Vowel shifts in Southern US speech

- Vowels in the Southern US speech vary within the region and across racial and social groups.
- What are the effects and interactions of these factors, measured in a large acoustic corpus?

Southern Vowel Shift
- lowering and backing of tense /ɛ/ and raising and fronting of lax /ɛ/;
- /30/ /30/ fronting (Chappell, Person, and Dr. Jang 2006)
- dynamic changes like diphthongization, even triphthongization (Thomas 2018)

African American Vowel Shift
- /ɛ/ /ɛ/ fronting, and raising and fronting of /ɛɛ/ /ɛɛ/.
- Less back-vowel fronting than the SVS, as well as less /ɛɛ/ /ɛɛ/ “swapping” (Thomas 2018)

Digital Archive of Southern Speech (DASS)
- A 64-speaker subset of LAGS (Johnson et al. 1996; Krimm et al. 2013)
- 30 women, 34 men
- 18 African Americans, 46 European Americans
- Transcribed and processed at UGA (Olsen et al. 2017)
- Forced alignment and vowel formant measurement by DARLA (Bickley & Stanford 2015)
- This study includes 626,669 vowel tokens
- See the Gazetteer of Southern Vowels (Bickley et al. 2018)

Methods

Data Processing
- Stressed vowels only
- Removed 5% of tokens based on Mahalanobis Distance from means
- Normalized with Lobanov transformation
- Birth year reset to “years since 1886”

Static Methods
- Pillai scores quantify the relative overlap between vowel pairs (see, Warner & Cross 2008)
- We calculate these using measurements from vowel midpoints

Statistical Analysis
- Linear mixed-effects model using lme4 (Bates et al. 2015)
- Separate models for each measure and for each vowel or pair of vowels
- In all models, speaker was included as a random intercept

Spectral Rate of Change (ROC)

ROC = TL / 0.6 x duration

Higher ROC = more dynamic movement

Results

High Front Vowels

Swapping of /ɛɛ/ increases with birth year
Model: Pillai(ε) = yob x sex + eth + dur
yob β = -0.002, SE = 0.0007, t = -2.533, p < 0.01

Mid Front Vowels

Women diphthongize /ɛɛ/ more than men
Model: Pillai(ɛ) = yob x sex + eth + dur
yob β = -0.001, SE = 0.0006, t = -3.027, p < 0.01 **

Mid Back Vowels

Younger speakers have more /ɛɛ/ fronting
Model: Pillai(ɛ) = yob x sex + eth + dur
yob β = -0.001, SE = 0.0006, t = -2.209, p < 0.05 *

Low Vowels

Vector length of /ɛɛ/ increases with birth year and in men
Model: Pillai(ɛ) = yob x sex + eth + dur
yob β = -0.001, SE = 0.0008, t = -2.721, p < 0.01 **

Trajectory length (TL)

TL = \sqrt{(F_{120} - F_{140})^2 + (F_{220} - F_{240})^2} + \sqrt{(F_{120} - F_{140})^2 + (F_{220} - F_{240})^2}

Longer TL = more diphthongal vowel

Conclusions

Vowels’ acoustics vary by race, sex and age
- European American speakers have greater /ɛɛ/ swapping than African Americans, supporting Thomas’ (2007) characterization of the African American Vowel Shift
- Women have a more diphthongal realization of front /ɛɛ/ than men

Active divergence of Southern speech from other varieties
- In this historical dataset, younger speakers lead Southern shifting; they have more “swapping” of /ɛɛ/ /ɛɛ/; more back-vowel fronting, and more dynamic /ɛɛ/ /ɛɛ/ vowels
- Older speakers are more conservative both in vowels’ relative positioning, and their dynamics

References


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