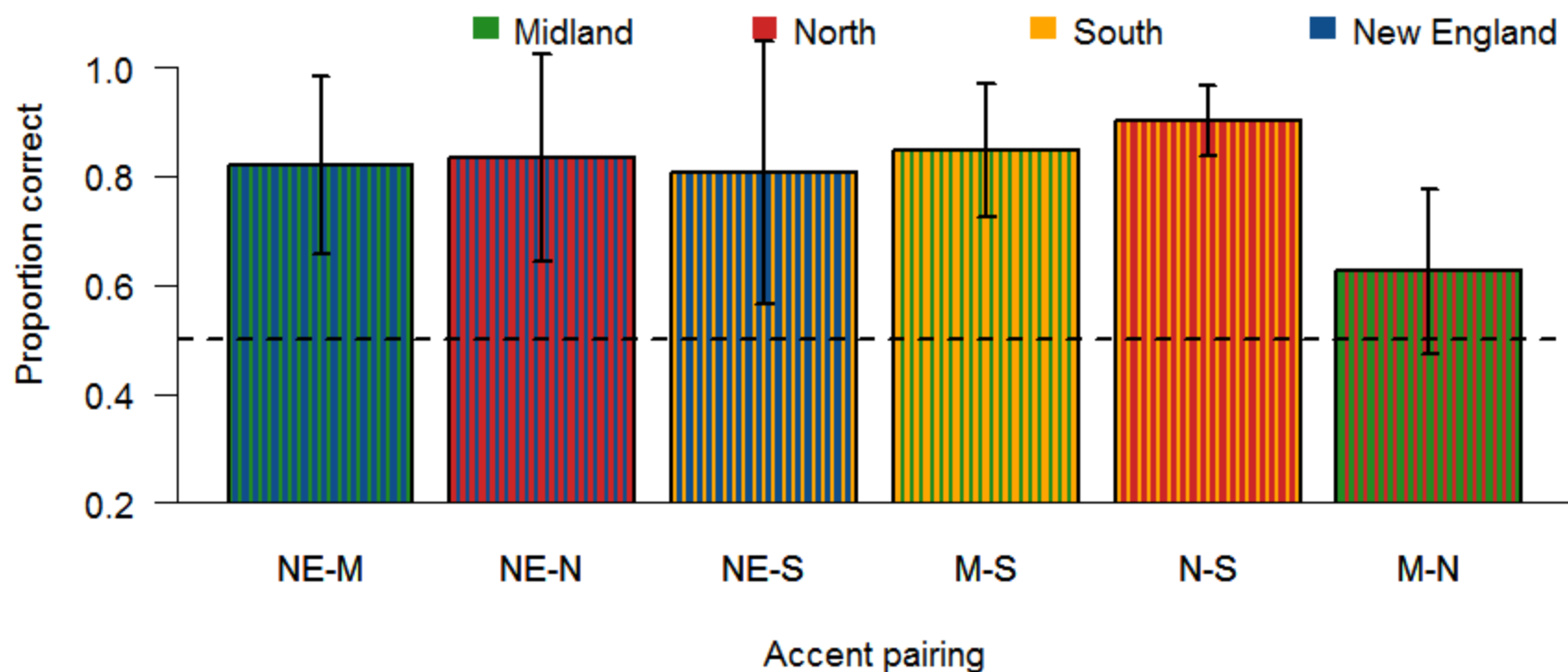
The labeling analysis was identical to the discrimination analysis.

However, the labeling task involved fewer trials for each participant, so significant effects were more difficult to achieve.

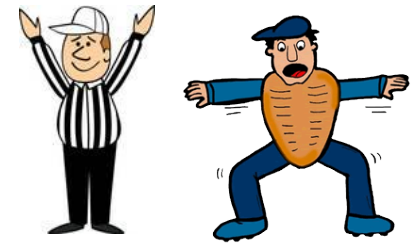
Labeling, ages 35-49



Adults performed above chance on all accent pairings except **Midland-North**.



Labeling scorecard



Accent pairing

New England-Midland

New England-North

New England-South

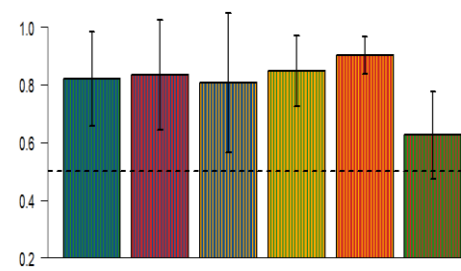
Midland-South

North-South

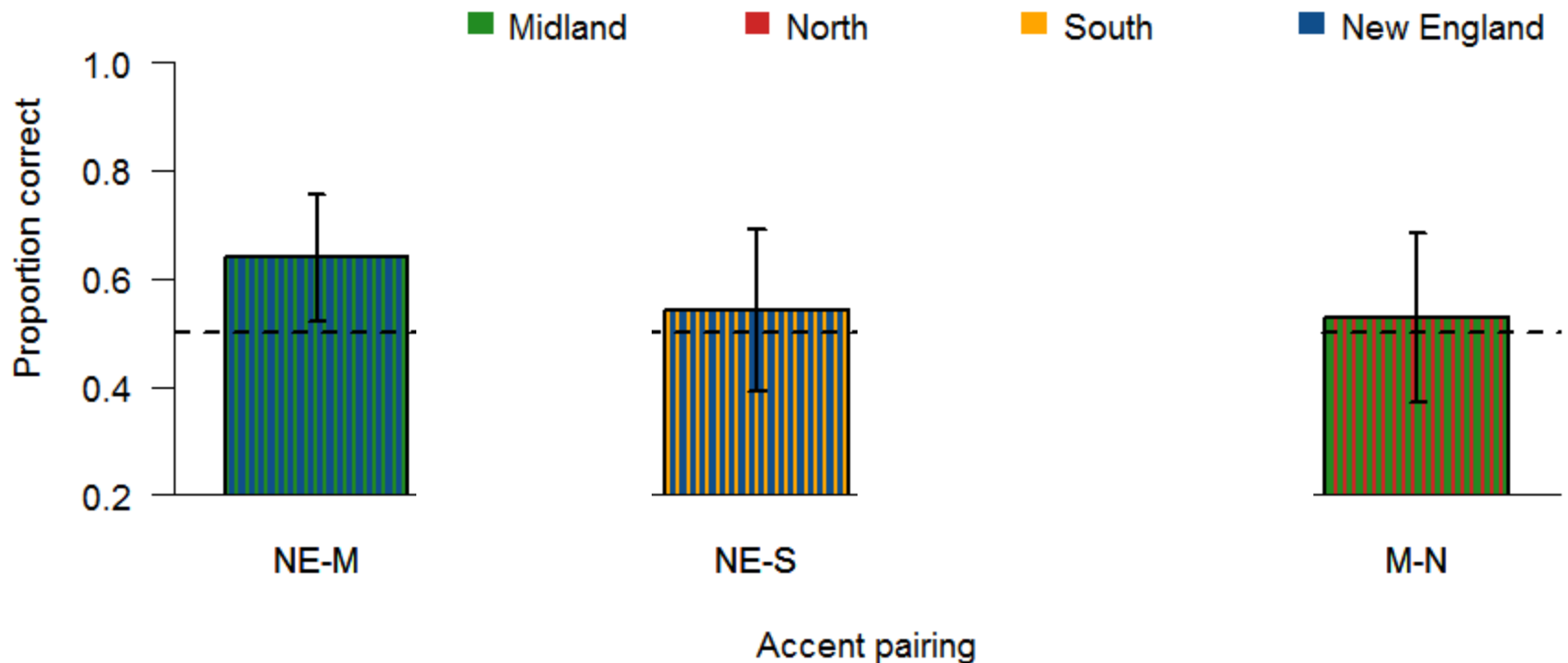
Midland-North

Adult-like at...

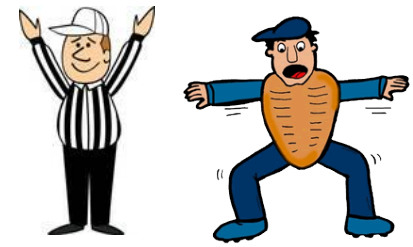
Labeling, ages 4-5



4- and 5-year-olds had adult-like performance on New England-Midland, New England-South and Midland-North.



Labeling scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

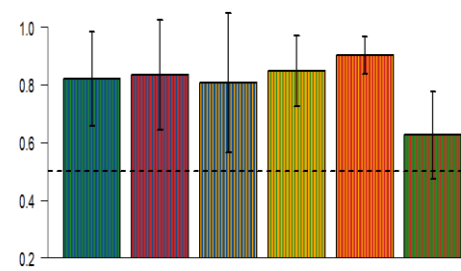
Adult-like at...

4-5 years

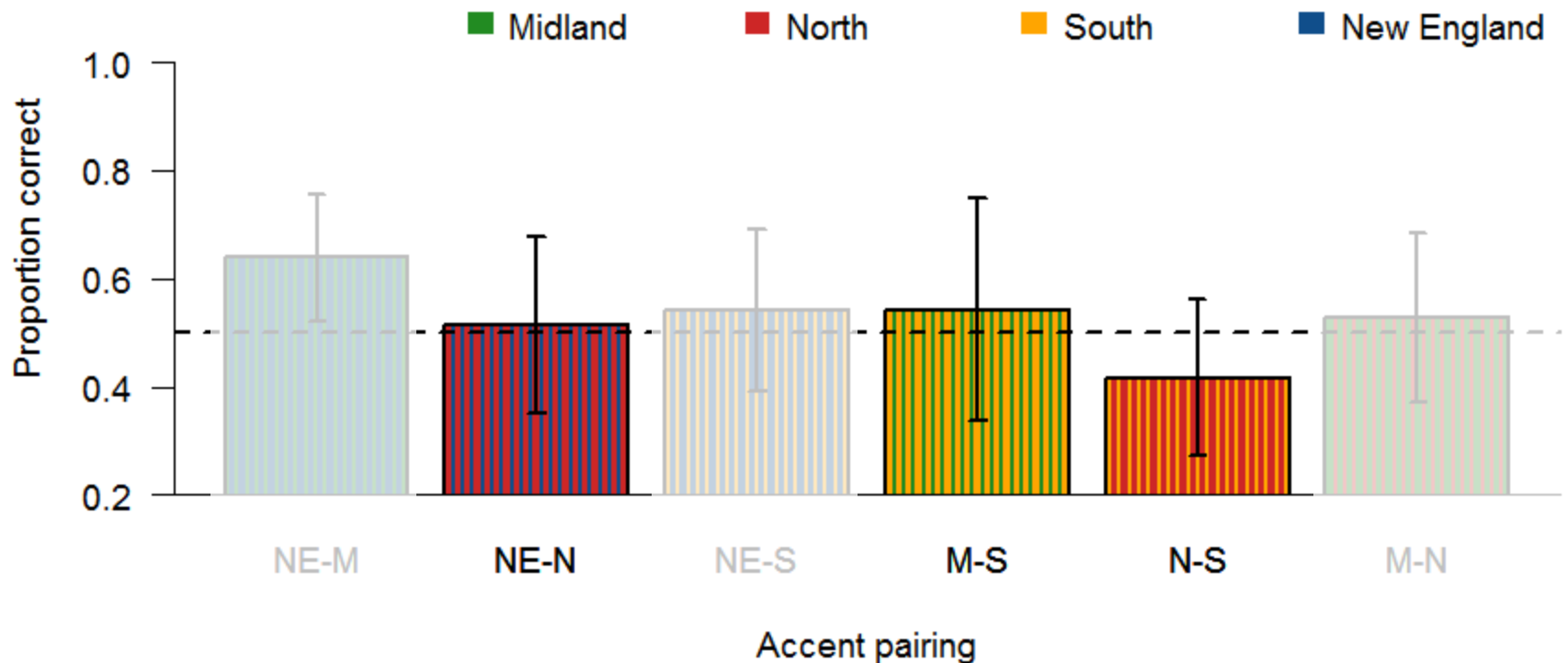
4-5 years

4-5 years

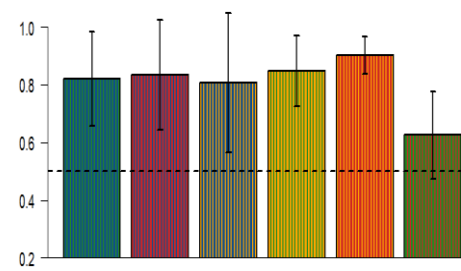
Labeling, ages 4-5



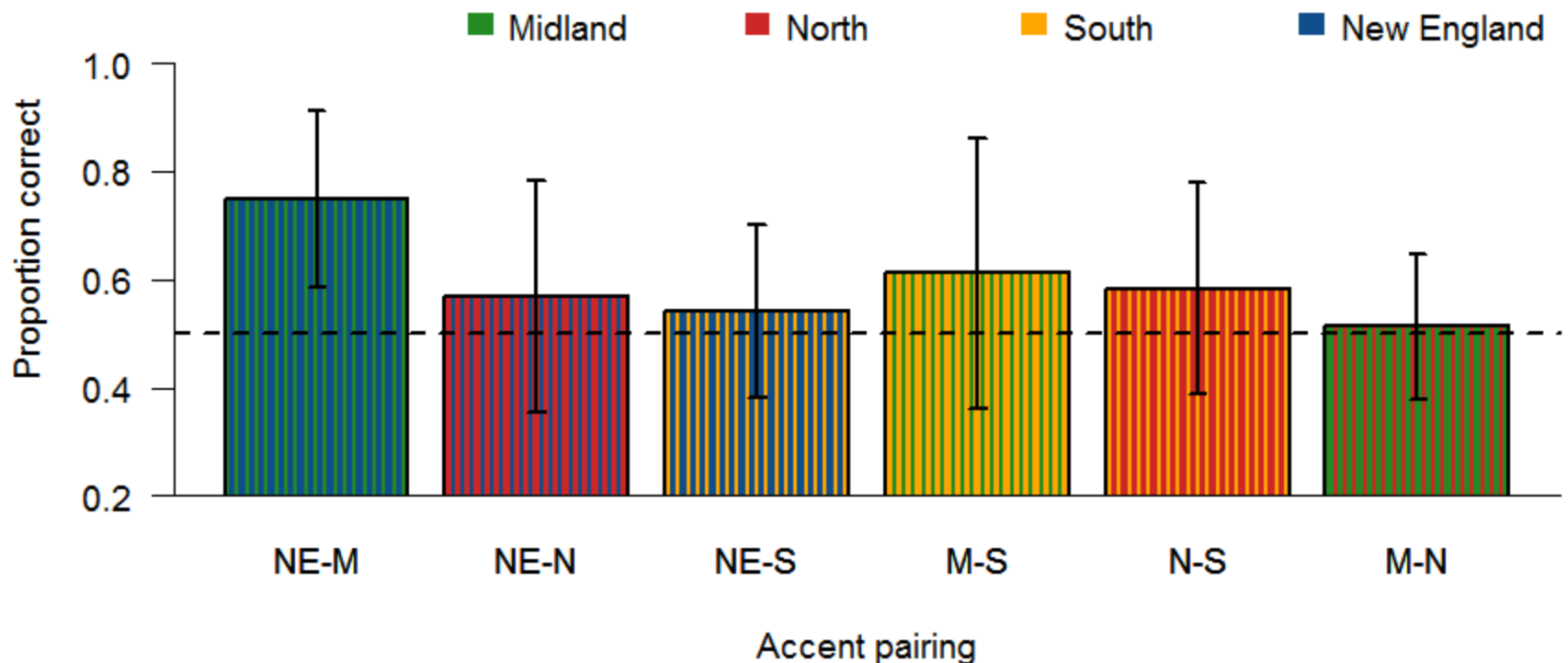
Their performance on **New England-North**, **Midland-South**, and **North-South** was lower than adults', and at chance.



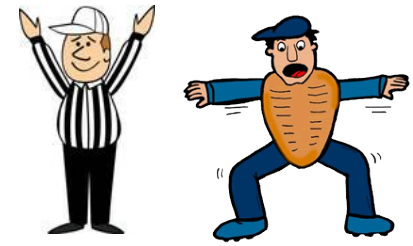
Labeling, ages 6-7



6- and 7-year-olds had adult-like performance on all pairings except **North-South**, on which they performed at chance.



Labeling scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

Adult-like at...

4-5 years

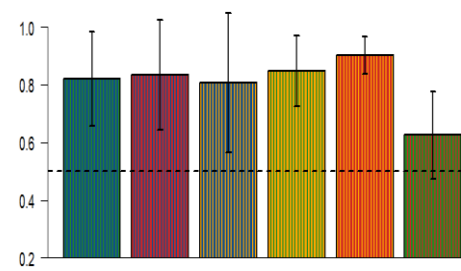
6-7 years

4-5 years

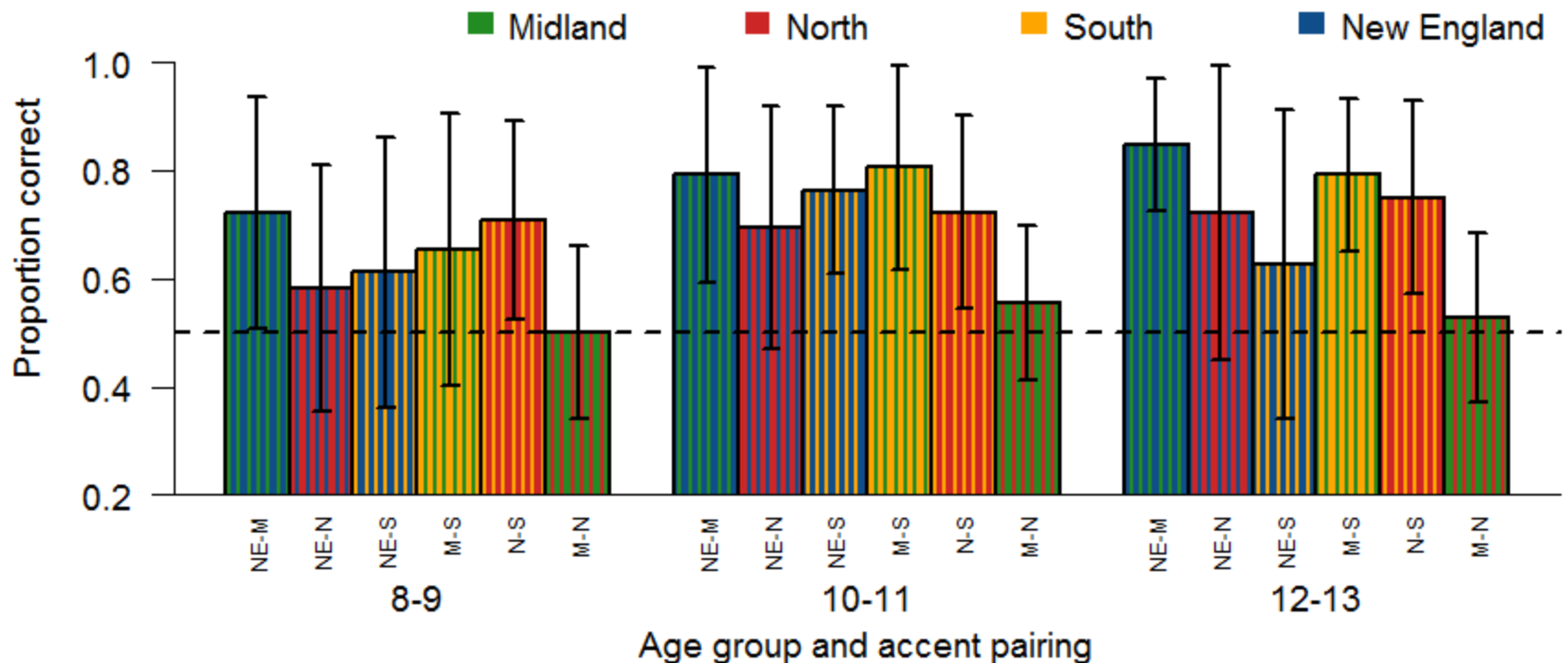
6-7 years

4-5 years

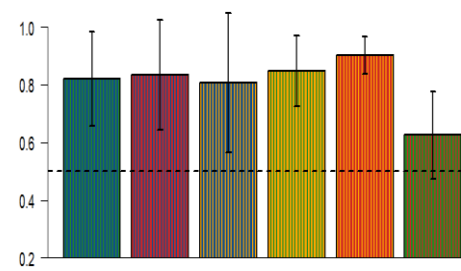
Labeling, ages 8+



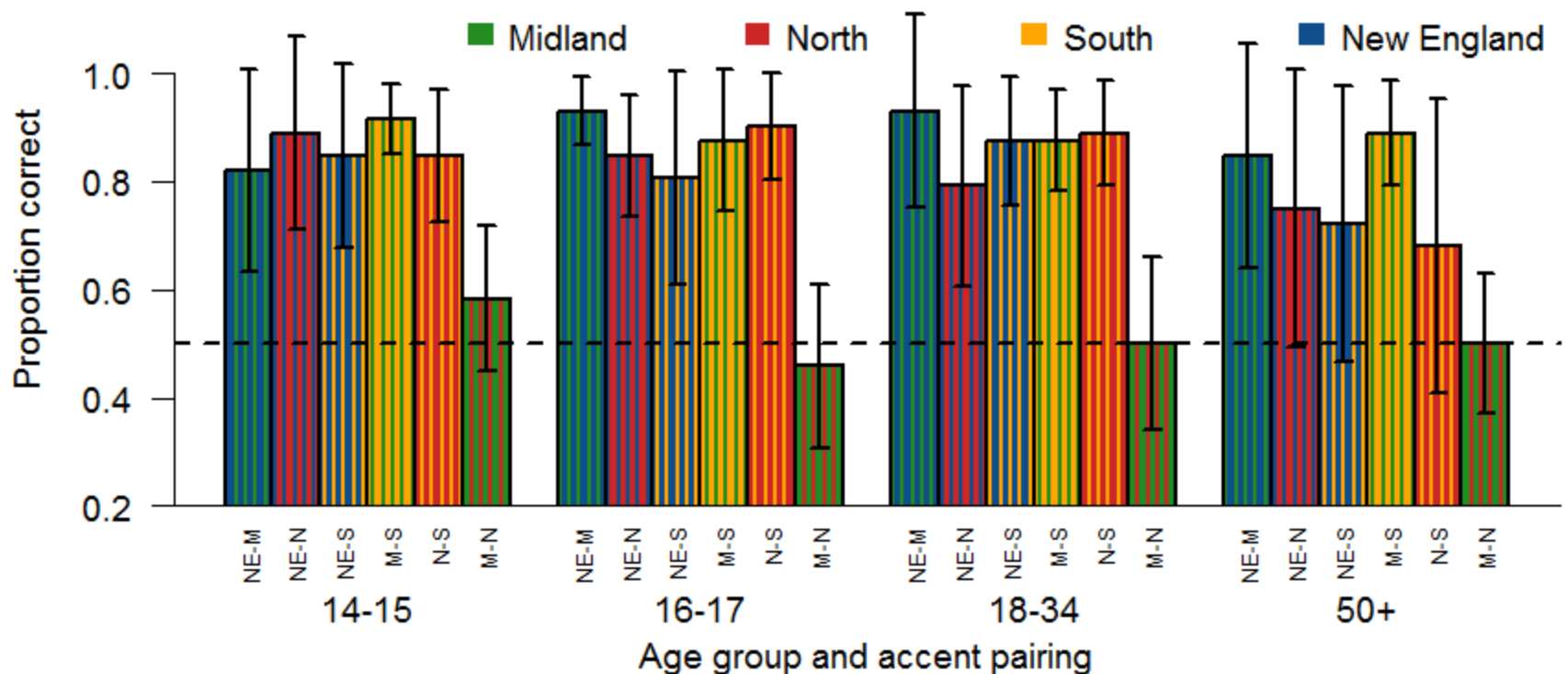
Beginning at age 8, all groups showed adult-like performance.



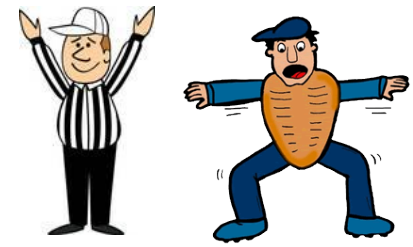
Labeling, ages 8+



Beginning at age 8, all groups showed adult-like performance.



Labeling scorecard



Accent pairing

New England-Midland

New England-North

New England-South

Midland-South

North-South

Midland-North

Adult-like at...

4-5 years

6-7 years

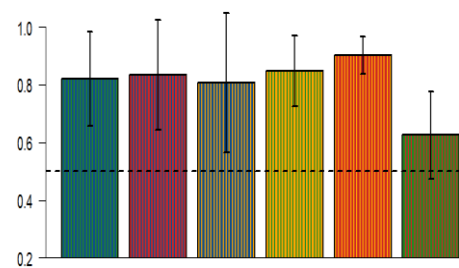
4-5 years

6-7 years

8-9 years

4-5 years

What labeling tells us



New England again stands out.

- Even 4- and 5-year-olds label talkers as well as adults do when New England talkers are paired with Midland or South talkers.

But there's more to the story.

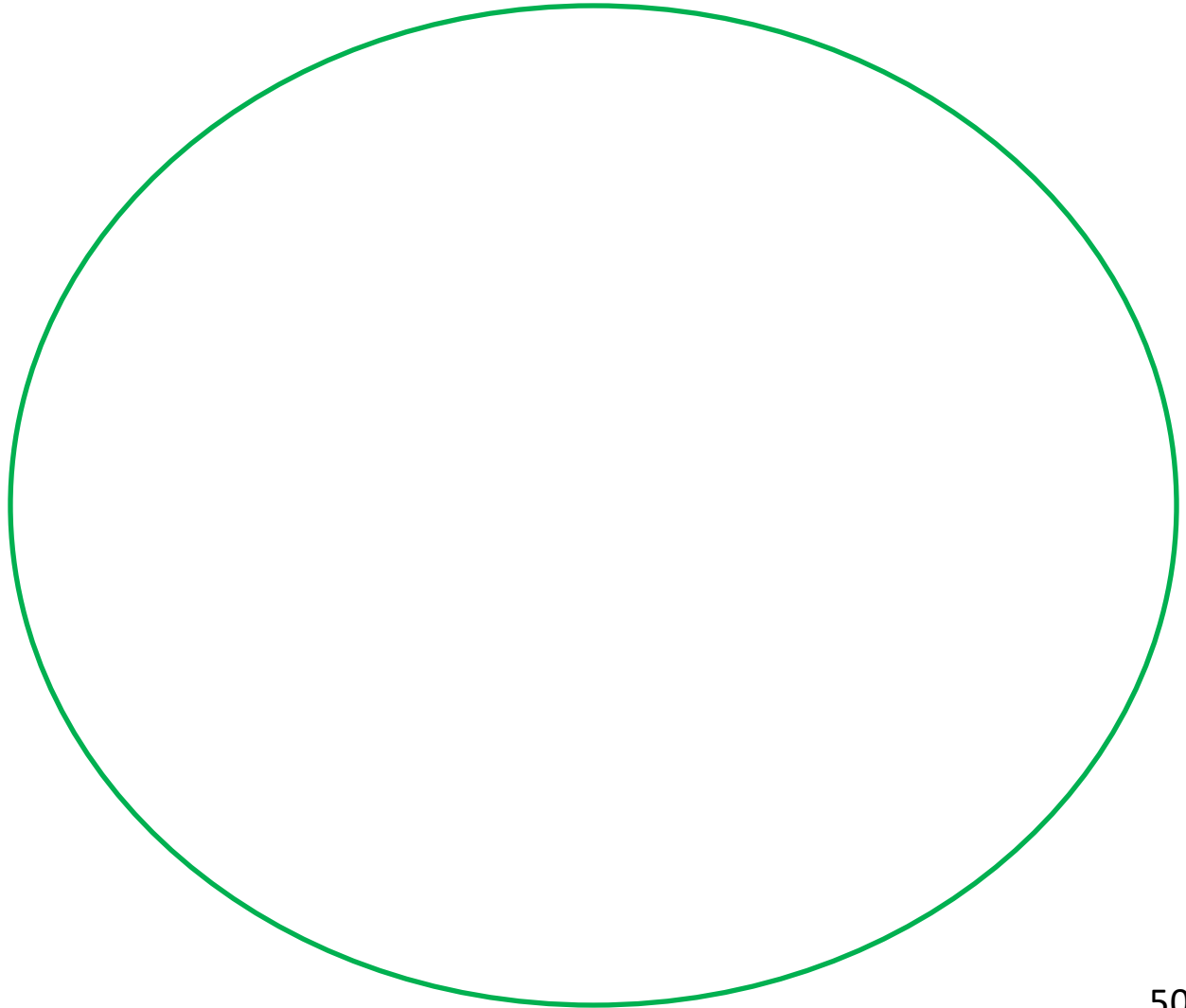
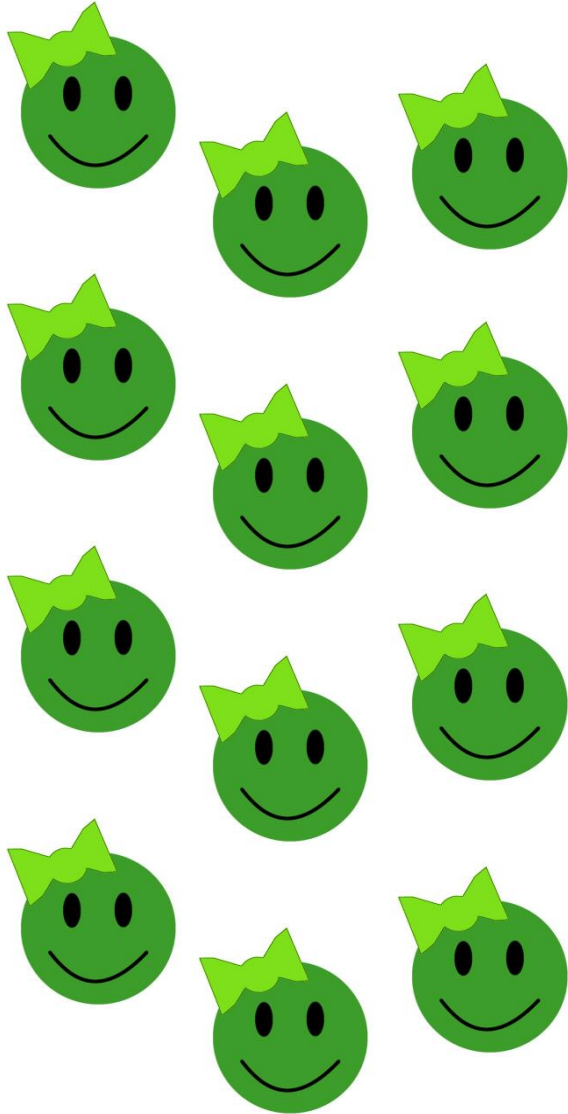
- Performance for North-South did not reach adult-like levels until age 8.
 - Adults were especially good at this accent pairing.

But this task is still somewhat limited.

The labeling task involves only two accents at a time.

What happens in a task involving simultaneous comparison of all four of these accents?

Task 3: Free classification



Task 3: Free classification

In this task, each listener arranged all 12 talkers into groups based on where they were from.

- There was no limitation on the number of groups or the number of talkers per group.
- Auditory stimuli could be replayed as many times as desired.
- Listeners who did not pass a control test by grouping items on specified dimensions were not included in the data set.

76 listeners participated.

- These listeners were roughly evenly distributed among four age groups: 4-5, 6-7, 8-9, and 10-11 years old.
- A previous ORDDR study suggested that free classification results did not change substantially after this age.

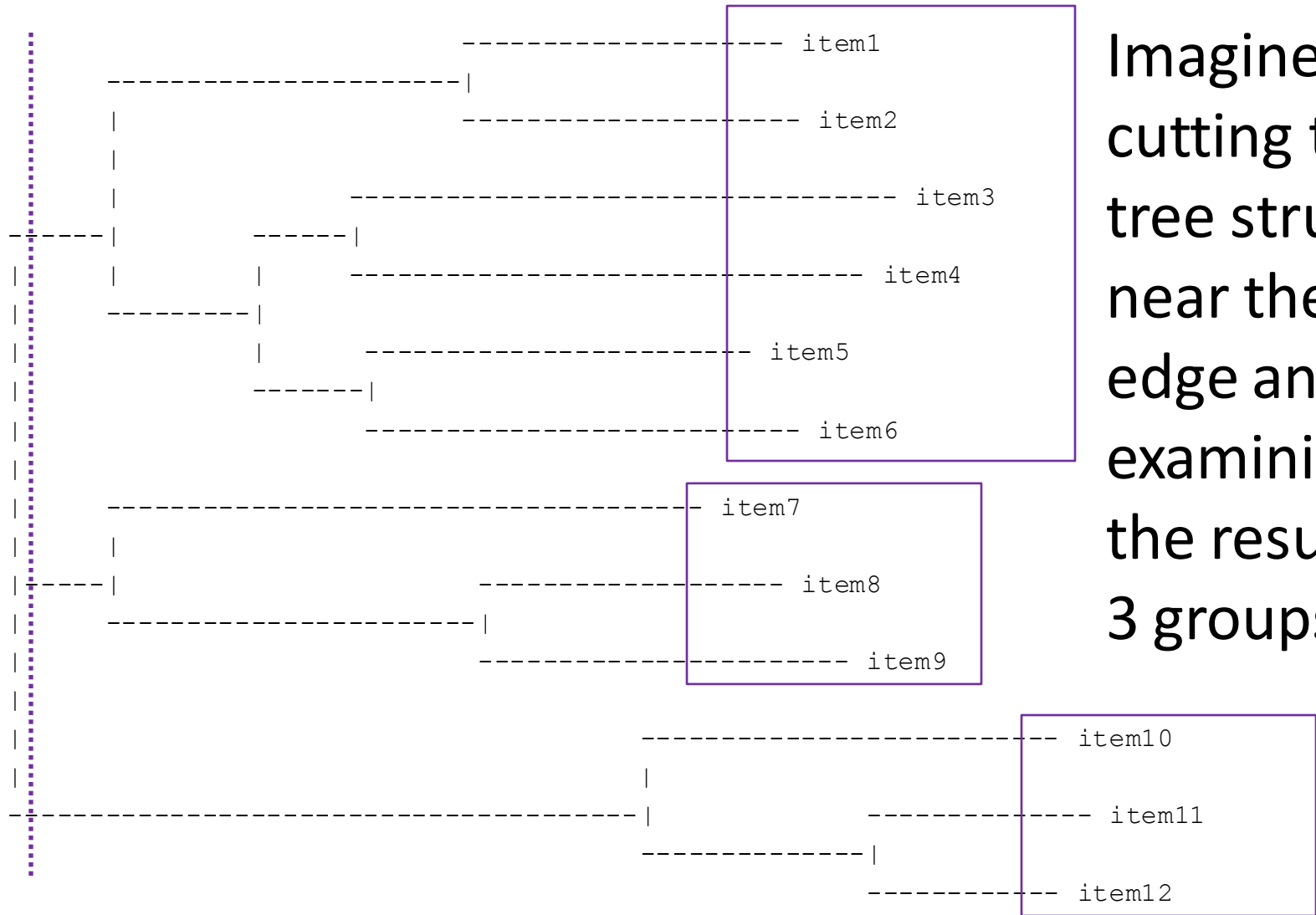
Free classification analysis

A clustering analysis was performed using ADDTREE.

- Corter (1982)

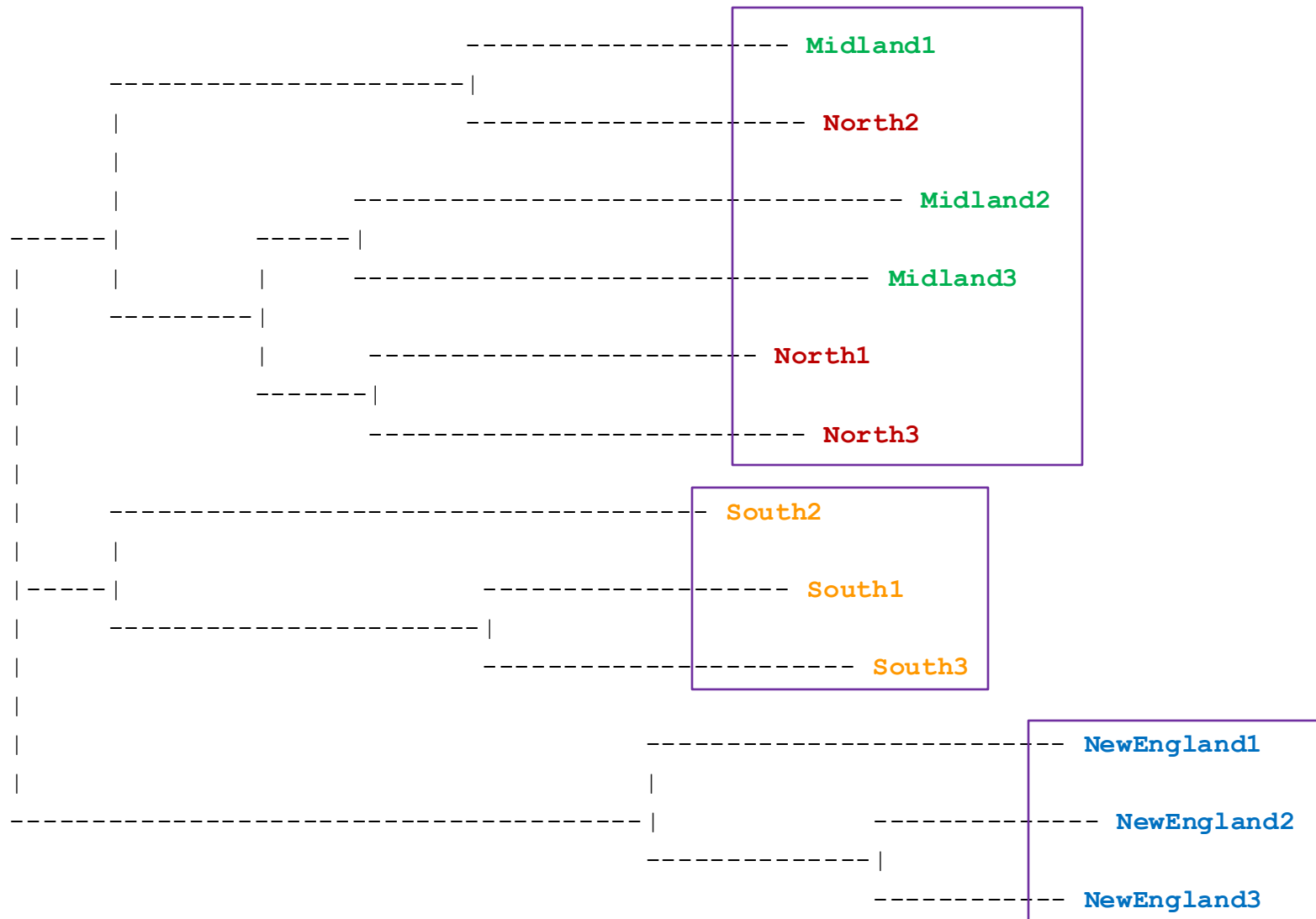
Today's analysis focuses on high-level groupings.

Free classification results

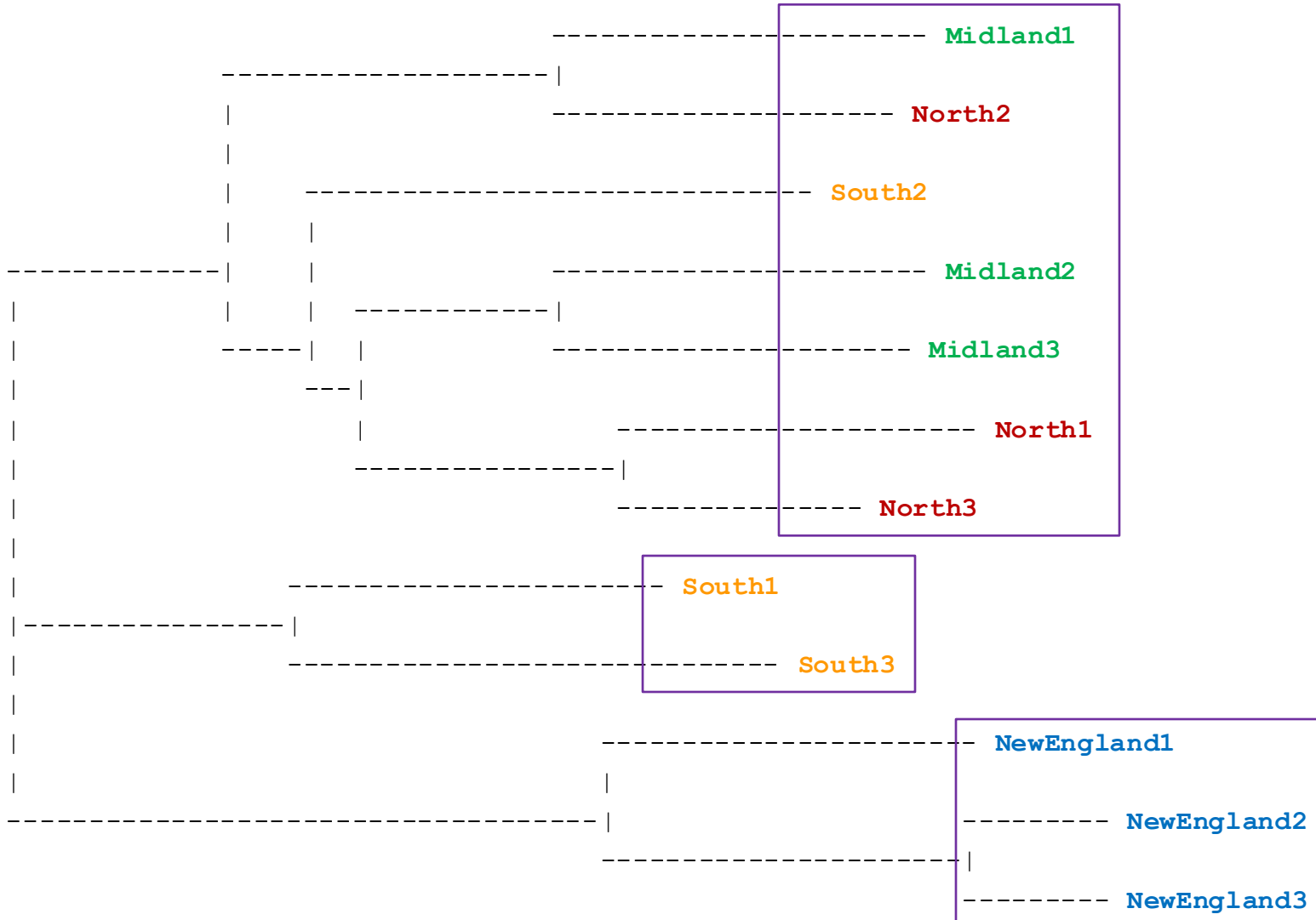


Imagine cutting the tree structure near the left edge and examining the resulting 3 groups.

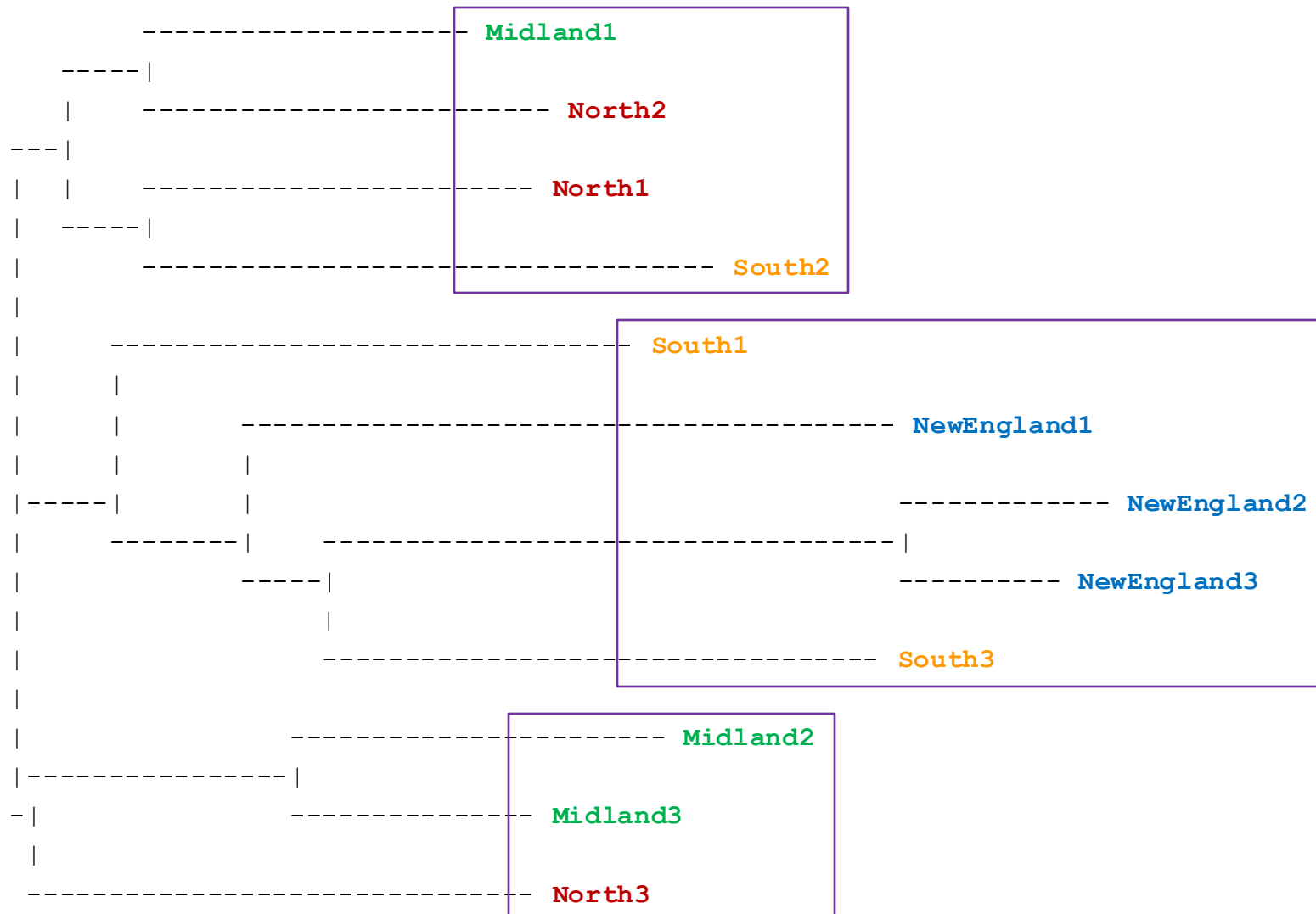
Free classification, ages 10-11



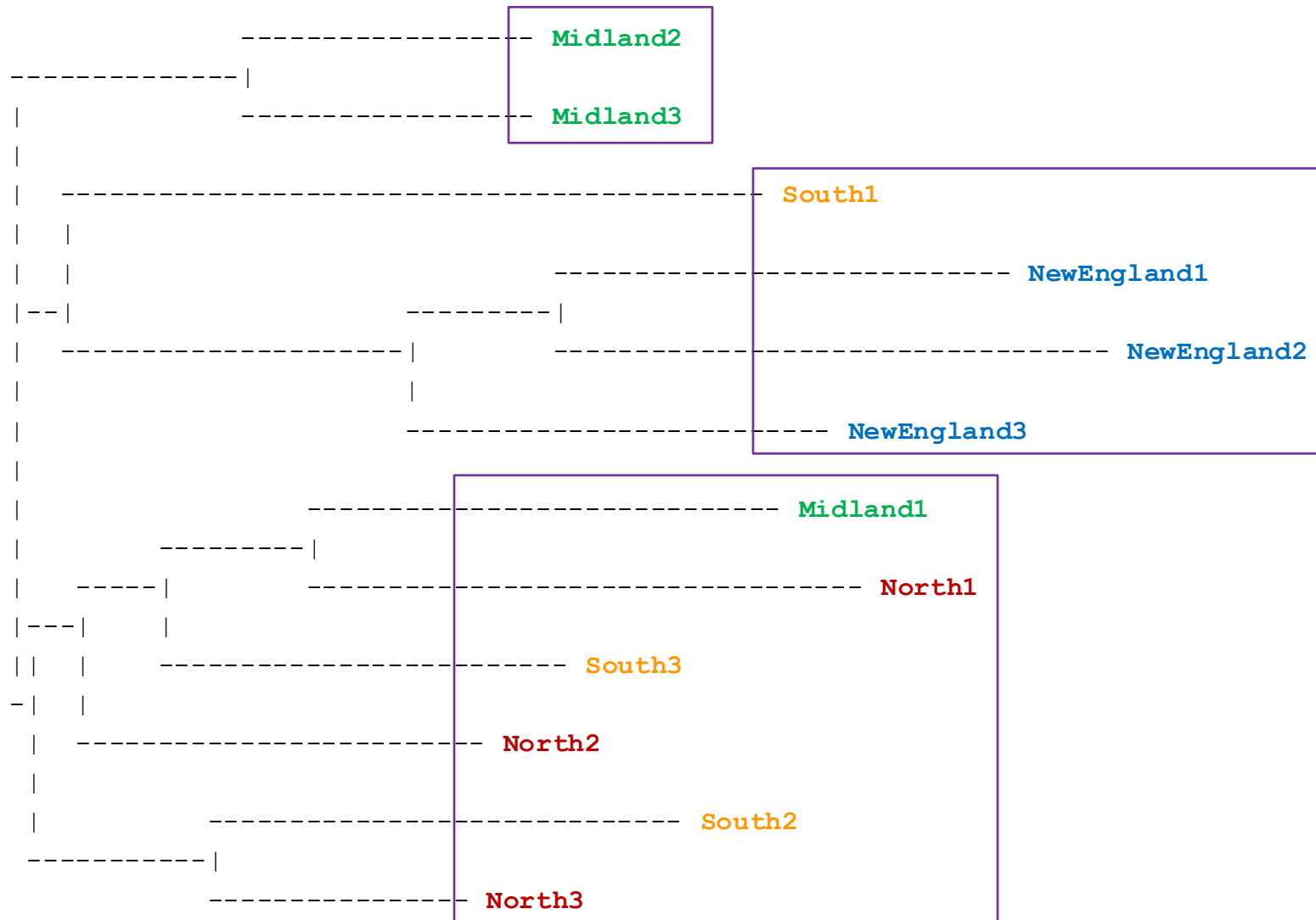
Free classification, ages 8-9



Free classification, ages 6-7



Free classification, ages 4-5



What free classification tells us

New England talkers consistently formed a cohesive group.

- 4- to 7-year-olds included some talkers from the South (likely also a less familiar accent) in this group.
- 8- to 11-year-olds included only New England talkers in the group.

Listeners through 11 years mixed Midland and North talkers in the same groups.

Converging results across tasks

As in previous work, some regional accents are very difficult to tell apart.

- Across tasks and age groups, **Midland** talkers were generally not distinguished from **North** talkers.

However, some regional accents are very easy to tell apart.

- **New England** talkers were easy to tell apart from other talkers. 4- and 5-year-olds could reliably distinguish **New England** talkers from **Midland** talkers in all tasks.

Foreign versus regional accents

Accent-related perception difficulties are about more than “regional” versus “foreign.”

- Not all regional accents are equally hard for children.

Are all foreign accents equally easy for children?

- Maybe there is a range of difficulty for each type of accent and early studies happened to use somewhat extreme varieties of each type.

Remaining questions

What makes some accents easier or harder than others in perceptual tasks?

- Degree of accentedness?
- Dimensions of variation?
- Degrees or patterns of variation?

Thanks to the ORDDR team!

- Cynthia Clopper
- Laura Wagner
- Zack Jones
- Qingyang Yan
- Eryn Ahlers
- Emily Behm
- Lindsay Brown
- Anna Coffman
- Liz Nugent

Thanks also to Ohio State University's Center for Cognitive and Brain Sciences for funding the ORDDR project.

Thank you!

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