Code Switching to Standard American English: Categorization, Comprehension, and Executive Function

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INTRODUCTION

Background

- Nationally representative standardized assessments have shown a persistent achievement gap between African American and European American students (e.g., Lee et al., 2007; NCES 2009).

- Many African American students initially learn to speak African American English (AAE), a dialect of English that differs from the dialect of instruction, Standard American English (SAE).

- Both dialects of English are systematic and rule governed (e.g., Labov, 1966).

- There are morphosyntactic and phonological differences between AAE and SAE that may impact comprehension for young AAE-speaking children when they listen to SAE (e.g., Beyer & Kam, 2006, 2009; Johnson, 2005; de Villiers & Johnson, 2007).

Purpose of this study:

- To evaluate whether AAE-speaking young children can appropriately categorize AAE and SAE.

- To evaluate whether phonological and morphological differences between AAE and SAE impact comprehension of SAE in AAE-speaking children.

- To examine relationships among performance on these two experimental tasks and other individual differences, such as age, vocabulary size, and executive function.

Importance of this study:

- 33% of AAE-speaking children do not spontaneously learn to code-switch by the end of 2nd grade.

- These children are at high risk for academic failure.

- The experimental tasks measure skills relevant to code-switching, so we are interested in what individual differences might predict performance on these tasks.

METHODS

Participant Characteristics: Means (SDs in parentheses)

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Number of boys, girls	44 boys, 44 girls
Age in months	73 (16); range: 41-105
Ethnicity	African American or biracial
Socioeconomic status	76% low-SES (parent interview)
Hearing Screening	All passed
PPVT-4 standard score	94.6 (12.8)
EVT-2 standard score	93.8 (10.2)
TACL-3 (EPS) standard score	9.7 (2.1)

Experimental Tasks

- A subset of the experimental tasks are described below.

Experiment 1: Dialect categorization

Stimuli:

- Visual: 6 red and 6 blue monsters

Figure 1. Example of monster stimuli.
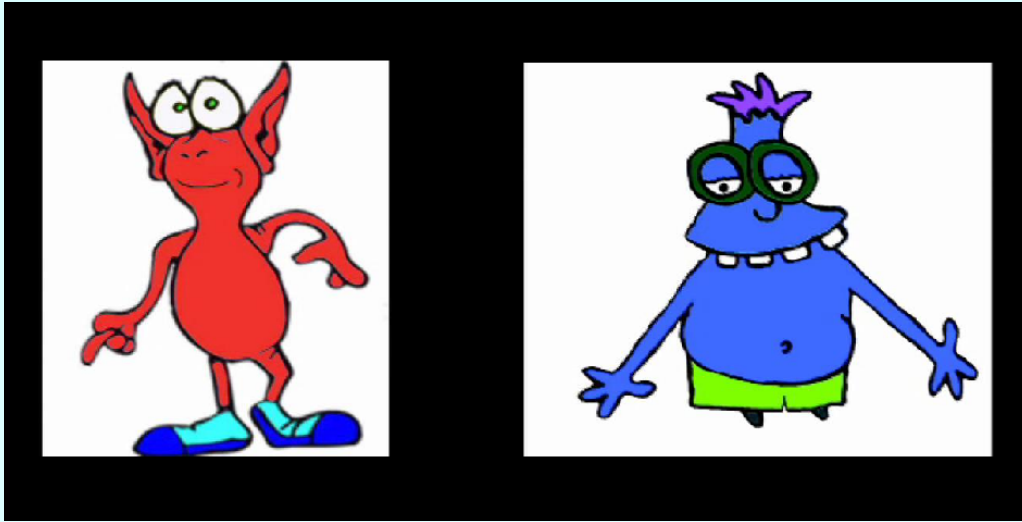
- Auditory:
  - Voices: 6 SAE-speaking and 6 AAE-speaking young women.
  - All speakers read 2 children's books: *A Snowy Day* and *A Letter to Amy*.
  - Auditory stimuli were edited into 1-2 sentence segments, paired with monsters (1 red and 1 blue per speaker) and animated to "speak" the story.

Procedure:

1. Training Phase:

- A red monster and a blue monster were presented on a touch screen: all red monsters spoke AAE and all blue monsters spoke SAE (or vice versa).
- The monsters both repeated a story segment, one at a time.
- Child's task after each monster spoke: "Touch the monster that just talked." Because the monsters were animated, it was clear which monster was talking.
- 3 AAE and 3 SAE voice/monster dyads were presented.

2. Practice Phase	3. Test Phase
Visual setup: Same as training (red monster and blue monster presented on screen)	
No animation. Story segment presented in either SAE or AAE	
Child's task after hearing story segment: "Touch the monster that talked."	
Feedback	No feedback
Same story as training	New story
Same voice/monster/dyads as training	3 new, unfamiliar voice/monster dyads introduced (50% of trials)

Experiment 2: Comprehension of SAE
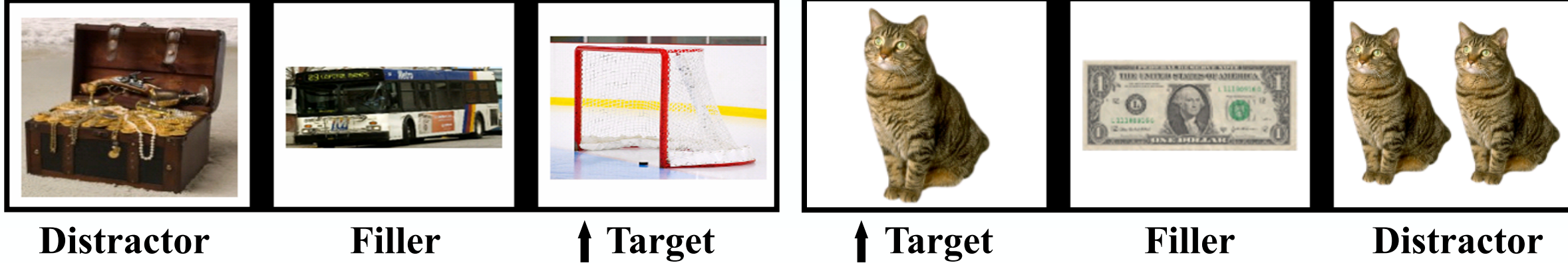**Word-level experiment**

Stimuli:

- Pictureable words that were familiar to children:
  - Word pairs were potentially ambiguous in AAE because:
    - Contained final consonant or consonant cluster (e.g., *goal* vs. *gold*).
    - Contained singular/plural contrast (e.g., *cat* vs. *cats*)
- Auditory stimuli: Recordings by a young adult female speaker of SAE.
- Visual stimuli: Color photographs of objects

Procedure:

1. Familiarization: Children listened to the picture-names and repeated each one as they looked at the pictures.
2. Identification: Children were asked to touch the correct picture to match the word they heard.

"Show me goal, please." "Show me cat, please."

Figure 2. Sample Trials

Distractor Filler ↑ Target ↑ Target Filler Distractor

Executive Function: Dimensional Change Card Sort (Zelazo, 1996)

Figure 3. Example of Zelazo's computerized DCCS Left: Pre-switch (color). Right: Post-switch (shape).

- 3 Phases
1. Pre-switch: Child sorts by one dimension (e.g., color)
2. Post-switch: Child sorts by other dimension (e.g., shape)
3. Mixed: Child sorts by shape on some trials and by color on others.
   switch trials (color → shape); non-switch trials (color → color)
- Accuracy and response times were recorded.
- Measures task-shifting and inhibition, which are aspects of executive function.
- Task-shifting and inhibition should also be relevant for learning how to code-switch. (e.g., Bialystok & Viswanathan, 2009; Garbin et al., 2010)

Standardized Tests:

- Hearing screening
- Expressive and receptive vocabulary (EVT-2, Williams, 2007; PPVT-4, Dunn & Dunn, 2007)
- Sentence comprehension (EPS subtest of TACL-3, Carrow-Woolfolk, 1999).

RESULTS

Experiment	Dependent Variables	Mean (SD)
1: Dialect categorization	% correct	69 (20)
2: Word comprehension	% correct on singular/plural	74 (17) / 65 (15)

- Both experimental tasks were significantly correlated with age.
  - r = .57 for dialect categorization; r = .43 for word comprehension.

Statistical Analyses

- We ran two mixed effects logistic regression models.
- Predictor variables for each model were chosen on the basis of which measures had the highest correlations with the dependent variables.

- **Model 1: Dialect Categorization**
  - Dependent variable: Percent correct on dialect categorization
  - Predictor variables: Age, EVT raw score, TACL-EPS raw score, Overall accuracy on DCCS (executive function measure).
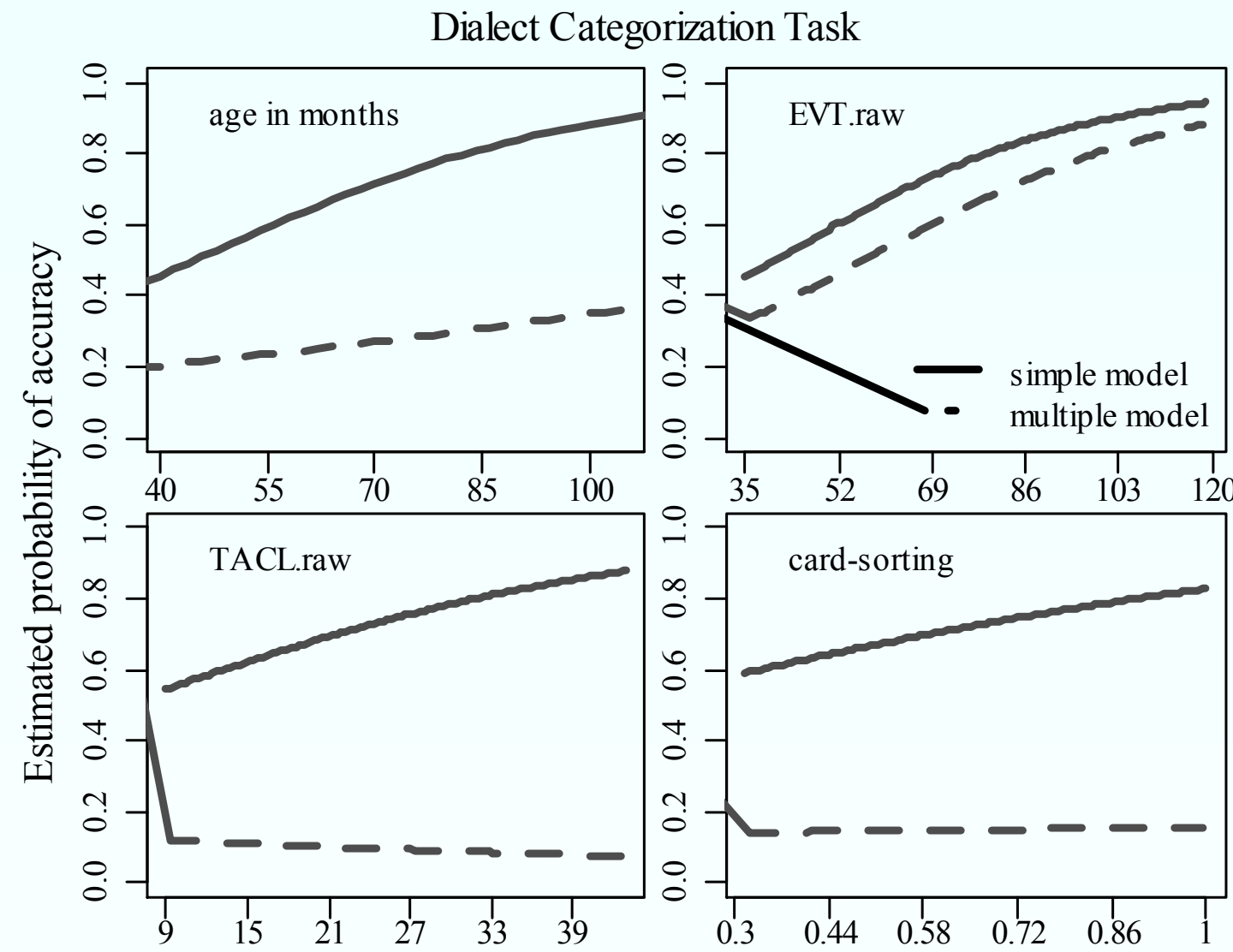

Figure 4. Model fits for all four independent variables separately (solid line) and combined (dashed line).

- Results for Model 1:
  - The only significant predictor of categorization accuracy was EVT raw score, when the other variables were included in the model..
  - Overall accuracy on the DCCS was not a significant predictor of categorization accuracy.

- **Model 2: Word Comprehension (singular/plural)**
  - Dependent variable: Percent correct on singular/plural comprehension.
  - Predictor variables: Age, EVT raw score, TACL-EPS raw score, Mixed accuracy on DCCS (executive function measure).
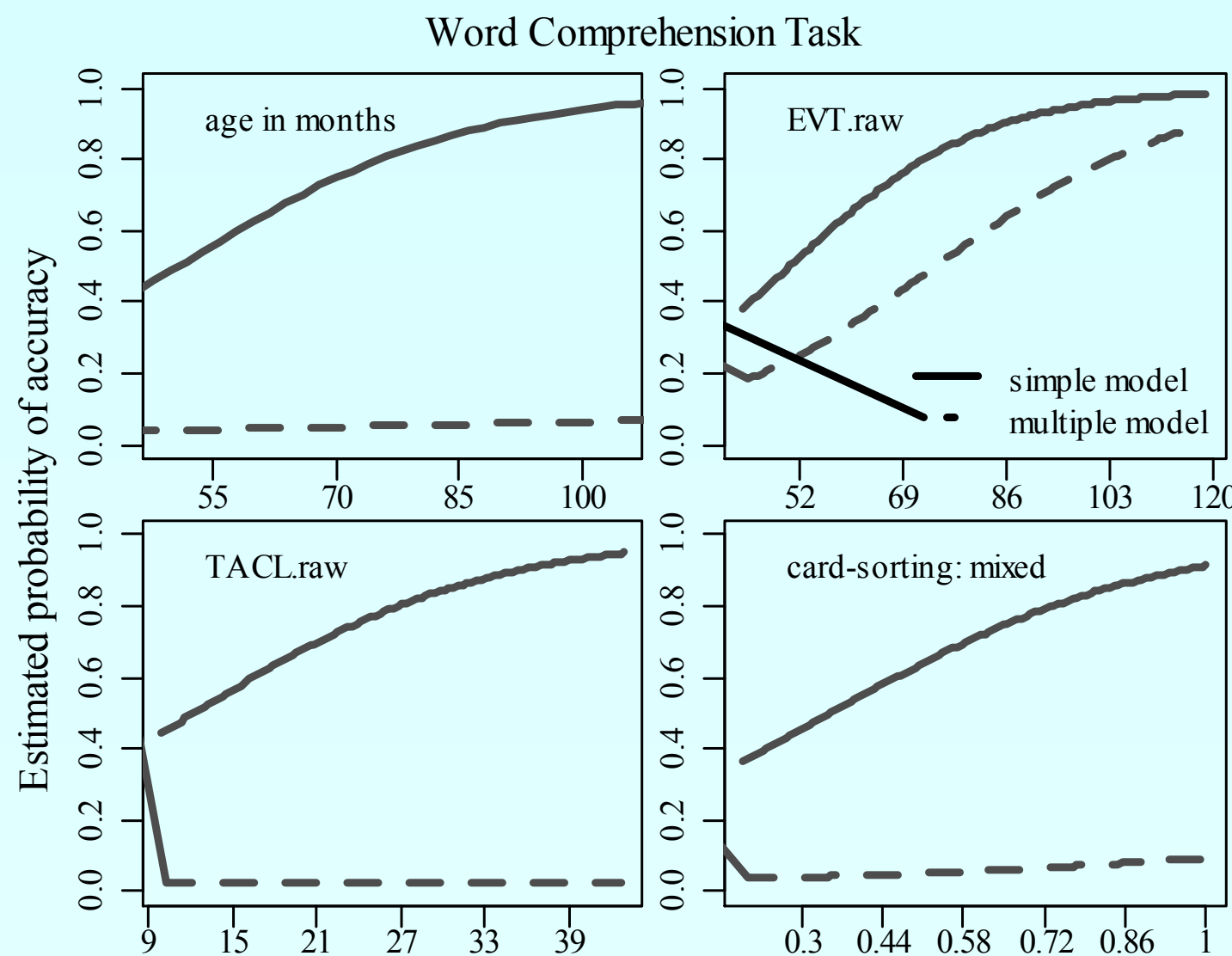

Figure 5. Model fits for all four independent variables separately (solid line) and combined (dashed line).

- Results for Model 2:
  - Both EVT and overall accuracy on DCCS were significant predictors of word comprehension accuracy, even when other predictors were included.

DISCUSSION

Summary and Discussion

- The language skills of the children in this study seemed to be representative of those of children from low-SES families more generally.
  - For example, Washington & Craig (1999) reported a mean of 91 on the PPVT-III for a similar group of children.
- Expressive vocabulary size was a significant predictor of performance on both experimental tasks, suggesting that better language learners are more able to code-switch.
- The relationship between categorization accuracy and expressive vocabulary also suggests that socio-phonetic categorization is involved in word learning
- Executive function, as measured by mixed-accuracy on the DCCS, was a significant predictor of singular/plural comprehension, suggesting that task-shifting and inhibition are involved in code-switching.

Limitations and Future Directions

- Language samples to measure dialect density are not yet analyzed.
  - In a subset of data (N=8), a U-shaped relationship between dialect density and word comprehension was observed (Knox et al., 2010).
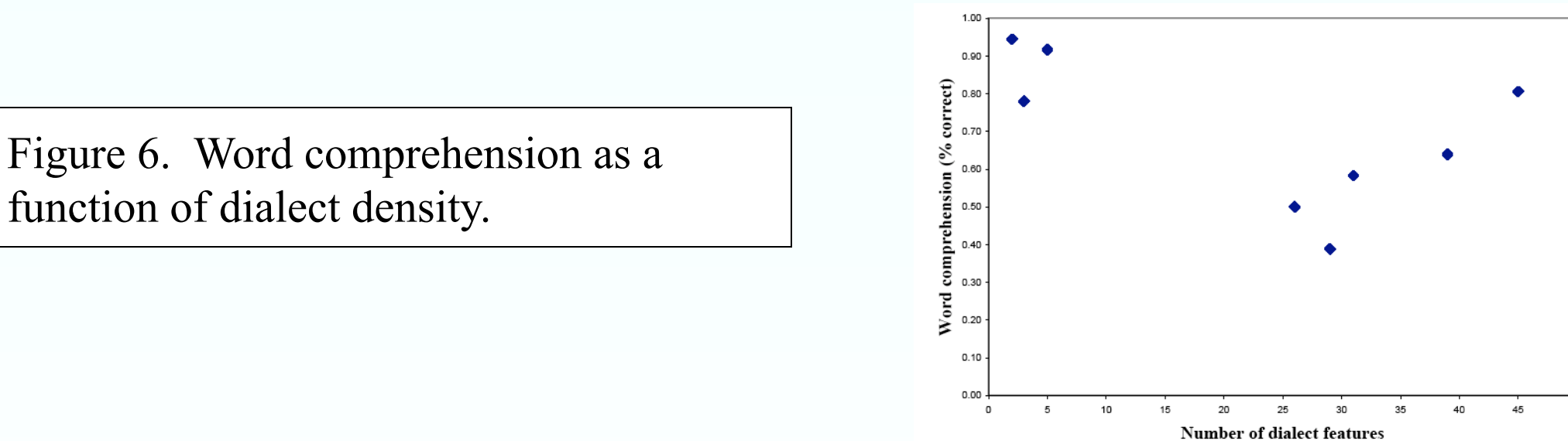

Figure 6. Word comprehension as a function of dialect density.

- Many of the younger children (n = 21) did not meet criterion on the switching portion of the DCCS, so another executive function task may be more appropriate for this age group.
- We have not yet analyzed reaction time data for the DCCS.