Effect of school demographics on child and adolescent morphosyntactic and phonetic variation: A longitudinal analysis

Charlie Farrington
North Carolina State University

Mary Kohn and Jennifer Renn
University of North Carolina at Chapel Hill

ViLA 2012, February 10

African American English

- In this presentation, AAE refers to "any kind of English spoken by African Americans that could be identified by American listeners with a greater frequency as African American" (Thomas *forthcoming*)
- General AAE Features: vowel phonology, intonation, prosody
- Features of Vernacular: morphosyntactic markers (3rd person sing. –s ab.; habitual *be*, etc.)

African American English

- The study of African American English (AAE) has an important role in the history of sociolinguistics
  - Labov et al. (1968), Wolfram (1969), Fasold & Wolfram (1970), etc.
- AAE use may contribute to the U.S. academic achievement gap because of a mismatch between the variety of speech that many African American children use at home and the language used in school
  - e.g., Baratz & Shuy 1969; Rickford & Wolfram 2010

Relationship of School Demographics

- With this in mind, we want to understand the relationship of language to school demographics
- More diverse schools, less vernacular AAE use (Bountress 1983; Terry, Connor, Thomas-Tate, Love 2010)
- Integrated schools are associated with more equitable math achievement (Harris, 2006; Berends & Penaloza, forthcoming); reading achievement (Borman et al., 2005); and high school graduation and post-secondary education success (Massey, Charles, & Gneisha, 2007)
- Conversely, minority segregated schools are associated with constrained academic achievement, especially reading achievement for African-American students (Kainz & Vernon-Feagans, 2007; Mickelson, 1999).

Motivation for Longitudinal Analyses: (Sankoff 2005)

- Identify what is normal and expected, what can change and when?
- Explore how critical age may inhibit certain linguistic structures from changing during the lifespan
- Identify if linguistic subsystems behave differently across the lifespan

Frank Porter Graham

- 1990: 88 African American children from 6-12 months (mean 8.1 months)
- 2011: 67 continue in study
- 71% below poverty level
- Batteries of standardized and nonstandardized tests, including progressively collected language samples annually or bi-annually

- FPG participants come from the Piedmont Region in North Carolina

Map source: http://www.welt-atlas.de/map_of_east_coast_usa_7-245

Completed Analyses at FPG

- Previous Linguistic Analyses
  - Morphosyntactic analysis (Van Hofwegen & Wolfram 2010, Van Hofwegen 2012)
  - Style Analysis (Renn 2007, 2010; Renn & Terry 2009)
  - Phonological analysis (Acoustic) (Kohn & Farrington 2011, 2012; Farrington 2011)

A comprehensive analysis of the entire system from childhood to early adulthood is available, so the next step is to look at longitudinal patterns in terms of social factors….

Research Questions

1. Is there a relationship between school demographics and level of vernacularity?

2. Do different linguistic subsystems show similar correlations with demographic variables?

Motivation for Morphosyntactic Analysis

- Morphosyntactic variables tend to be above the level of consciousness and are more socially diagnostic (habitual *be*, etc.)
- Many standardized tests rely on measurements of speakers' use of "standard" morphosyntactic forms
  - Implications for educational testing and teaching strategies in the classroom

Dialect Density Measure

- Token-based quantitative method (Craig & Washington 2004, 2006)
- Index of several dozen common AAE features
- Contains some phonological features, but biased toward morphosyntactic forms
- Divide total number of tokens by the total number of utterances or words

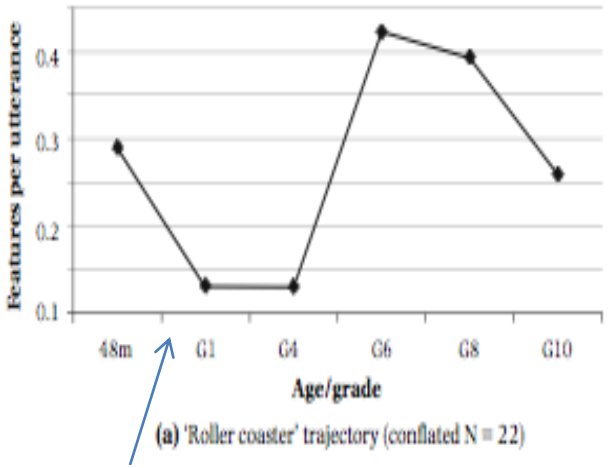
FPG Dialect Density Measure

- Vernacularity measured using DDM
  - Token-based calculation in terms of dialect features per communication unit or word; based on an inventory of canonical vernacular AAE features (Craig and Washington 2006; Renn 2007, 2010)
- Sample features used in DDM
  - Nasal fronting, copula absence, auxiliary absence, 3rd person singular –s absence, invariant *be*, negative concord, ain't (Van Hofwegen & Wolfram 2010)

Longitudinal African American Morphosyntactic Development

- Prominent dip in 1st and 4th grade, most children peak in 6th or 8th grade (Frank Porter Graham)
- Speakers use more AAE features as children (Baugh 1996, Rickford & McNair-Knox 1994, Cukor-Avila 2002)

More vernacular



More standard

Van Hofwegen and Wolfram 2010

Methods

- Participants=African American children from FPG study
- Recordings from:
  - 1st Grade (Age 6)
  - 6th Grade (Age 11)
  - 8th Grade (Age 13)
- Recordings come from mother-child interactions and peer interactions
- Language samples transcribed and coded using SALT language analysis software
- Used DDM to represent morphosyntactic AAE use

Descriptive Statistics

Variable	Grade	N	M (SD)
Male	1	33 (47%)	
	6	24 (40%)	
	8	22 (38%)	
*% School African American**	1	71	53.23 (29.33)
	6	60	45.99 (24.48)
	8	58	48.49 (22.46)
# AAE Forms per Utterance	1	71	0.16 (0.09)
	6	60	0.40 (0.18)
	8	58	0.44 (0.21)

*: % School African American = % of children in school that identify as African American

Correlations among Variables

- AAE Use = # of AAE morphosyntactic forms per utterance

	Gender	**Age**	**% School Af. American**	**AAE Use**
Covariates				
Gender	1			
Age	-0.075	1		
% School African American	**0.156***	-0.099	1	
AAE Use	0.002	**0.606****	**0.154***	1

*Note: *=p<.05, **p<.005*

Regression Results

- Use of AAE increases with age
  - Increase of approximately 40 vernacular forms per 1000 utterances each year
- Use of AAE increases with greater percentage of African American classmates
  - Increase of approximately 2 forms per 1000 utterances with each additional percentage point

	AAE Use	
	B	SE(B)
Intercept	0.03	0.03
Gender	0.01	0.02
Age	**0.04***	0.003
% School	**0.002***	0.0005
Note: $R^{2=}$ 0.41 *p<.05		

Morphosyntax: Conclusions

- While gender was not a factor, use of morphosyntactic AAE forms was related to both the child's age and the percentage of African American students in the classroom
- As children get older they are more and more likely to use vernacular features in informal contexts
- Students with more African American classmates use a greater number of morphosyntactic AAE forms

Motivation for Phonological Analysis (Bailey & Thomas 1998)

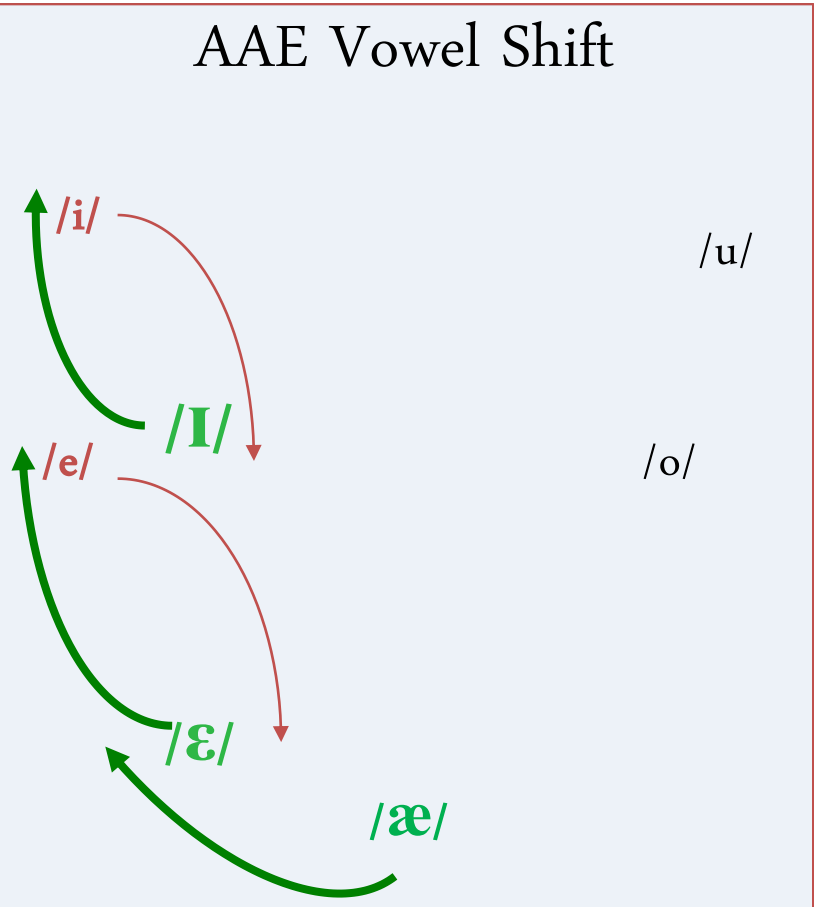
- Important cue in speech discrimination task
- May lead to erroneous placement in special education and speech therapy interventions (see also Wolfram 1994, Stockman 1996)
- ". . . An understanding of [AAVE phonology] is crucial for attacking the educational and social problems which confront speakers of AAVE" (P. 86)

Relationships among AAE Subsystems

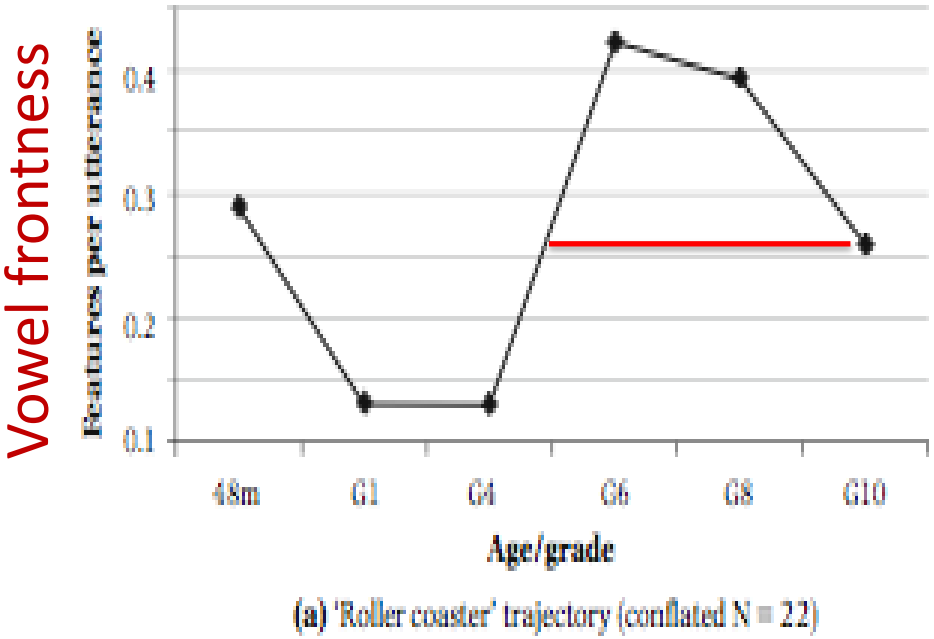
- Consonantal Variation of word-final /-d/ correlates with African American English composite AAE vowel score in Houston, TX
  - Koops & Niedzielski (2009)
- Children who use non-standard morphosyntactic features are more likely to have southern-shifted front vowels
  - Kohn & Farrington (2011)

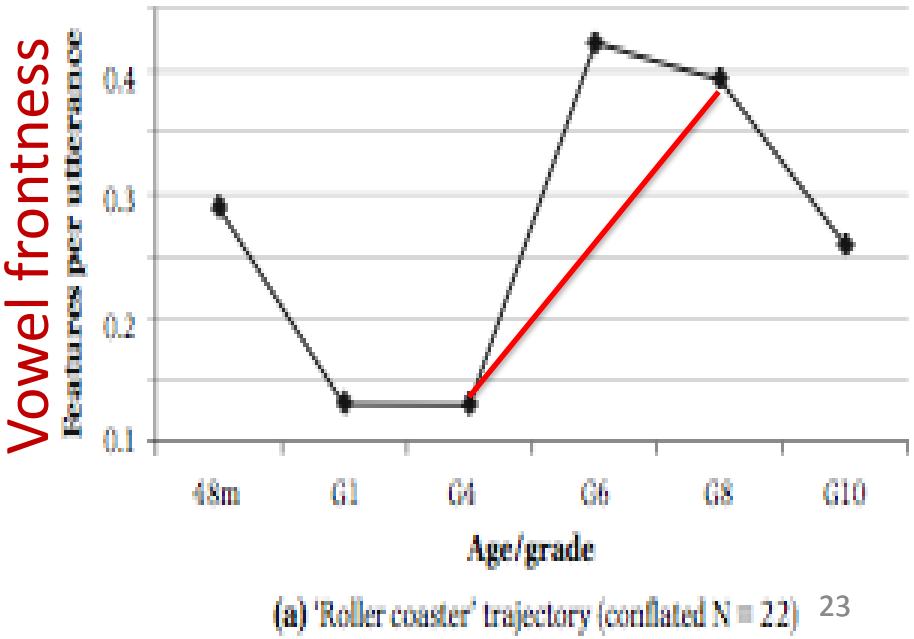
Southern AAE Vowel Variation

- Front lax vowels raise
  - ‘sick and healthy’
  - ‘the dog and cat’
- Front tense vowels lower
  - ‘sage’



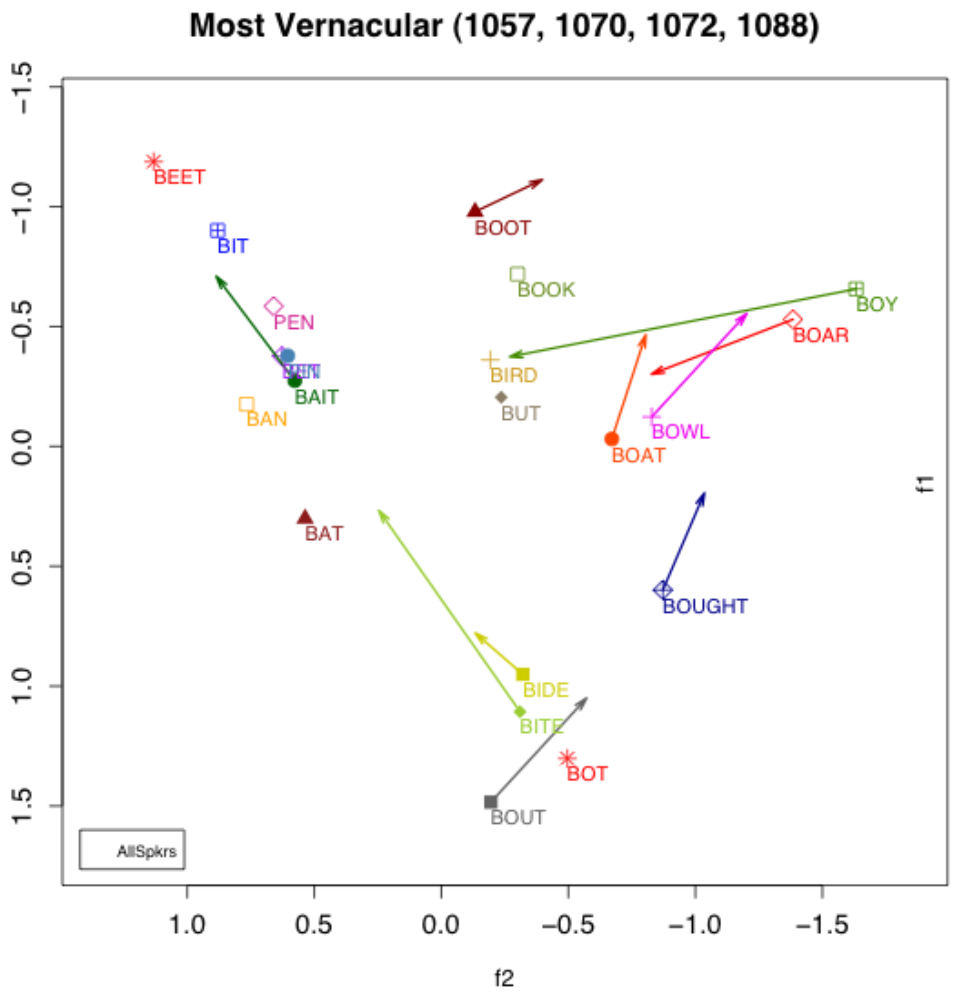
- Relationship between vowels and non-standard features
  - Mid vowels (BET and BAIT) have an indirect relationship
  - BAT has a direct relationship



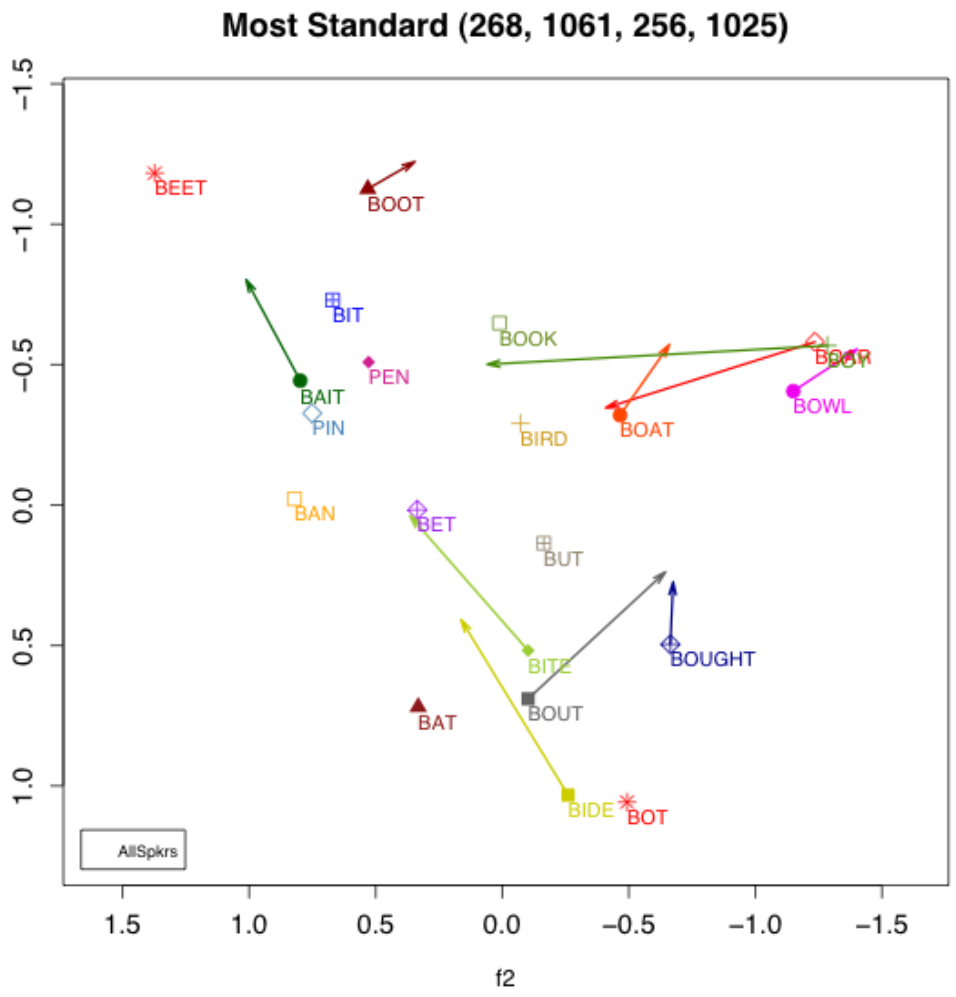


Social Factors

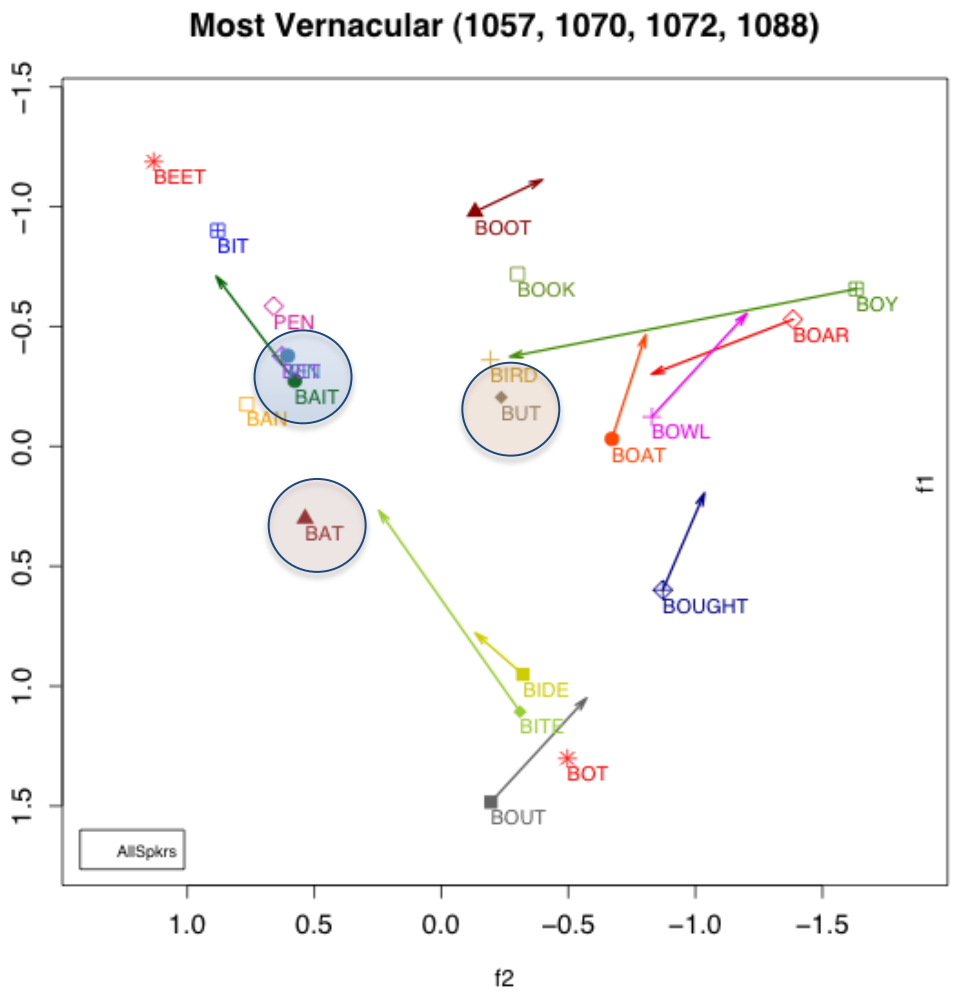
- Social factors have generally been left out of the equation
  - —What is the relationship between demographics and vowel shifting?
  - —Is it similar to the relationship between the morphosyntactic features captured by the DDM and demographics in the school?



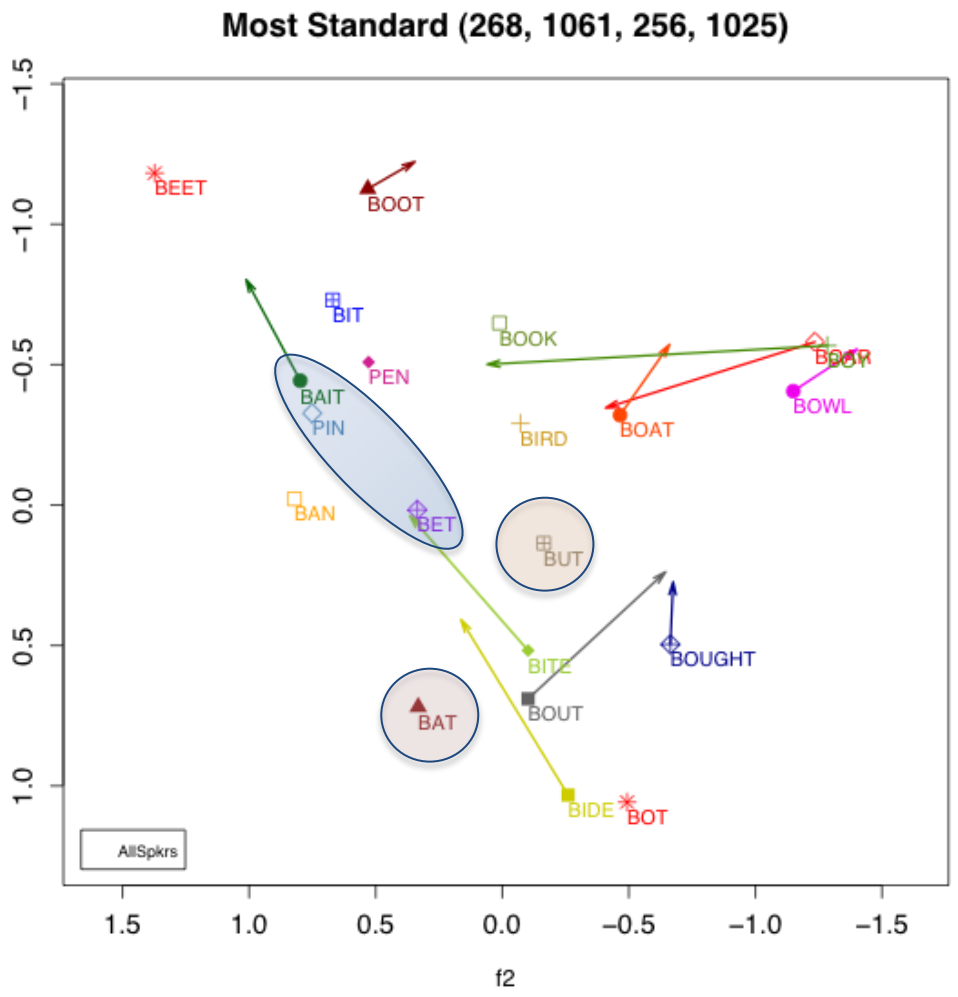
DDM Overall Mean=.397



DDM Overall Mean=.186



DDM Overall Mean=.397



DDM Overall Mean=.186

Methods

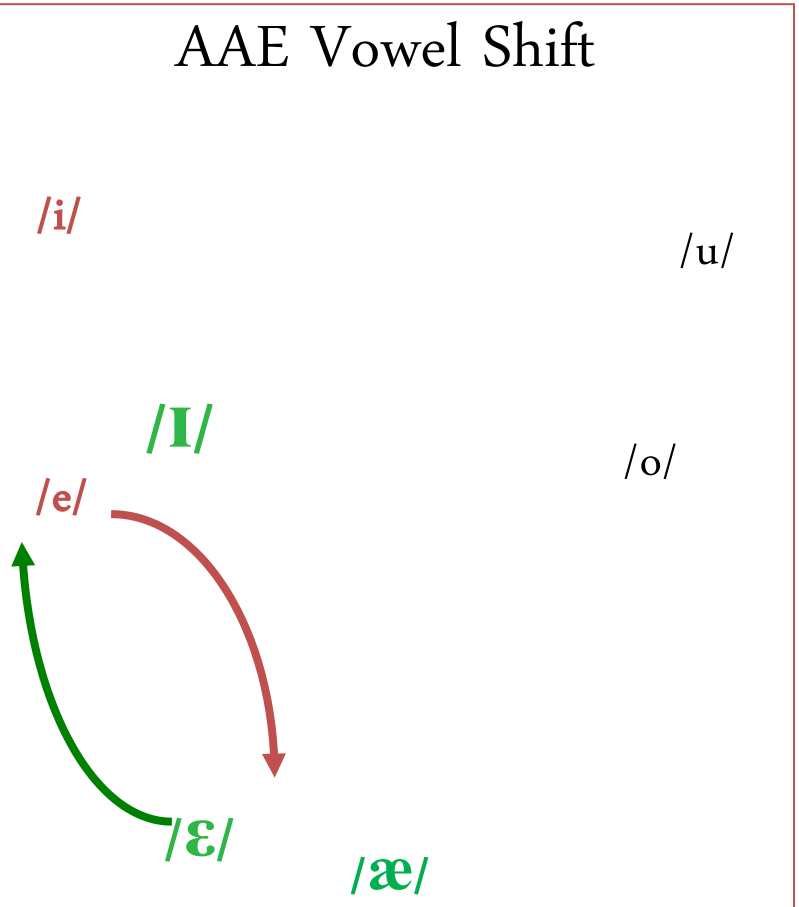
- Participants=10 children (5 boys, 5 girls)
  - Similar socioeconomic backgrounds
- Recordings from:
  - 4th Grade (Age 9)
  - 8th Grade (Age 13)
- Recordings come from peer interactions, standardized tests, and adults formal/informal interactions
- 200 tokens per speaker taken using PRAAT

Vowel Methods

- Regression analysis
  - Dependent variable = normalized F2 at midpoint for steady state vowels and nucleus for the diphthong BAIT
  - Independent variable = following phonetic environment, duration, sex, % African American in school, grade, interaction between grade and % School African American
  - Random factors = speaker, grade

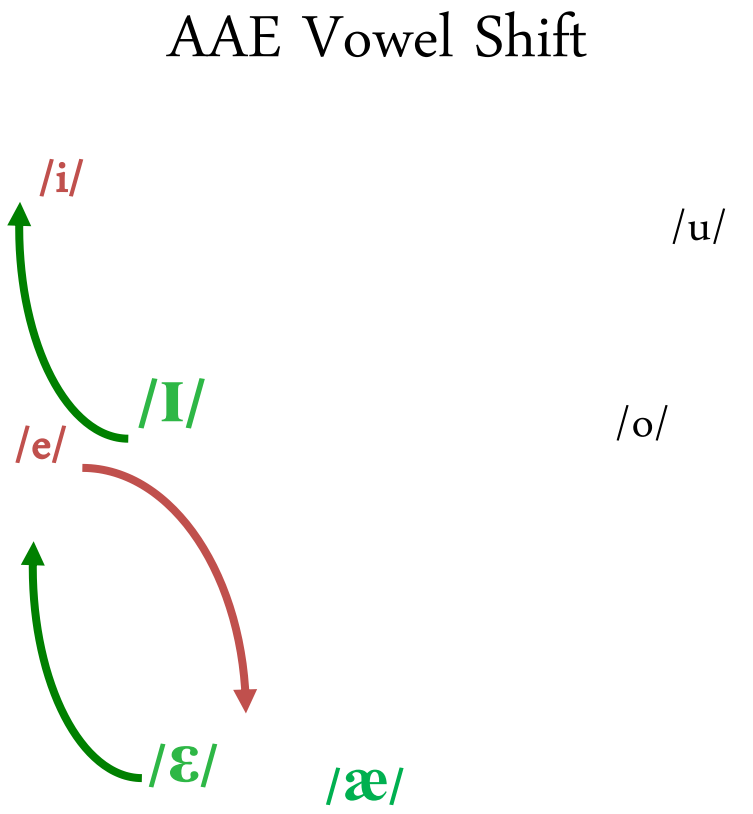
Significant Results for Grade

- Front lax vowels
  - BET p<.01
- Front tense vowels
  - BAIT p<.01



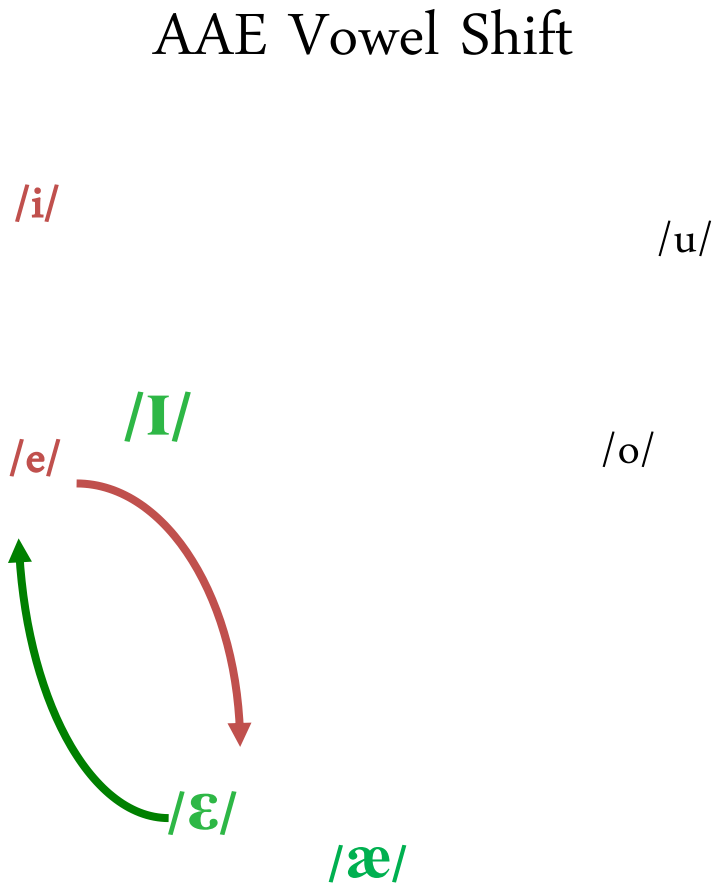
Significant Results for % School African American

- Front lax vowels
  - BET $p<.001$
  - BIT $p<.05$
- Front tense vowels
  - BAIT $p<.01$



Significant Interaction

- Front lax vowels
  - BET p<.0001
- Front tense vowels
  - BAIT p<.001



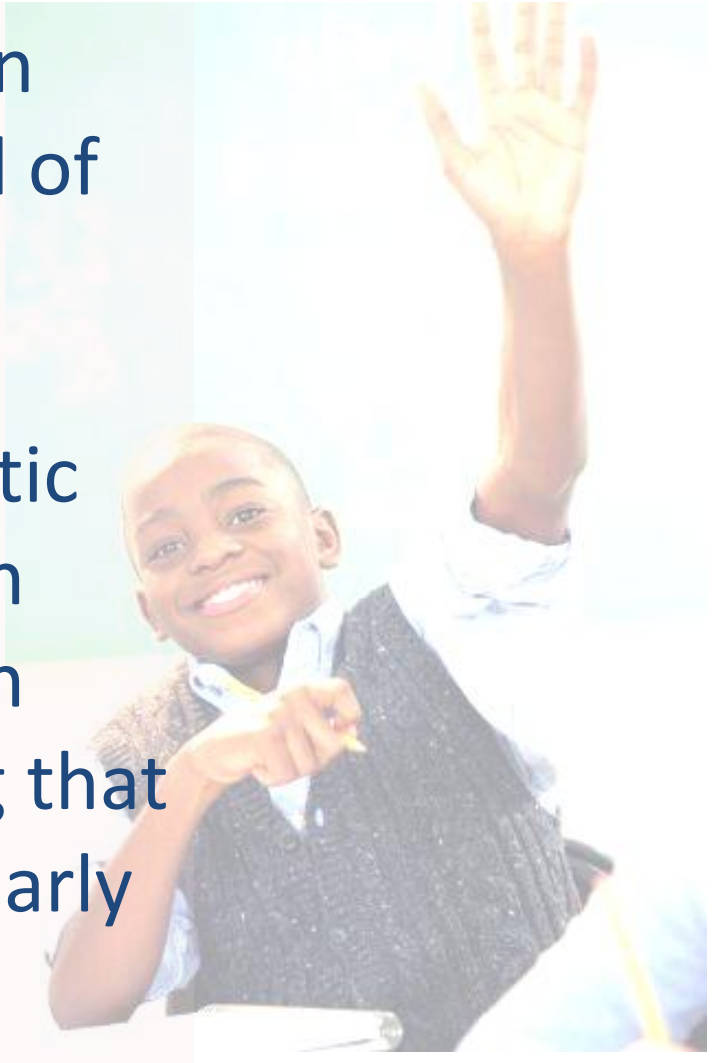
Vowels: Conclusions

- Subsection of vowels within the front vowel space show change in relation to changing school populations, specifically BAIT and BET
- Students with more African American peers in school are more likely to have southern shifted mid front vowels
- The distinction between the mid and high front vowel pairs (BEET/BIT and BAIT/BET) may be due to the fact that the SVS is not advanced for this sample population (Thomas 2001)
- The BAT vowel does not show similar correlations, despite being an ethnically salient vowel (Thomas et al. 2010)

Conclusions

- There is a relationship between school demographics and level of vernacularity

- The vocalic and morphosyntactic subsystems analyzed here both show positive correlations with school demographics, showing that these subsystems behave similarly with respect to this variable



Acknowledgements

Susan Zeisel for making this project possible, David Ethier for data collection, Robin Dodsworth for assistance with statistical software, Walt Wolfram for offering insight, Erik Thomas for assistance throughout the process, Tyler Kendall for NORM's graphing programs, all of the NCLLP crew especially Janneke Van Hofwegen for helping us navigate the data.

National Science Foundation Grant

BCS-0544744

BCS-0843865

For More Information:

Jennifer Renn: jennifer.renn@unc.edu

Charlie Farrington: crfarrington@gmail.com

Mary Kohn: maryekohn@gmail.com

References

Ash, Sharon. 1982. The vocalization of /l/ in Philadelphia. *The SECOL Review*, 6, 162-175.

Bailey, Guy and Erik R. Thomas. 1998. Some aspects of African-American Vernacular English phonology. *African-American English: Structure, History, and Use*, ed. by Salikoko S. Mufwene, John R. Rickford, Guy Bailey, and John Baugh. London and New York: Routledge, 85-109.

Baratz, Joan and Roger Shuy. 1969 (eds.) 1969. *Teaching black children to read*. Washington, D.C.: Center for Applied Linguistics.

Berends, M. & Penaloza, R. V. (2010, forthcoming). . Increasing racial isolation and test score gaps in mathematics: A 30-year perspective."*Teachers College Record 112.*

Borman, K. M., McNulty Eitle, T., Michael, D., Eitle, D. J., Lee, R., Johnson, L., Cobb-Roberts, D., Dorn, S., & Shircliffe, B. (2004). Accountability in a postdesegregation era: The continuing significance of racial segregation in Florida's schools. *American Educational Research Journal, 41,* 605-631.

Bountress, Nicholas G. 1983. Effect of Segregated and Integrated Educational Settings Upon Selected Dialectal Features. *Perceptual and Motor Skills 57*: 71-78.

Cedergren, H. J. 1987. The spread of language change: Verifying inferences of linguistic diffusion. In P. H. Lowenberg (Ed.), *Language Spread and Language Policy: Issues, Implications and Case Studies*. pp. 44-60. Washington.

Craig, Holly and Julie Washington. 2004. Grade-related changes in the production of African American English. Journal of Speech, Language, and Hearing Research, 47, 450–463. American English. Journal of Speech, Language, and Hearing Research, 47, 450–463.

Craig, Holly K. and Julie A. Washington. 2006. *Malik Goes to School: Examining the Language Skills of African American Students from Preschool-5th Grade*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Cukor-Avila, Patricia. 2002. She say, she go, she be like: Verbs of quotation over time in African American Vernacular English. *American Speech* 77:3-31

Eckert, Penelope. 1997. "Age as a sociolinguistic variable" in *Handbook of Sociolinguistics,* F. Coulmas (ed.), Oxford, 151-167.

Farrington, Charles. 2011. Devoicing in African American English: A Longitudinal and Apparent Time Analysis. Unpublished Master's Thesis. North Carolina State University.

Fasold, Ralph and Walt Wolfram. 1970. "Some linguistic features of Negro dialect." In *Teaching Standard English in the Inner City,* R. W. Fasold and R. W. Shuy (eds.), 41-86. Washington, DC: Center for Applied Linguistics.

Harris, D. (2006). *Lost learning, forgotten promises: A national analysis of school racial segregation, student achievement, and controlled choice plans*. Washington, DC: Center for American Progress.

Kainz, K., Vernon-Feagans, L. (2007) The ecology of early reading development for children in poverty. *Elementary School Journal, 107,* 407-427.

Kohn, Mary and Charlie Farrington. 2011. The socio-regional distribution of African American vowel systems in Piedmont, North Carolina. Paper presented at NWAV 40: *New Ways of Analyzing Language Variation*. Georgetown, October.

Kohn, Mary and Charlie Farrington. 2012. African American English: Longitudinal trajectories of vowel development. Paper presented at Linguistic Society of America 2012 Annual Meeting. Portland, OR, January.

Koops, Christian and Nancy Niedzielski. 2009. /t/, /d/ -glottalization and vowel variation in Houston AAE. Paper presented at NWAV 38: *New Ways of Analyzing Variation*. Ottawa.

Labov William. 2001. Principle of Linguistic Change, Volume 2: External Factors. Malden, MA: Wiley Blackwell.

Labov, William, P. Cohen, C. Robins and J. Lewis. 1968. A study of the non-standard English of Negro and Puerto Rican Speakers in New York City. Cooperative Research Report 3288. Vols I and II. Philadelphia: U.S. Regional Survey (Linguistics Laboratory, U. of Pa.).

References

Massey, D., Charles, C. & Dinwiddie, G. (2004). The continuing consequences of segregation: Family stress and college academic achievement. *Social Science Quarterly, 85,* 1353-1373.

Mickelson, R. (2008). Twenty-first century social science on school racial diversity and educational outcomes. *Ohio State Law Journal, 69,* 1173-1227.

Renn, Jennifer. 2007. *Measuring Style Shift: A Quantitative Analysis of African American English*. Unpublished Master's Thesis.

Renn, Jennifer. 2010. *Acquiring Style: The Development of Dialect Shifting among African American Children*. Unpublished Dissertation. University of North Carolina, Chapel Hill.

Renn, Jennifer and J. Michael Terry. 2009. Operationalizing style: Quantifying style shift in the speech of African American adolescents. American Speech 84(4): 367-390.

Rickford, John R., and F. McNair-Knox. 1994. Addressee- and Topic-Influenced Style Shift: A Quantitative Sociolinguistic Study. In D. Biber & E. Finegan (Eds.), *Sociolinguistic perspectives on register*. New York: Oxford University Press. pp. 235-276.

Rickford, John and Walt Wolfram. 2010. Formal instruction in oral language (as a second dialect) National Research Council Workshop on Language Development. California: National Academy of Science.

Sankoff, Gillian. 2005. Cross-Sectional and Longitudinal Studies. In Ammon, Ulrich, Norbert Dittmar, Klaus J. Mattheier, and Peter Trudgill (eds.) *An International Handbook of the Science of Language and Society*, Volume 2, 2. Berlin: de Gruyter, pp.1003-1013.

Stockman, Ida J. 1996. The promises and pitfalls of language sample analysis as an assessment tool for linguistic minority children. *Language, Speech, and Hearing Services in Schools*, *27*, 355–366.

Tagliamonte, Sali and Alexandra D'Arcy. 2009. Peaks beyond phonology: Adolescence, incrementation, and language change. *Language. 85.1*:58-108.

Terry, Nicole Patton, Carol McDonald Connor, Shurita Thomas-Tate, and Michael Love. 2010. Examining Relationships Among Dialect Variation, Literacy Skills, and School Context in First Grade. *Journal of Speech, Language, and Hearing Research 53*: 126-145.

Thomas, Erik R. 2001. *An Acoustic Analysis of Vowel Variation in New World English*. Publication of the American Dialect Society 85. Durham, NC: Duke University Press.

Thomas, Erik R. *forthcoming*. Prosodic Features of African American English. In Sonja Lanehart and Lisa Green (eds.) *Oxford Handbook of African American Language*. Oxford.

Thomas, Erik R., Norman Lass, and Jeannine Carpenter. 2010. Identification of African American Speech. In Nancy Niedzielski and Dennis Preston (eds.) *A Reader in Sociophonetics*. New York: De Gruyter.

Van Hofwegen, Janneke. Personal- and peer-level factors affecting AAE vernacularity in peer dyads. Paper presented at Linguistic Society of America 2012 Annual Meeting. Portland, OR, January

Van Hofwegen, Janneke and Walt Wolfram. 2010. Coming of Age in African American English: A longitudinal study. *Journal of Sociolinguistics 14*(4): 427-455.

Wolfram, Walt. 1969. *A Sociolinguistic Description of Detroit Negro Speech*. Washington, D.C.: Center for Applied Linguistics.

Wolfram, Walt 1994. "The phonology of a sociocultural variety: The case of African American Vernacular English." In *Child Phonology: Characteristics, Assessment, and Intervention with Special Populations*, ed. John E Bernthal and Nicholas W. Bankson, 227-44. New York: Thieme Medical Publishers, Inc.

Appendix 1

Slides 42-45: Vocalic Data Collection and Normalization information

≈200 tokens of vowels for each speaker per timepoint

/i/ BEET*

/u/ BOOT

/ɪ/ BIT

/ʊ/ BOOK

/ʌ/ BUT

/ei/ BAIT

/o/ BOAT, BOWL, BOAR

/ɛ/ BET

/ɔ/ BOUGHT

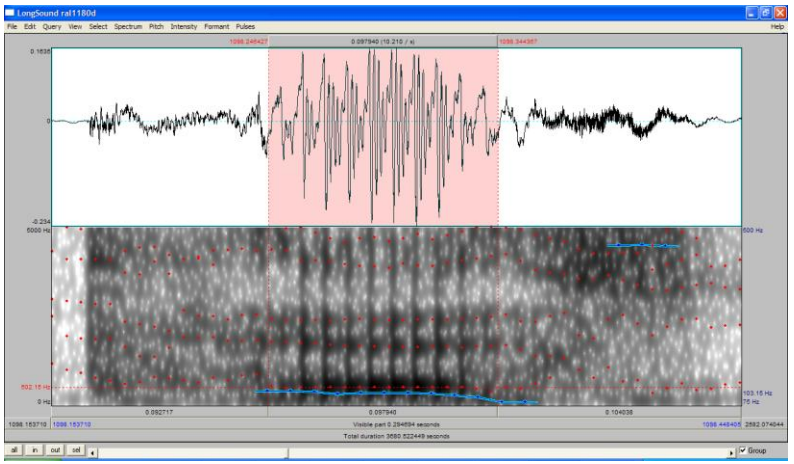
/æ/ BAT, BAN

/ɑ/ BOT

/ai/ BITE/BIDE

* Represents Wellsian-style frames

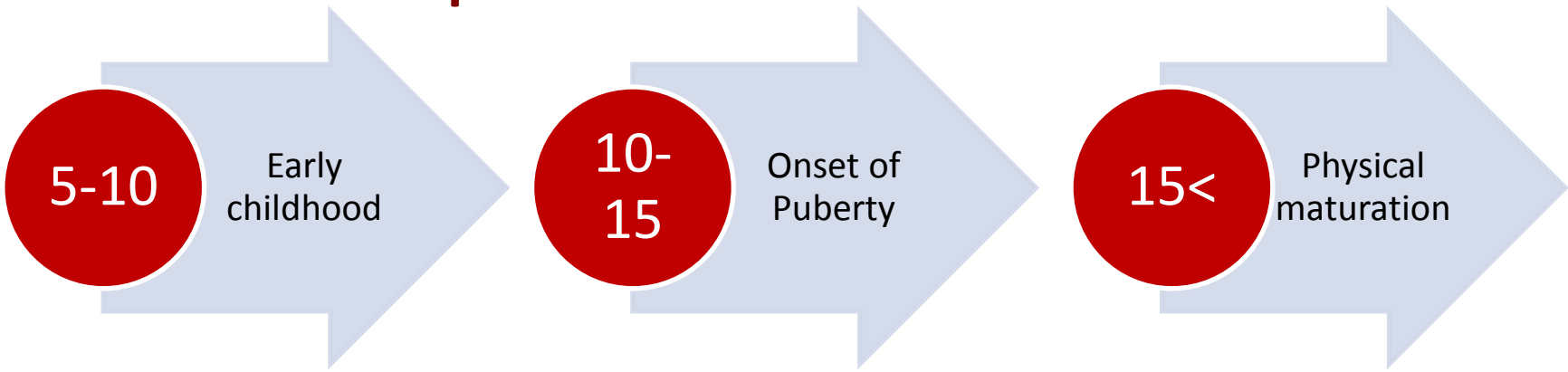
measurements at



onset 25% 50% 75% coda

Normalized using Lobanov (1971)

Non- uniform/ gender specific development of the vocal tract



- sexual dimorphism in low and mid vowels before age 5 (Whiteside 2001)
- Overall decline in vowel space
- reduction in variation Eguchi and Hirsh (1969)

- 15 yrs: Significant difference in pharynx length (Fitch and Giedd 1999).
- Males: Rapid formant descent
- Females : shallow descent (Vorperian and Kent 1999)
- Adult-like f3 achieved

- Female f1 still not adult-like (Whiteside 2001)
- significant difference in pharynx length by age 15 (Fitch and Giedd 1999).

- *Growth of oral tract is proportional (*correlated with F1) (Fant 1975)
- *Growth of pharynx non-proportional to oral tract* (correlated with F2) (Fant 1975)
- *Greatest sex differences for low vowel F1* (e.g. Fant 1975, Vorperian and Kent 1999).

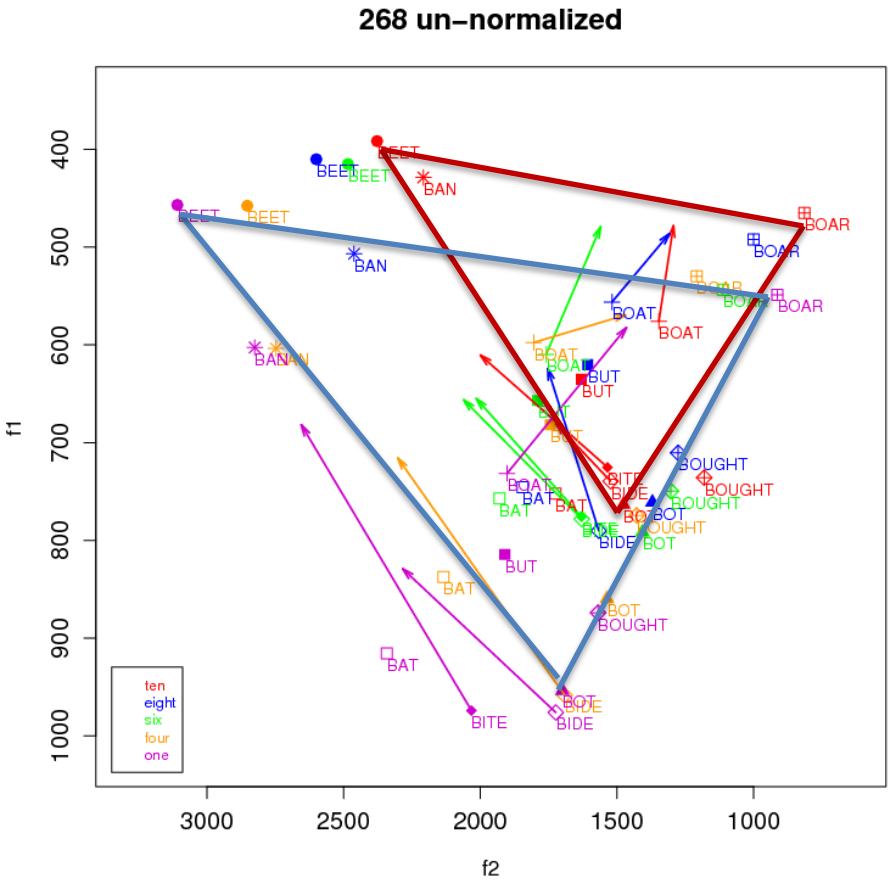
Choice of normalization technique

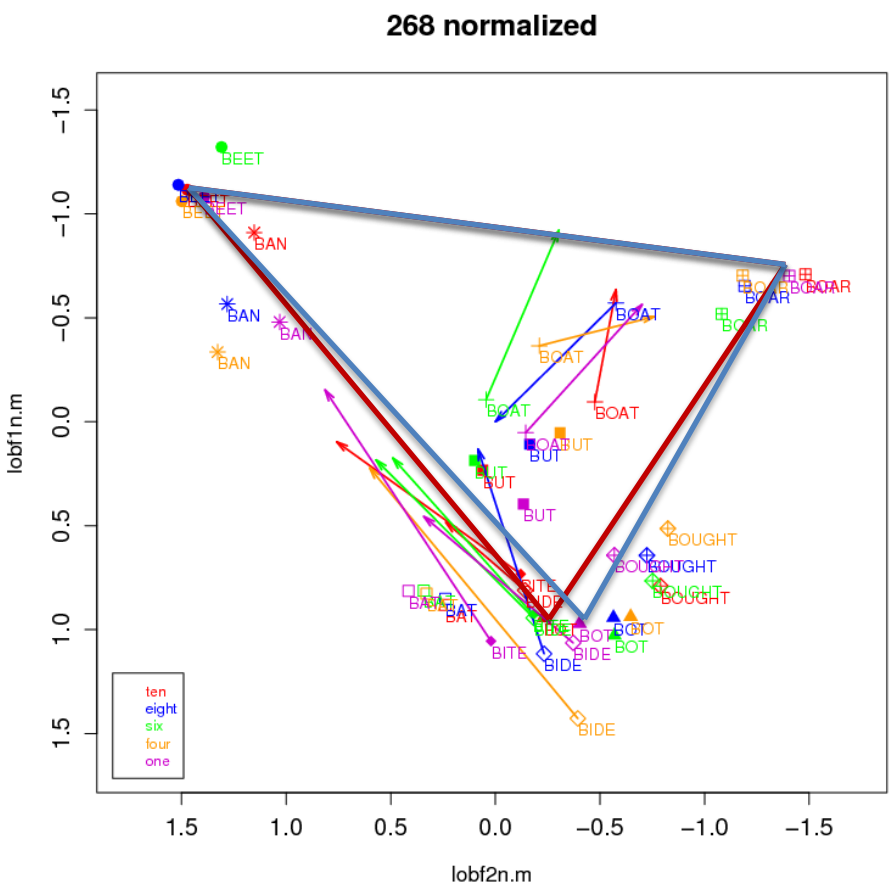
Lobanov (1971)

- Formant extrinsic
- Vowel extrinsic
- Top-performing when compared to other techniques (Clopper 2009, Adank et al 2004)
- Modified for the sample population vowels: BEET, BOAR, BAT, BOT

F_i – Grand Mean F_i / Standard deviation

Effectiveness of Normalization





All vowel plots produced by NORM (Kendall and Thomas 2010)

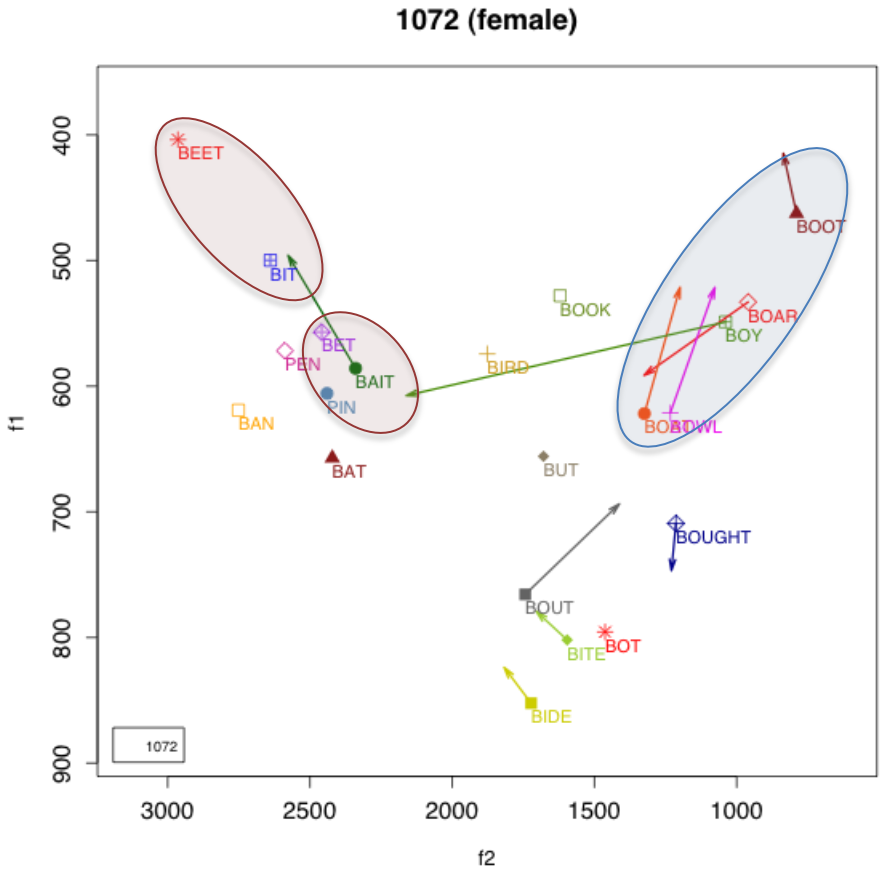
Appendix 2

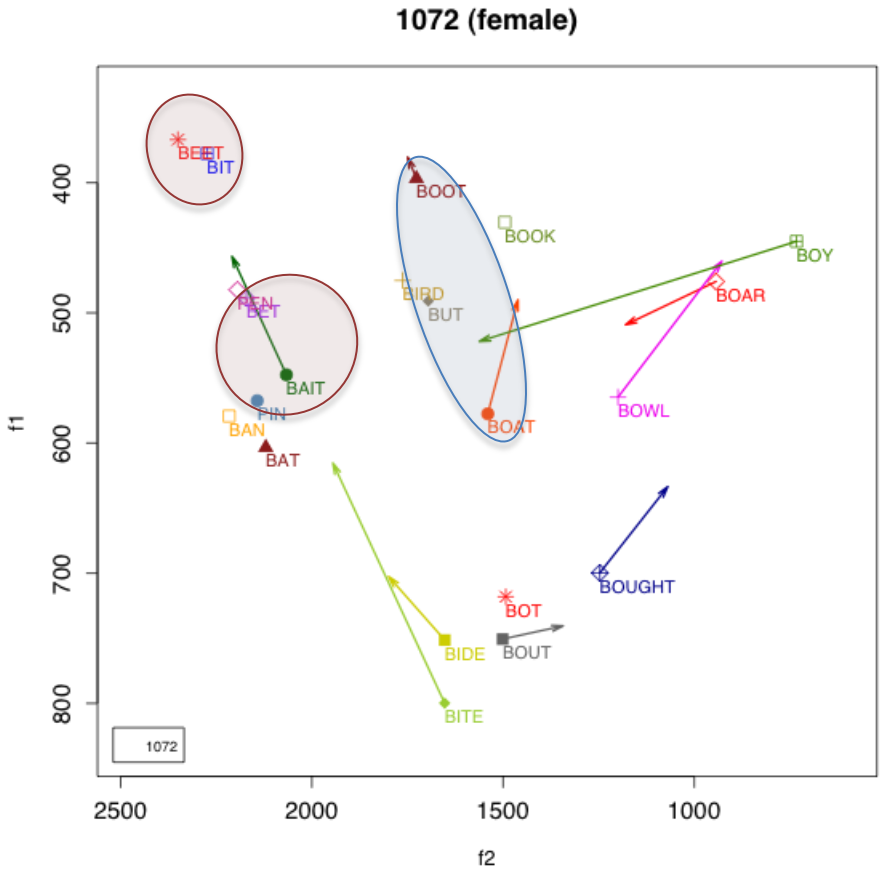
Slides 47-51: Sample Longitudinal Vowel Plots

- 47: 1072 (female)
- 48: K268 (female)
- 49: 1058 (female)
- 50: K275 (male)
- 51: K256 (male)

4th Grade DDM: .30

8th Grade DDM: .45

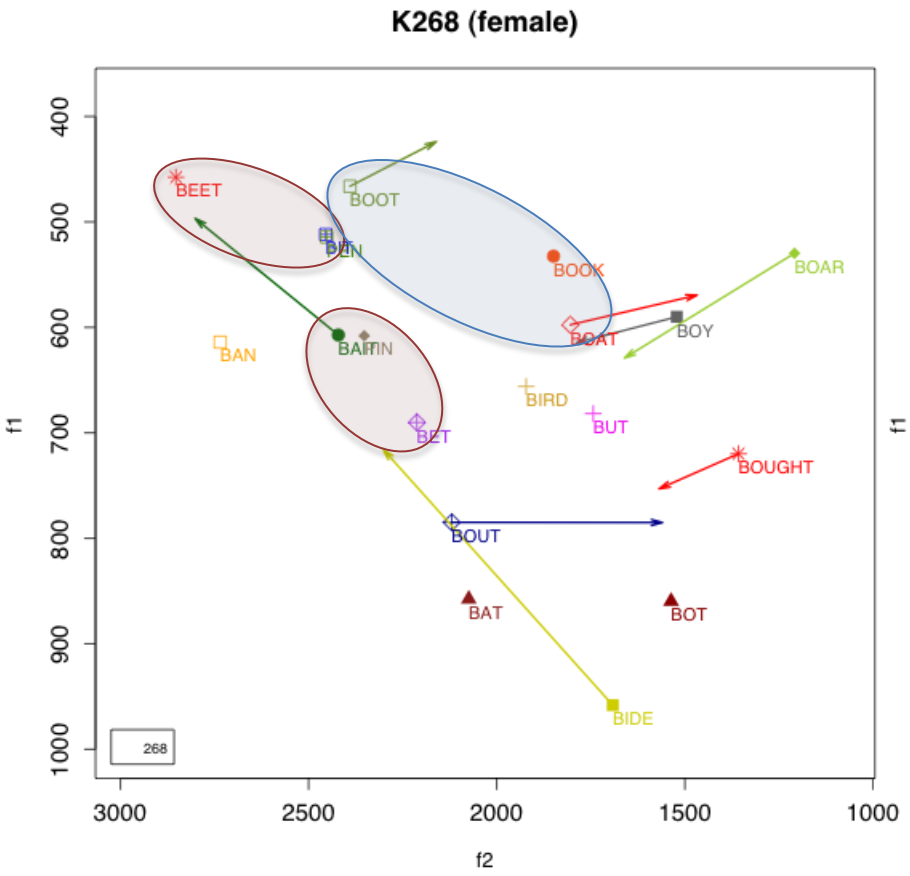


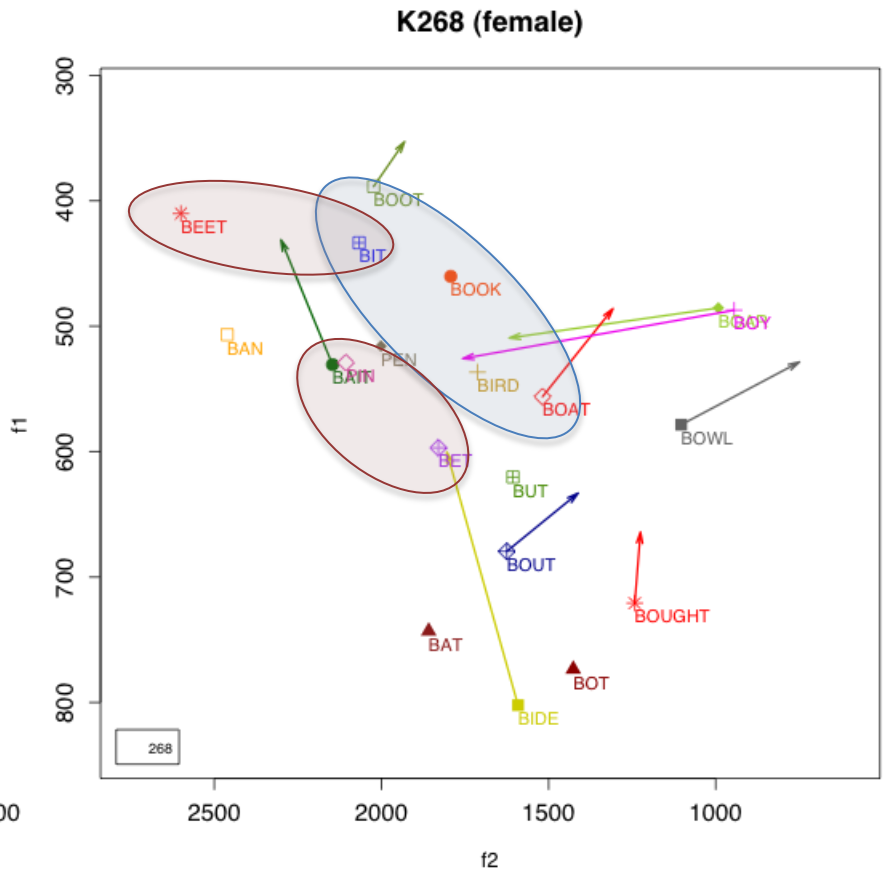


Increasing trajectory of Morphosyntactic Vernacularity

4th Grade DDM: .08

8th Grade DDM: .20

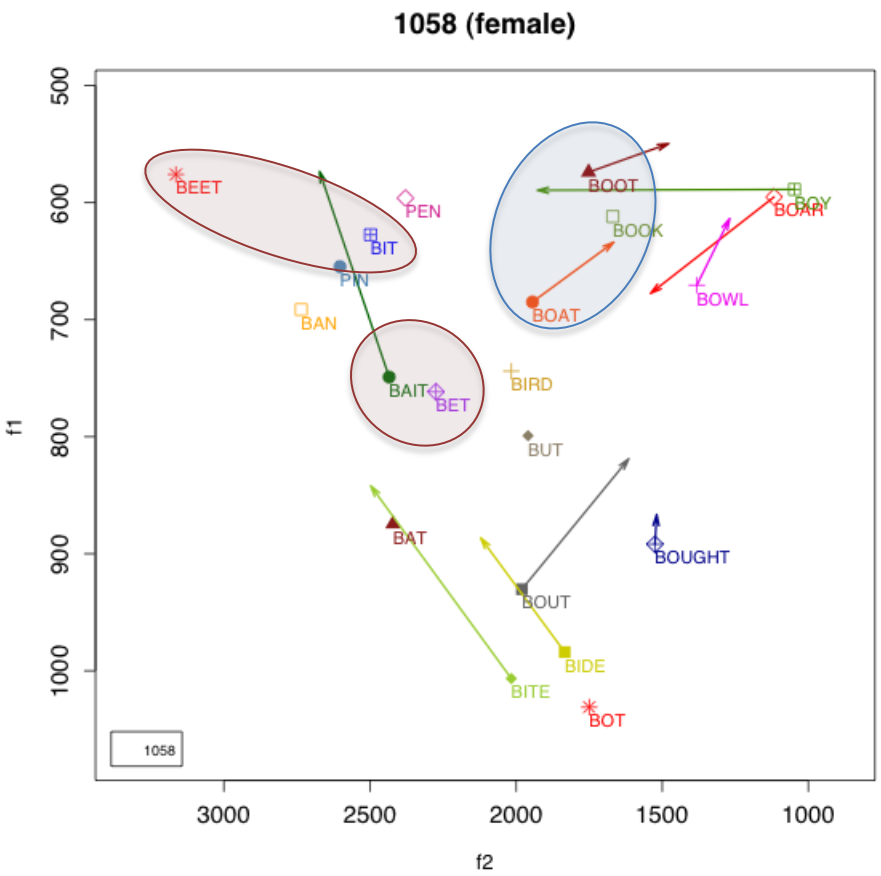


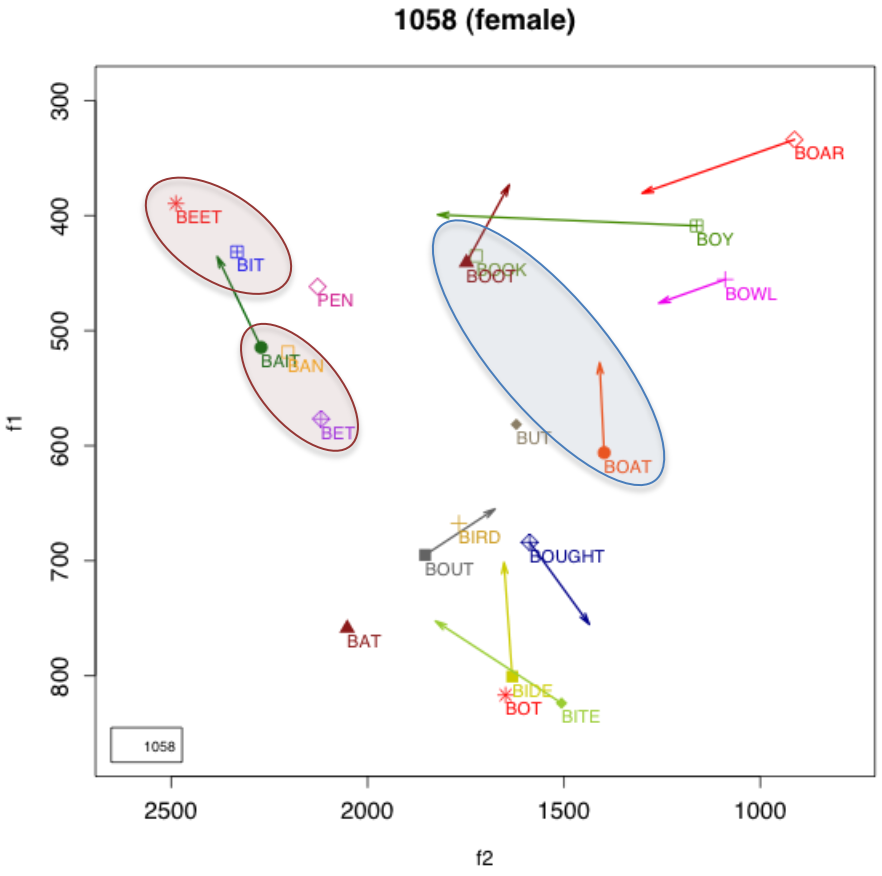


Increasing trajectory of Morphosyntactic Vernacularity

4th Grade DDM: .13

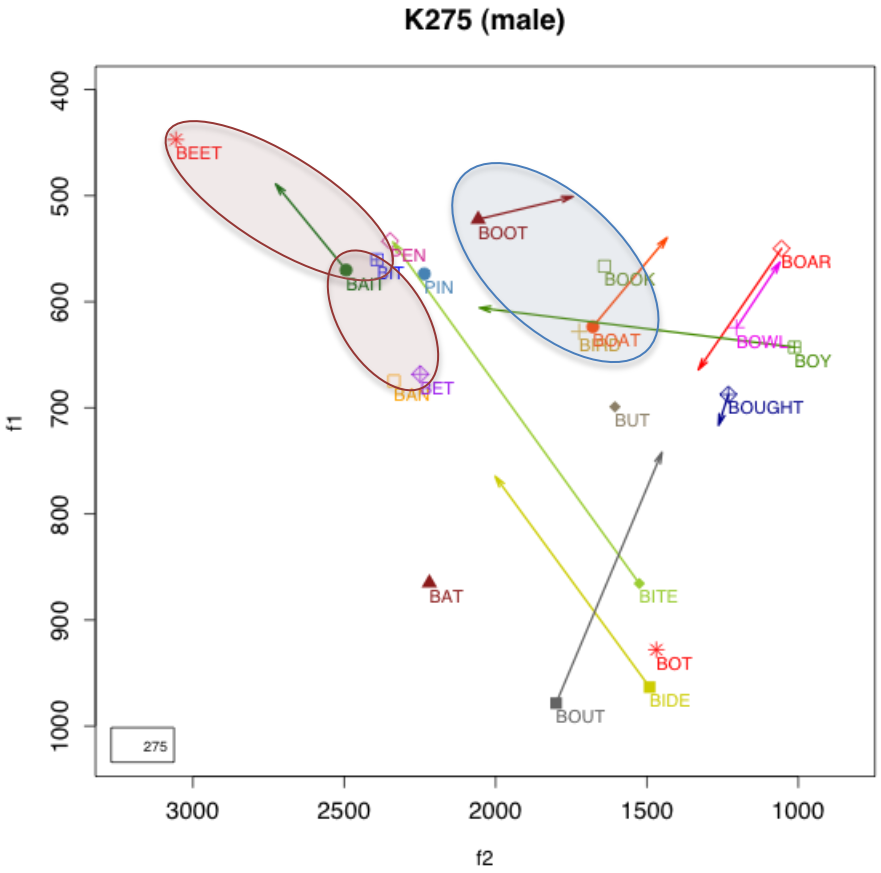
8th Grade DDM: .45



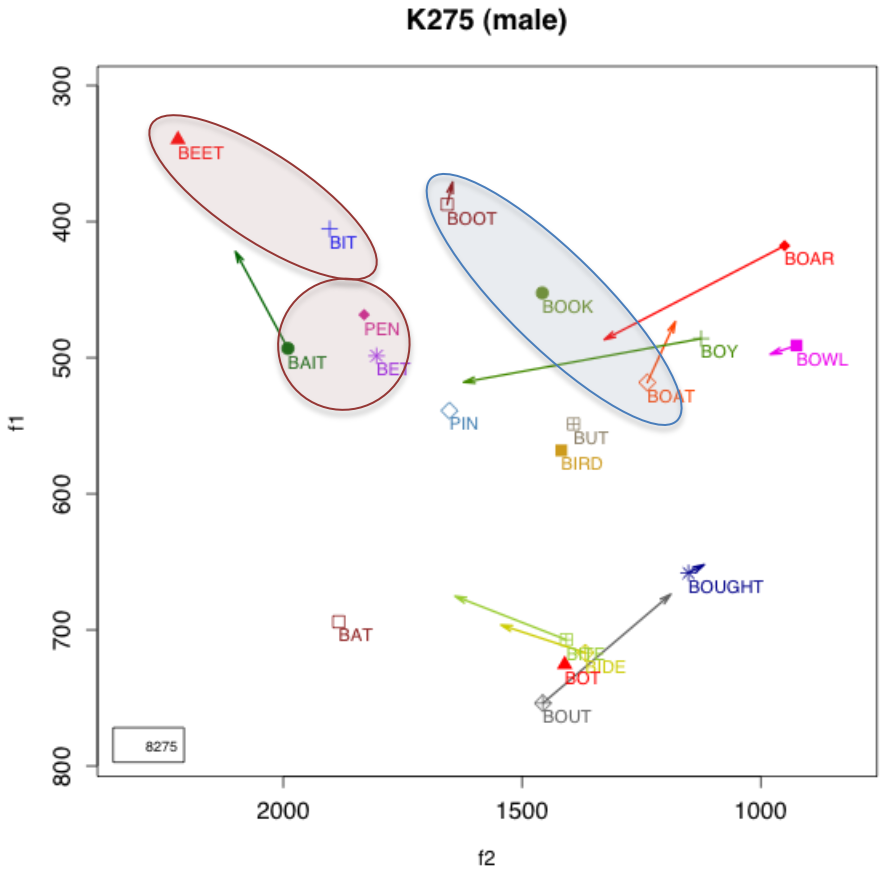


Increasing trajectory of Morphosyntactic Vernacularity

4th Grade DDM: .09



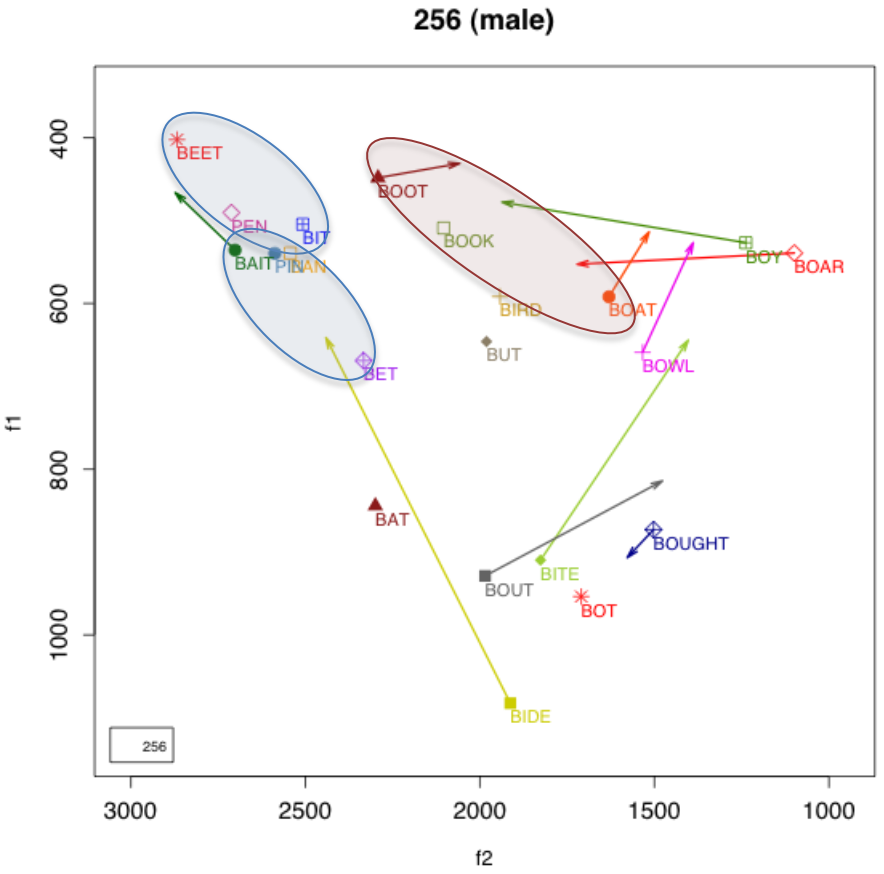
8th Grade DDM: .77

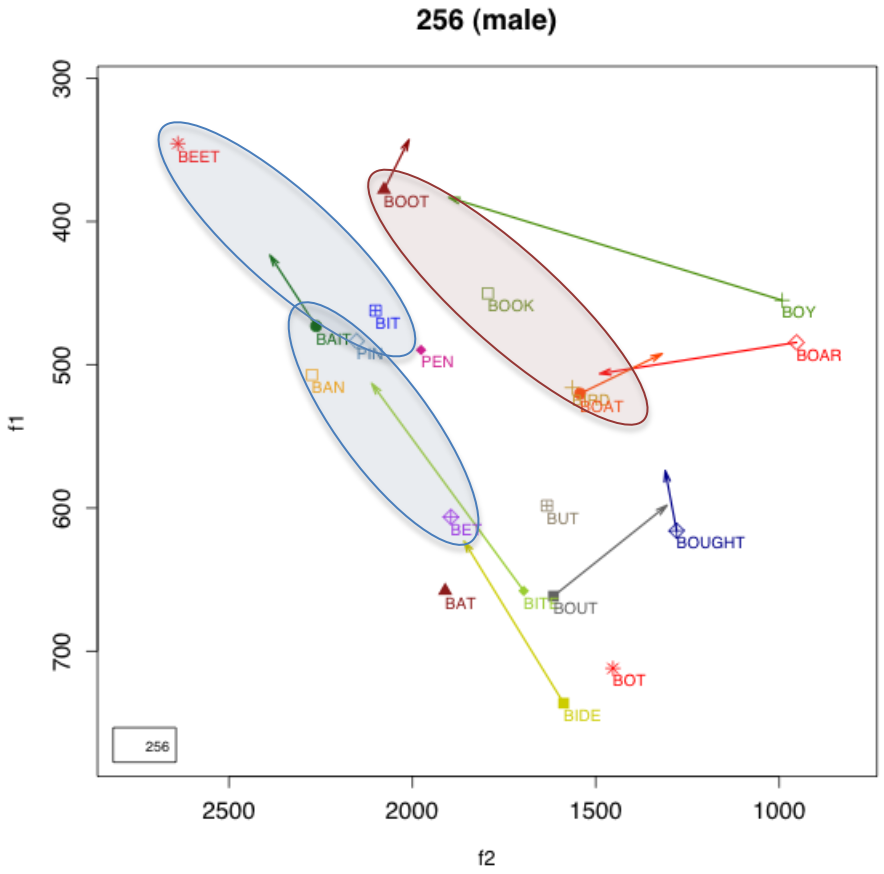


Increasing trajectory of Morphosyntactic Vernacularity: Large shifter

4th Grade DDM: .19

8th Grade DDM: .14





Decreasing trajectory of Morphosyntactic Vernacularity: Small shifter

Appendix 3

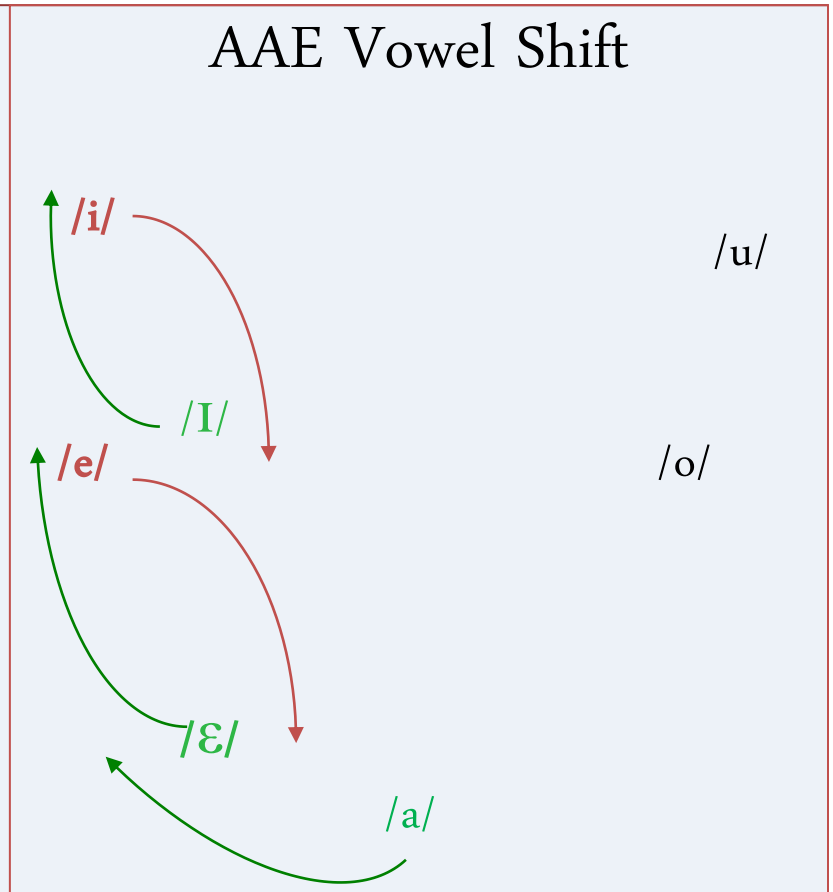
Slides 53-55: More background information on vowels

Slide 56: FPG Vowel Traits from Kohn and Farrington (2011)

Southern AAE Vowel Variation

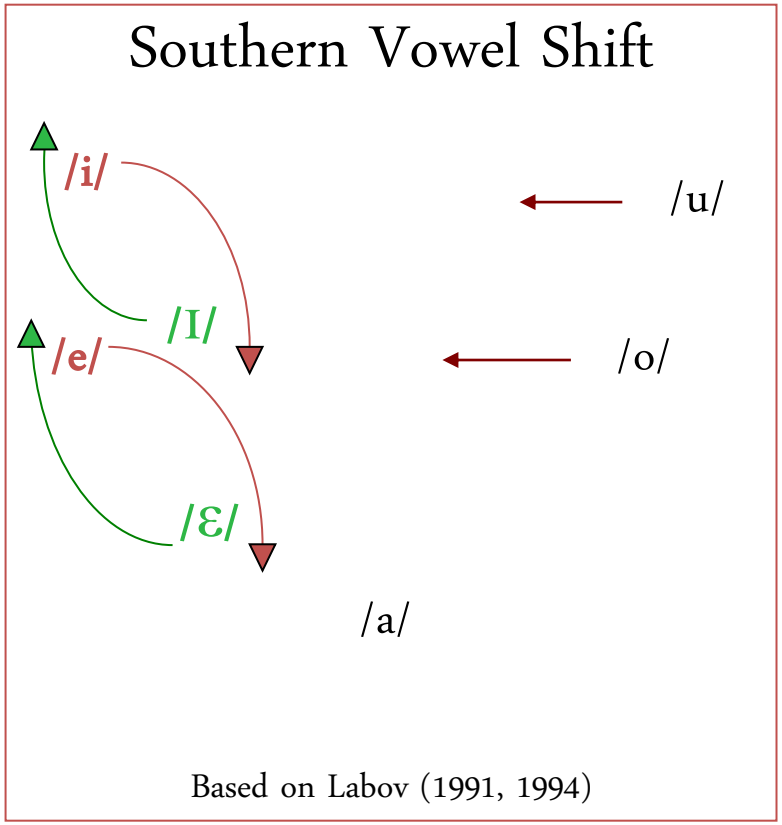
- Memphis
  - Fridland (2003)
- Roswell, Georgia
  - Andres & Votta (2010)
- Rural NC*
  - Childs et al. (2010)
  - Wolfram & Thomas (2002)

*Texana, Beech Bottom, Hyde County



AAE Vowels in the South

- Shared features (Thomas 2007, Fridland 2003)
  - Raising of front lax vowels
  - Lowering of front tense vowels
- Features not shared with Southern EAE
  - Resistance to back vowel fronting



Unique AAE Vowel features?

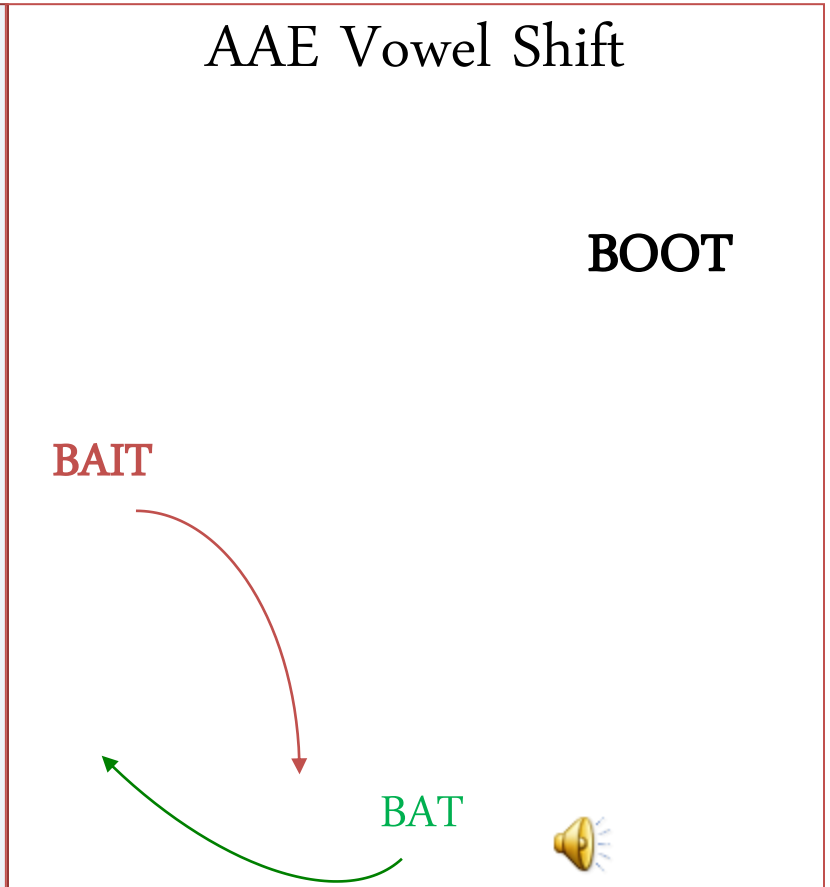
BAT

Distinctively higher in AA communities when compared to White communities since the 1900's

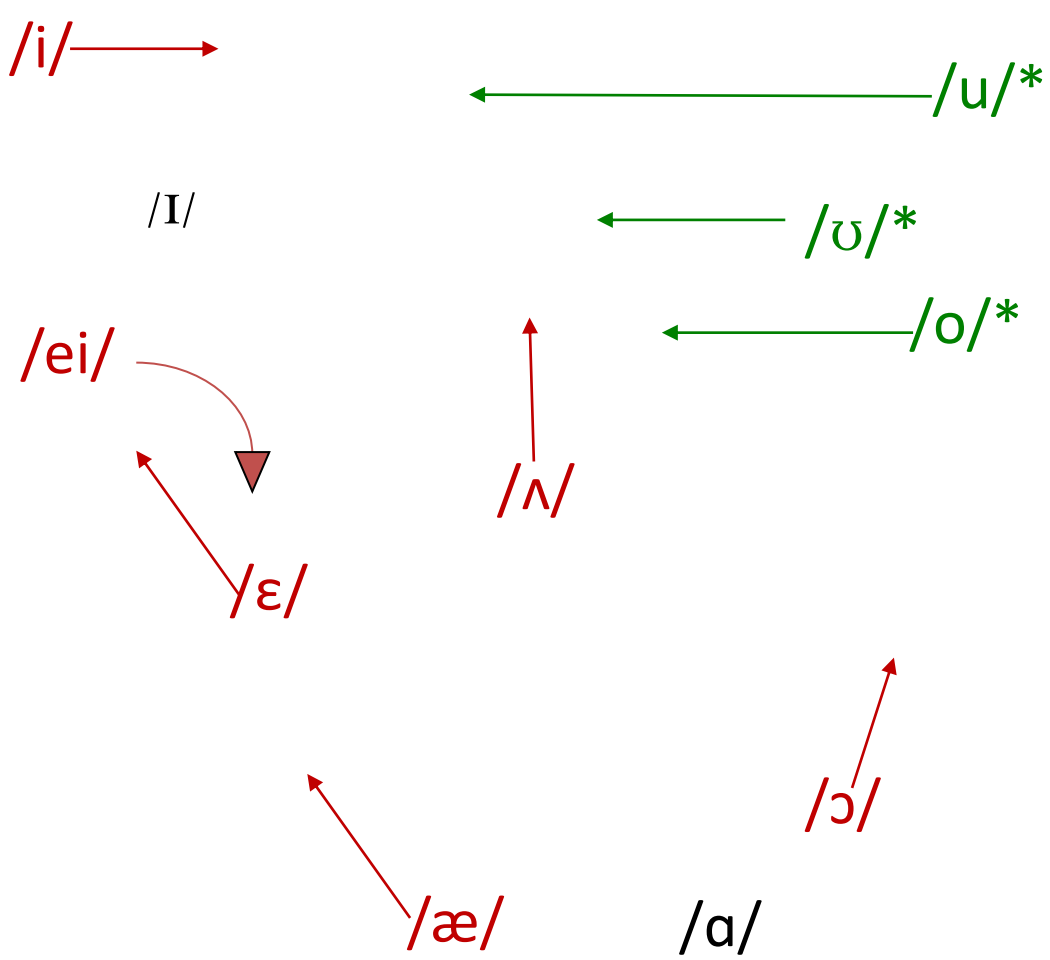
- Bailey & Thomas (1998)

Perception tests indicate that listeners can identify ethnicity based on these vowels.

- Thomas, Lass, & Carpenter (2010)



Vernacular FPG Vowel Traits



-All speakers, but most vernacular are not as fronted
-Vernacular speaker trends