A Cross Generational Dialect Study in Western North Carolina

Dissertation

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By

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Abstract

This dissertation evaluates the relationship between African American English and White Vernacular English as spoken in a small rural town in western North Carolina for consistencies in vowel production by group membership and for participation in the Southern Vowel Shift (SVS), a vowel rotation currently occurring in the Southern United States. A sociophonetic approach is used to gather and analyze data from male and female African American (AA) and European American (EA) lifelong or near life-long community residents. Sixty-four speakers aged 19 - 70+ were recorded reading the word list *heed, hid, hayed, head, had, hod, whod, hood, hoed, hawed, heard, hide, hoyed, howed* representing the vowel contained in the hVd frame. Measures of vowel duration, normalized vowel space area, trajectory length (TL), and spectral rate of change (SROC) are completed. Analysis of variance of the obtained mean values categorized by gender, ethnicity, and age group (pre-integration or post-integration) are completed. The results of the data analysis indicate that ethnicity is not always a main effect of the variance found in the mean values. When ethnicity is a main effect there is a substantial difference in the variance accounted for when AA speakers have greater mean values than when EA speakers have greater mean values. When AA speakers have greater values the variance accounted for is typically between 50% and 60%. When EA speakers have greater values the variance accounted for ranged from 50% to 7%. There is no clear pattern of divergence between AA and EA speakers in this community. There is no definitive pattern of difference in vowel productions by gender or age group. Instead there are trends of similarity by age or gender or ethnicity on a number of parameters. A complex and evolving relationship of group membership to vowel production is evident. In assessing community participation in the SVS participation by both AA and EA speakers is evident. The data indicate community participation in the SVS is in regression with EA females leading the change. Both older and younger EA female speakers produce vowels in a manner suggesting earlier generations may have fully participated in the Southern Vowel Shift. A discussion of the findings is presented.

Acknowledgements

I would like to take this opportunity to thank the members of my dissertation committee, Dr. Fox, Dr. Clopper, Dr. Jacewicz, and Dr. Winford for the insight and guidance they have provided. I am indebted to you as a scholar. Thank you.

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Chapter 1: Introduction

This dissertation will assess the ability of current theories of language change to account for the hypothesized regularity within African American English (AAE). There is an ongoing debate as to whether the primary motivation for language change is internal (system oriented) or external (socially oriented). It has been asserted that speakers of African American English do not actively participate in the regional vowel change phenomena (Labov, Ash, Boberg, 2006), neither the Northern Cities Shift (NCS) nor the Southern Vowel Shift (SVS). The reasons for this lack of participation are hypothesized to be external.

Sound change in the form of vowel change is rooted in the concepts of phonological contrast and neutralization (Hock 1991). It is widely accepted that a phonetic difference in the form of relative vowel duration or formant frequency is a structural aspect of the underlying categorical phonological contrast between American English vowels. A minimally contrastive vowel pair such as /i/ versus /I/ can be structurally described with respect to the relative durations and formant frequencies of the individual tokens (e.g., Peterson & Barney 1952, Peterson & Lehiste 1960). While the acoustic measurements of the syllable nuclei and the duration values are speaker dependent, a minimal perceptual difference between the tokens must persist (e.g., relative duration, relative values of F1 and F2) in order for contrast to be maintained. When a group of speakers consistently change at least one aspect of production, the result can be a change in the perception of the phonetic target by listeners outside that speaker group. The impetus for this change is an empirical question. Do vowel changes occur as a result of system internal forces related to biological imperatives such as ease of production? Or are external factors such as maximal differentiation of contrastive targets for either communicative or socially motivated factors the initiating forces of vowel change?

Labov (1994) characterized the internal factors of vowel change as those encompassing the "phonetic, phonemic and morphological systems and the [resultant] effects of sound change on the capacity of sounds to distinguish meanings." While the phonetic units can be measured without regard to the social structure of a particular community their function, use and spread within a community cannot. Social information is included in the phonemes production. Information on the sex, age, race, class and community. The acoustic characteristics of the speech token can transmit speaker demographic information. Importantly this information may be decoded only by listeners familiar with the social construct under which this information is relevant (see Thomas (2002) for a discussion on research in this area). This dissertation will complete a sociophonetic analysis, the quantitative assessment of the distribution of phonetic variables within a community based on speaker background (Foulkes 2006) to evaluate the status of vowel production in African American English and White Vernacular English.

It has been hypothesized that African American English (AAE) and White Vernacular English (WVE) are diverging. Termed the "divergence hypothesis" this idea was formulated from research conducted by Bailey, Maynor and Cukor-Avila on suprasegmental aspects of the two dialects and from research conducted by Labov and colleagues on each group's use of vowel space area (Labov, 1985a, 1985b; Myhill & Harris 1986; Dayton 1996; Bailey & Basset 1986; Bailey & Maynor 1985a, 1985b, 1987). In the mid-1980s Bailey, Maynor and Cukor-Avila compared previous research describing the grammatical system of AAE. They compared data gathered from young urban AAE speakers living in northern cities to data gathered from old and young, urban and rural, AAE and WVE speakers living in the South. The comparisons revealed that many of the morphosyntactic structures present in the speech of the young AAE speakers (e.g., *be*+verb+*ing*; innovative *had* + past) were rare or absent in the speech of the older AAE speakers, and both older and younger WVE speakers. The recent and novel linguistic constructions were identified as innovations in AAE. The presence of the innovative structures in the speech of the younger AAE speakers was judged by Bailey's group to provide support for the hypothesized divergence of AAE and WVE. Labov and his research team, studying vowel space use and patterns of vowel rotation, found that AAE speakers did not participate in the vowel rotations actively occurring in the speech of WVE speakers throughout the United States (e.g. Labov 1991).

These two research groups assessed different aspects of AAE grammar yet drew similar conclusions regarding the divergence of AAE from regional WVE. Following the publication of this research, divergence in AAE, as evaluated in the collected samples, was generalized to be representative of divergence in AAE throughout the US. This broad generalization was used by some researchers to expand the divergence hypothesis to a statement of unilateral change in AAE (see Wolfram 2007 for a discussion). The evidence for the divergence hypothesis presents a more limited view of the divergence of AAE and regional WVE.

The divergence hypothesis can be characterized in terms of both a strong and a weak position. The strong position would assert that AAE, a social dialect spoken throughout the United States by many people of historical African descent, is becoming more internally uniform and moving away from localized (WVE) community dialect norms (e.g. Labov 1985;Wolfram, Thomas, Green 2000). The weak position of the divergence hypothesis would assert that multiple patterns of change, both divergent and convergent, may be expected in AAE in relation to WVE based on a variety of sociohistorical factors, including population density of AAE to WVE speakers, interpersonal interactions, access to public education, literacy, overall community size and the particular grammatical structures evaluated (e.g. Wolfram 2007).

In the recent work, *The Atlas of North American English* (ANAE), completed by Labov et. al. (2006) evidence in support of the divergence of local AAE from local WVE has been presented. The data were compiled from speaker recordings completed during a nationwide study of vowel space area and vowel rotation. Speakers were categorized based on their age, geographic residence and ethnic background. For example the low back merger of /ɔ/~/ɑ/, relevant for the West Coast, is complete for all sampled Los Angeles WVE speakers yet the productions remain distinct for all sampled Los Angeles AAE speakers. In the Southern United States AAE and WVE speakers were evaluated for participation in the SVS a change in the relative positions of the front vowels /e/, /ɛ/, /i/, /ɪ/, and the diphthong /aɪ/. Direct comparisons of individual AAE and WVE speakers in Columbia SC and Durham NC illustrated full participation in the shift by speakers of WVE with minimal participation in the shift demonstrated by speakers of AAE.

The ANAE discusses AAE as a conservative dialect due to its decreased participation in the ongoing vowel changes found in WVE throughout the United States. This direct comparison of AAE to WVE is limited by several factors. Key among them is geography and population density. Data for the ANAE was collected from cities with populations greater than 50,000, although some smaller cities were included for greater geographic coverage. The statistical analyses completed on the data gathered from the southern United States revealed that a city population of less than 100,000 and residence in the Inland South, a region including east Tennessee and western North Carolina, were the two factors most strongly associated with participation in the vowel changes of the SVS. None of the AAE speakers sampled for the ANAE were residents of communities in or near the Inland South.

Labov et al. (2006) compared his most recent AAE data to AAE data collected previously by Thomas (2001). These data were recordings of older AAE speakers primarily from rural areas of North Carolina and Texas. Acoustic analysis of the recordings revealed AAE speaker participation in the SVS has developed more slowly than WVE participation. In the AAE speaker group in Thomas' (2001) speakers did not show glide deletion before voiceless consonants. The oldest AAE speakers (born prior to 1930) had no reversal of /e/~/ɛ/. The younger speakers (born after 1930) did show reversal of /e/~/ɛ/. None of Thomas' (2001) AAE speakers had reversal of /i/~/ɪ/. While these data can be interpreted to show minimal AAE participation in the SVS it must be noted no data was presented for AAE residents of the Inland South.

The presented data on AAE participation in the SVS are judged by Labov et al. (2006) to be consistent with the view of AAE in the Southern states as a phonologically conservative dialect. While some data on rural AAE speakers was presented the data grouped AAE speakers living in disparate areas (NC and TX) for participation in the SVS. The presented data were judged to show support for AAE as a phonologically conservative dialect. No statement was made regarding AAE participation in the SVS.

Neither data set of Southern AAE speakers (Thomas 2001; Labov 2006) was obtained from a group of male and female AAE and WVE speakers from the same community in or near the Inland South. This lack of rural Southern AAE data from regions in or near the Inland South makes a conclusive statement regarding the conservative nature of AAE in the SVS premature. The primary goal of this dissertation is to provide a useful data set from which factors related to AAE and WVE divergence, and AAE participation in the SVS can be addressed.

In order to evaluate the relative influence of geography, rural community status, ethnicity, gender, and Black[1]/White interaction on participation in the SVS data will be collected and analyzed from AAE and WVE lifelong or near lifelong residents of a small rural community in the foothills of the Appalachian Mountains in North Carolina. The community is located in western North Carolina on the fringes of the dialect boundary Labov et al. (2006) identify as the Inland South. The community is southeast of Asheville and northwest of Charlotte. Importantly, the community is neither a geographically isolated community nor a historically majority Black community, both areas where Black/White interactions were not possible due to population demographics. The study of vowel change in AAE and WVE in a biracial community is necessary in order to makes cross-ethnic comparisons of speech, in apparent time and in the same community, possible. Statesville/Iredell county is a bi-racial community with a population consistent with the east to west settlement patterns of North Carolina.

Labov et. al. (2006) found older speakers living in the Inland South demonstrated greater participation in the SVS than younger speakers. Both of these factors must be accounted for when assessing local community participation in this vowel change event. By

[1]Throughout history multiple terms have been used to refer to Americans of historical African descent. These include Colored, Negro, Black, Afro-American, African American, and African-American. In order to maintain the socio-cultural authenticity of the referenced works the same terms used to describe African-Americans in those texts will be used when the text is referenced in this dissertation.

sampling from a single community with both AAE and WVE speakers geography is a constant. The citation speech task, a controlled production experiment, ensures the tokens derived from AAE and WVE speakers are similar in both expected form and phonetic context. By using speakers from both pre- and post- public school integration, the influence of integration, in the form of dialect contact, on the group's vowel productions can be evaluated. Because Statesville did not develop private schools during the integration period there are no AAE and WVE speakers who did not attend integrated schools after approximately 1968.

The speakers that represent the pre-integration cohort (over 50 years of age in 2006-2009) were more likely to have spent the majority of their early childhood and adolescence in racially segregated educational and social environments (e.g., all White or all Black). The speakers in the post-integration cohort (between 21 and 49 years old in 2006-2009) were more likely to have spent both their early childhood and adolescence in an integrated educational and social environment. This dissertation hypothesizes that if the evidence provided in support of the divergence hypothesis, AAE and WVE were more alike before WWII and began to diverge after, remains valid for the community under study then the pre-integration speakers (older group) will show more ethnic (Black/White) similarity in their vowel system; while the post-integration speakers (younger group) will show more cross ethnic difference. Patterns of either divergence, convergence or some variation may be seen in the younger generation depending on the current trajectories of ongoing change in the community.

The gathered data will be evaluated to first, provide evidence on the trajectories of change in the vowel systems of the AAE and WVE speakers in the community, and then to evaluate speaker and group participation in the first two elements of the Southern Shift, /aɪ/ monophthongization and /e/, /ɛ/ reversal. The third element of the Southern Shift, reversal of /i/ and /ɪ/, is not expected in the obtained speaker sample.

Chapter 2: Background and Literature Review

Southern American English

The dialect of interest to this dissertation is Southern American English. The Southern American dialect region has been defined in the recent past by dialect geographers such as Kurath (1949) and Kurath & McDavid (1961). Using vocabulary, grammar and pronunciation as defining features, these modern dialect geographers defined multiple dialect regions along the eastern coast of the United States. Of interest to this text is the identification of region 13 in the figure 1 below. Kurath (1949) identified western North Carolina and South Carolina as a Midland region differentiated from regions 15, 16 and 17, the Virginia Piedmont, north eastern North Carolina, and the Cape Fear and Peedee Valleys. Further analyses by Kurath & McDavid (1961) identified region 13 as part of the "South Midland," an area now considered to be part of the larger dialect region Southern. Labov et al. (2006) have identified the western North Carolina section of region 13 as part of the Inland South. The Inland South is identified as an originating region for the SVS.

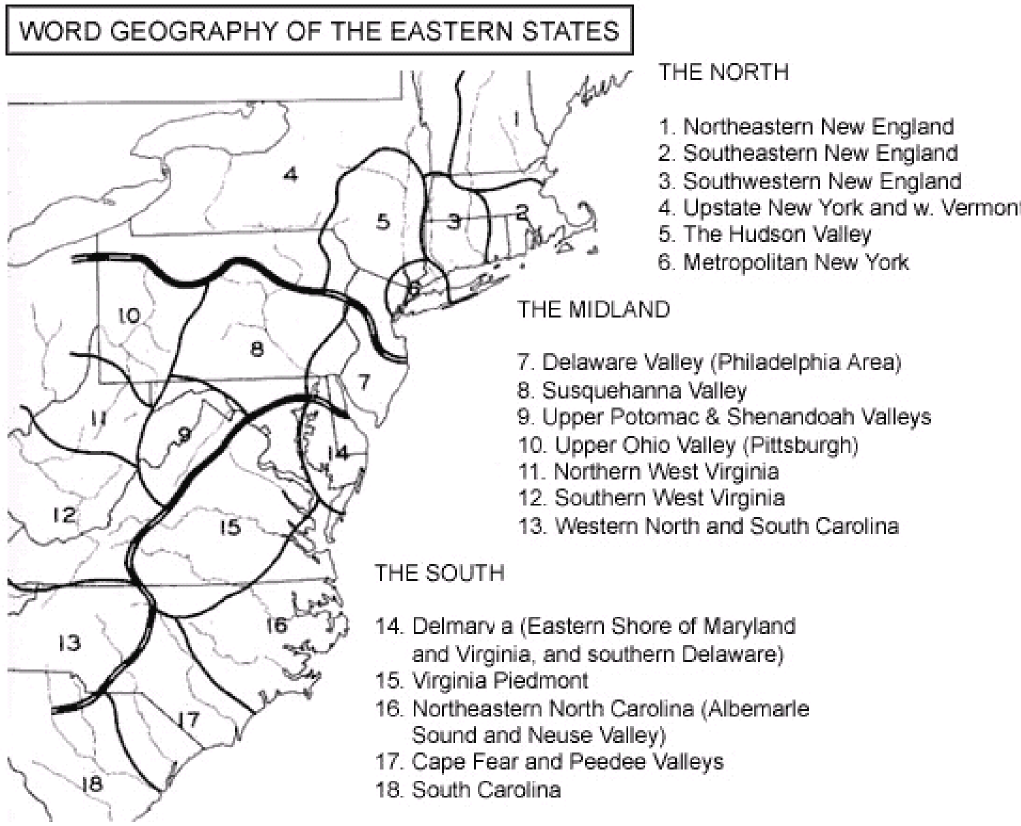

Figure 1 Dialect Map southeastern US
Kurath defined 18 distinct speech areas based on similarities in vocabulary, grammar and pronunciation. Map source: *A Word Geography of the Eastern United States. University of Michigan Press*, 1949, page 91.

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Labov et al.'s (2006) Southern region is broad and encompasses most of the former Confederate slave holding states and the Appalachian Mountain regions of Tennessee, Georgia and western North Carolina.

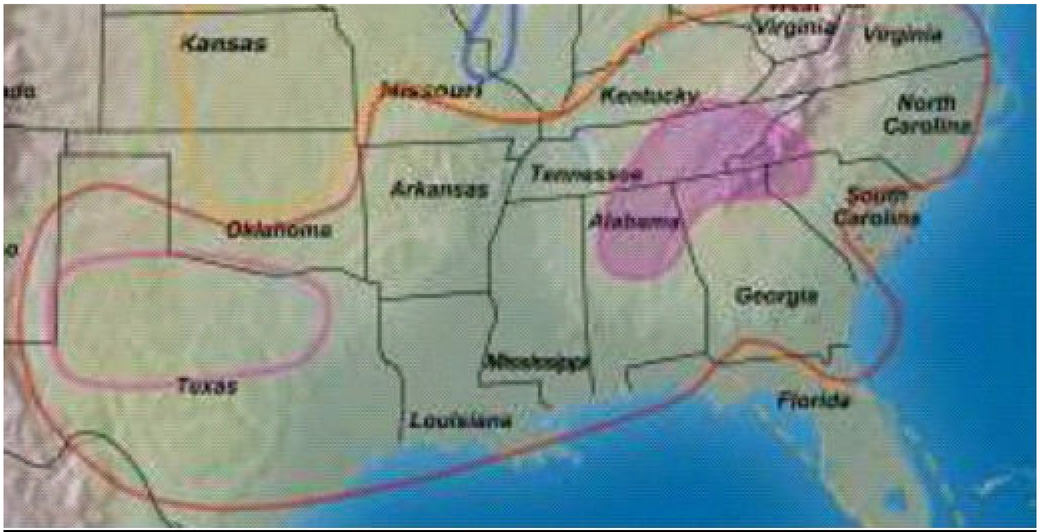

Figure 2 Southern Dialect Area
Southern Shift region outlined (burnt orange).
Stage 3 Inland South (filled in light purple)
The Atlas of North American English Labov et. al. 2006

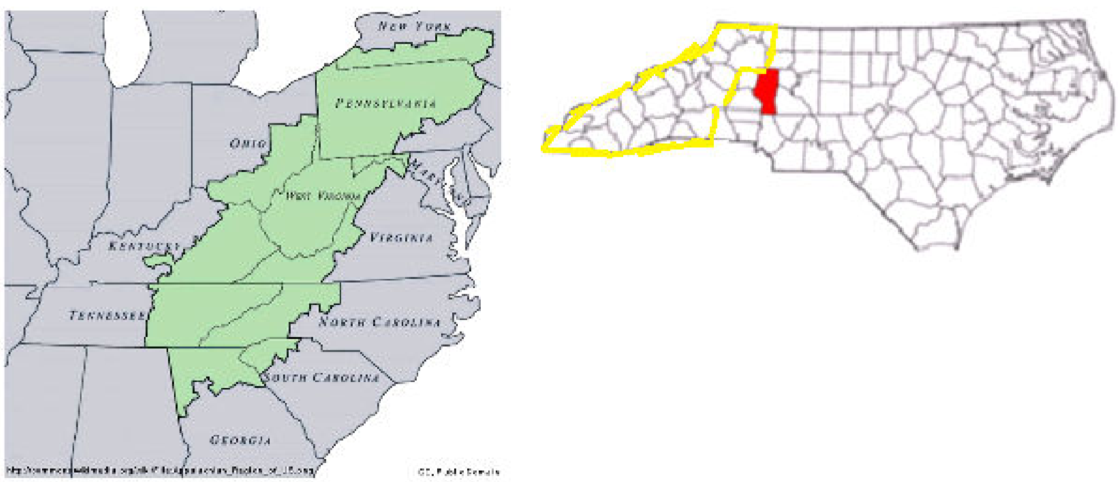

Figure 3 Appalachian Region

The Appalachian Region in green
http://www.scetv.org/index.php/web_of_water/maps/appalachia1/

The North Carolina Appalachian region in yellow.
The community under study, Iredell County, in red
http://northcarolinacountymaps.com/iredell.shtml

The historical development of Southern American English (SAE) phonology is shared by AAE and WVE (e.g., Bailey 2001). Thomas (2008) describes the Southern dialect region as inclusive of the southeastern United States roughly incorporating the north-south corridor from southern Maryland to northern Florida and the east- west dimensions from western Texas and eastern New Mexico to southern Missouri and eastern and southern Oklahoma. Thomas (2008) indicates there is debate as to the outer limits of the South with some researchers including northern West Virginia and southern areas of Ohio, Indiana and Illinois. The region of interest to this work, western North Carolina, is located within the area defined geographically and phonologically as the Southern dialect region. The regional dialect has several well researched features (e.g. /aɪ/ vowel production; vowel controlled /r/; /ɪ/ /ɛ/ merger before nasals). While the realization of these features is locally dependent and varies between rural and urban speakers in the southern United States, the use of these locally defined features mark the speaker as a Southerner.

Dialect geography was an early linguistic system developed to identify quantitatively, dialect boundaries through linguistic commonalities such as vocabulary and grammatical constructions (e.g., Kurath 1949). More recently researchers have used phonological variation to describe and define Southern American English (SAE). The SAE vowel system has been extensively described by Thomas (2008) and Bailey (2001, 2008). Their research on the speech of rural and urban Southern White speakers has been compiled and a portion is presented below. Of particular interest to this work are the front vowels /i/, /ɪ/, /e/, /ɛ/,/æ/ and the diphthong /aɪ/ as produced by SWVE and AAE speakers. The expected SWVE productions listed by age group, community size and conditioning factors are presented in Table 1 below. See Appendix A for a more extensive list.

The column headings and abbreviations are identified as follows: **RSW** (Rural Southern White), **UR-SW** (Urban Southern White), **SWVE** (Generally produced by Southern White speakers), **AGE** (variable production by age group) **CONDITION** (is the variant conditioned, if so by what) **STATUS** (when and by who a feature was conditioned, current usage), **OLDER** (production realized by older speakers), **YOUNGER** (production realized by younger speakers).

Table 1 Front vowels /i/ /ɪ/ /e/ /ɛ/ /æ/

WORD CLASS	**OLDER**	**YOUNGER**	**Condition**	**GROUP**	**STATUS**	**SOURCE**
FLEECE	i̞i ~ ɪi	i̞i ~ ɪ̞i	NO	RSW	common diphthong	Thomas 2008
FEEL	i̟i	i~iə~i̞i	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
FILL	ɪ~ iə	ɪ~ iə ~ ï	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
MIRROR /NEARER	ɪ ~ _i	_i	NO	RSW	scarce published evidence –young white Southerners in general appear to merge these	Thomas 2008

Table 2 Front vowels

KIT	i~iə ~ ̈ɪ	ɪ ~ iə	stress [tensing and raising in heavily stressed syllables; remains /I/ under weak stress]	RSW	part of the SVS noted in Labov 1991	Thomas 2008
happY	ɪ ~i	ɪ	NO	RSW	/ɪ/ production highly recessive	Thomas 2008
HORSES	ɪ ~ï	ɪ ~ ï	NO	RSW	affected by co-articulation of neighboring segments	Thomas 2008
PIN/PEN	ɪ ~ iə	ɪ ~ iə	merger of /ɪ/&/ε/ before nasals **RECED-ING IN UR-SW**	RSW *SWVE* **UR-SW**	began late 19th century spread during the 20th century; recessive in some areas 2nd education **EXPANDING IN RSW**	Thomas 2008 *BAILEY 2001* **TILLERY BAILEY 2008**

Table 3 Front vowels

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
DRESS	e~eə~eəi	e~ eə	variation related to the SVS; under heavy stress before /d/ middle aged and older speakers show triphthong; before nasals production consistent with PIN/PEN and LENGTH	RSW	/ɛ/ or /e/ if participating in the SVS	Thomas 2008
FELL	e~ ei	E	merger before /l/ *SWVE*	RSW	merger occurs less often than FEEL/FILL [i/I]	Thomas 2008 *BAILEY 2001*
FAIL	ei~æ_ ~ ei	ei ~ e	merger before /l/ *SWVE*	RSW	merger occurs less often than FEEL[i/I]	Thomas 2008 *BAILEY 2001*

Table 4 Front vowels

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
MARY	ei ~ ε	ẹ	AGE variant before /r/	RSW **UR-SW**	MARY/MERRY precedes merger with MARRY	Thomas 2008 **TILLERY BAILEY 2008**
TRAP	æ~ æε æ	æ	conditioned + AGE variant	RSW	[æ_εæ_] before/d/ & /n/. Speakers born between WWI and WWII may raise to [ε]	Thomas 2008
BATH	æε	æ	AGE	RSW	White Southerners born prior to WWII distinguish BATH and TRAP	Thomas 2008
DANCE	æε	eɔ	AGE + Geography younger Southerners do not distinguish BATH and TRAP	RSW	Variant by region [æ_ε] w or w/o up glide AND [ɑ:]	Thomas 2008
AND	æ~ æε æ	eɔ	AGE	RSW	young white Southerners raise [æ] before nasals; older Southerners use the listed tripthong	Thomas 2008

Thomas (2008) indicates the BATH and DANCE class are indistinct for most young Southerners. For SWVE speakers born prior to WWII the [æ̱ɛ] production is the most common realization although [æ̱e] and [aæ] may also occur. For speakers who differentiate these forms pairs such as *pass* and *pace* are distinguished by the height of the glide. The BATH class has a mid height vowel while the FACE class is produced with a high glide.

Table 5 Diphthong /ai/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
PRICE	ai~aːæ ~a~ ɑːe ai	ai~aːæ~ aː **full diphthong**	before vcls consonants *BEFORE VOICED OBS AND FINALLY* **all environ-ments**	RSW *SWVE* **UR-SW**	monophthong – glide weakened before voiceless consonants, before liquids: geographically and socially restricted by class, more so in urban than rural areas. Began in 19th century	Thomas 2008, *Bailey 2001* **Tillery Bailey 2008**
PRIZE	aːɛ~ aːæ~a	aːɛ ~ aːæ~aː **full diphthong**	see PRICE **all environ-ments**	RSW **UR-SW**	see PRICE	Thomas 2008 **Tillery Bailey 2008**

The above list provides information on the phonology of the front vowels and the diphthong /aɪ/ exhibited by many rural and urban SWVE speakers. Of interest to this discussion are the movements of the front vowels identified by Labov et al. (1996, 2006) as the SVS. These are /aɪ/ monophthongization and the reversal of the relative positions of /e/~/ɛ/ and /i/~/ɪ/. These movements are widespread in the Inland South, the dialect region is adjacent to Statesville/Iredell county, the community under study, as shown previously in Figure 3 above, highlighted in red.

Variation and change in Southern Black and White speech

The linguistic structures of African American English have been examined since the earliest descriptions of the dialect (e.g. Labov 1966, Wolfram 1969, Lanehart 2001, Green 2002,). AAE syntax and morphology (e.g. Fasold 1972, Labov 1972, Mufwene 1992, Green 1993, 2000), prosody (stress and intonation) (e.g. Kochman 1972, Tarone 1972, 1973,Wolfram and Fasold 1974, Baugh 1999), along with pragmatic features such as speech acts and ritual insults (e.g. Smitherman 1977, Morgan 2001, Troutman 2001) have also been the focus of substantial research. Less research has focused on the phonology of AAE and limited research has assessed the AAE vowel system. Many of the studies completed on AAE phonology have resulted in feature lists that differentiate AAE from Standard English. Green (2001) defines many of these. The list is limited and focuses primarily on consonant changes identified as expected phonological processes in AAE. It must be noted some of the phonological variations result in morphological change: final consonant deletion (e.g. *post*→pos *; wasp*→was*; bold*→bol ; *missed* → mɪs;

jumped→ʤʌmp); consonant cluster reduction preceding a suffix (e.g. *accept+able →accepable*; *soft+ness →sofness; cold+er→coler; spend+ing→spening*); consonant voicing alternations (e.g. *back→bag*; *cab→cap* OR *cap→gap*; *feed→feet*; *pig→pick* OR *pick→big*); vocalization of /r/ and /l/ (e.g. *court* →ko:t ; *cold* →ko:); substitution of t/d and f/v for (ð/θ) (e.g. bath→baf; bathe→bav; these→dese; with→wif; OR with→wit; OR with→wid); substitution of /n/ for /ŋ/ (e.g. jumping→jumpin'); substitution of /skr/ for /str/ (e.g. street→skreet). Minimal information is provided in Green (2002) on the vowel productions of AAE speakers with no information provided on front vowels or the diphthong /aɪ/ production.

Only limited phonological and phonetic data on the vowel system of Southern AAE speakers is presented in Table 4 below. The presented data is for the AAE front vowels /i/, /ɪ/, /e/, /ɛ/, /æ/ and the diphthong /aɪ/. These data were gathered from a variety of sources although Thomas (2008) and Bailey (2001) were primary. A longer list of AAE vowel productions is presented in Appendix A. Only data gathered from AAE speakers living in areas associated with the previously described Southern dialect region is included.

The clear delineation of vowel productions by speaker index (e.g. Rural/Urban) presented previously in the description of SWVE is not available in the presentation of Southern AAE. Only recently (e.g. Thomas 1986, Bailey 2001, Cukor-Avila 2001,Wolfram and Thomas 2002, Fridland 2003, Childs, Mallinson and Carpenter 2006) has Southern AAE been evaluated in contrast with local dialects of WVE. The ability to compare data gathered from regionally compact groups of AAE speakers will provide for an empirically strengthened argument on divergence within AAE and the divergence of SWVE from AAE.

Table 6 AAE Front vowels /i/ /I/ /e/ /ɛ/ /æ/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
FLEECE	deaf→ [dif]				has not disappeared in AA speech as quickly as in EA speech	LAGS 29%AA 13% EA
Field [i→ɪ] *sale* [e→ ɛ]			merger before /l/	EA speakers in Texas	EA more likely than AA speakers to show laxing of vowels (laxing is correlated with merger of the corresponding lax vowels)	Bernstein (1993)
heel/hill [i/I]			merger before /l/	AA more likely to show merger than EA	Throughout the US	Labov et. al. (2006)

Table 7 AAE /ɪ,e/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
DRESS/KIT			tense and raised	SWVE/AAE		Thomas (2008)
FACE/ DRESS reversal				SWVE/AAE	occurring in AAE	Fridland (2003); Fridland and Bartlett (2006); Andres and Votta (2006)
FACE	[feːs]		Monophthongal productions; more strongly correlated with areas having high concentrations of AA speakers and not correlated with Ulster Scots settlements	EA and AA born in the mid-late 19th century	Primarily found in speakers born before World War I; persisted longer in some regions—southern Louisiana (Thomas 2008)	Dorrill 1986 a, b using LAMSAS data; Thomas and Bailey (1998) using acoustic analysis of ex-slave recordings
FACE		[ɛi]	Lowering ; Extreme lowering	AAE SWVE	common in AAE;	(Thomas 2008)

Table 8 AAE /æ/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
TRAP	jaundice→ .[jændɪs]				has not disappeared in AA speech as quickly as in EA speech	LAGS 32%AA 13% EA

Table 9 AAE Diphthong /aɪ/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
PRIZE/PRY			lowering and glide weakening before vcd consonant	typifies southern EA in areas where plantation culture once dominated esp. among higher social classes; also typifies AAVE	ongoing; well documented in AAE(LAGS)	Reported in Thomas (2008) from data presented in McNair (2005); see also Kurath and McDavid (1961); Pedersen et.al. (1986-1992); Thomas (2001); Labov et.al. (2006)

Table 9 continued AAE Diphthong /aɪ/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
PRICE/PRIZE /PRY	right→ [ra:t] night→ [na:t]		Lowering and glide weakening in all contexts	most common in SWVE areas where the plantation culture never dominated (e.g. Appalachia , Ozarks, Piney Woods, from southern GA to northern FL,southern MS, Texas, southern OK); also in SWVE in other areas among lower social levels.	AAE glide weakening before vcls consonants less common LAGS data EA 8% AA25%	Reported in Thomas (2008) from data presented in McNair (2005); see also Kurath and McDavid (1961); Pedersen et.al. (1986-1992); Thomas (2001); Labov et.al. (2006); Bernstein (1993)

Similarities and differences in the Vowels of Southern AAE and Southern WVE

The identification of AAE as regionally variable (e.g. Northern/Southern) is a matter of debate. Early research sought to establish the systematic struture of the dialect and highlighted common phonological features such as those previously listed from Green (2001), along with common semantic and morphosyntactic features (e.g., Labov 1964, Wolfram, 1969). The early descriptions of AAE as uniform and systematic may have served both a linguistic and a socio-political purpose. Regional differences such as differences in the rates of /r/ vocalization for AAE speakers living in New York compared to those in Detroit (c.f. Wolfram 2007, Labov et al. 2006) were never fully explored. The presence of multiple minimally differentiated linguistic structures might have resulted in the recognition of systematic variation within AAE.

Bailey (2001) noted that the features which are similar in AAE and SWVE except for [aɪ] monophthongization are not associated with the Southern Shift (/e/, /ɛ/ and /i/, /ɪ/ reversals). Bailey (2001) states the changes in the use of vowel space consistent with the Southern Shift occurred primarily in the speech of Whites. He furthers this argument by generalizing that the phonological similarities between AAVE and SWVE involve mergers, the (glide) shortenings of offglides in diphthongs and changes in the shape of initial consonant clusters. Differences between the two dialects tend to involve the use of the vowel space. This difference is “perhaps the most important phonological difference between AAVE and SWVE” (Bailey 2001). For evidence of this emerging difference, Bailey (2001) provides the acoustic vowel space plots of an African American female and a White male. Bailey points to the differences in vowel space use by the two speakers as exemplary of the general differences in AAVE and SWVE in the following ways:

1. SWVE has fronted [u] and [ʊ]; in AAVE they remain back.
2. SWVE has fronted onsets of [aʊ]; in AAVE they remain central
3. SWVE has lowered/retracted [e]; AAVE shows minimal retraction
4. SWVE has centralized and/or lowered [o]; in AAVE it remains back
5. AAVE has raised [æ] in all environments, SWVE only before nasals

Bailey (2001) then makes a final statement that the expanding differences in AAVE and SWVE are the result of more recent phonological developments primarily affecting SWVE. The changes in SWVE tend to accentuate the differences between SWVE and AAVE. Bailey (2001) asserts many dialect changes in SWVE began after WWII. During the post WWII period the mergers of [ɔ] and [ɑ], [u] and [ʊ] before [l], and the loss of [h] before [j] developed. Bailey (2001) cited these features as those found almost exclusively in SWVE.

A review of the phonological descriptions of SWVE and AAE presented previously in Tables 6 through 10 does not support Bailey's (2001) assertion that the features which are similar in AAE and SWVE except for [aɪ] monophthongization are not associated with the SVS. Laxing of /e/ to /ɛ/ was found in contemporary studies of AAE by Bernstein (1993) in Texas; Fridland (2003), Fridland and Bartlett (2006) (Memphis, Tennessee). Andres and Votta (2006) (Roswell, Georgia) found /e/, /ɛ/ reversal in AAE. The reversal of /e/ and /ɛ/ is one component of the SVS. The finding that this process is occurring in AAE in Texas, Tennessee and Georgia indicates AAE participation in the SVS may be more widespread than Bailey (2001) describes.

Research by Labov et al. (2006) indicates AAE speakers living in the 48 contiguous United States are not participating in the regional sound change events (e.g. NCS and SVS) at a rate consistent with WVE peers. These regional sound change events are hypothesized to be moving the regional WVE dialects farther apart (Labov 1994, 1996; Labov et. al. 2006). Although the identified systematicity of AAE has been validated in works by Labov (1964) Wolfram (1969), Wolfram & Shuy (1972) among many others, variation within AAE at the segmental, suprasegmental and subsegmental levels has not been fully explored. This compilation of acoustically analyzed data from rural AAE speakers living in a bi-racial community will provide a data set to which other groups of AAE speakers can be compared.

The Southern Vowel Shift

Recent sociolinguistic and sociophonetic studies of Southern American English have found varying participation for Southern speakers in the vowel movements known as the Southern Vowel Shift (SVS). The SVS was redefined in Labov et al. (2006). Previously described as Pattern 4 (Labov, Yeager and Steiner, 1972) and listed as a configuration of vowel movement characteristic of West Germanic languages (Kim and Labov 2002) the SVS is a vowel rotation that applies only to systems with several front upgliding vowels realized phonologically as the long vowels, and several phonologically short front vowels. The triggering event for the SVS is the change of /aɪ/ vowel from a front upgliding diphthong to either a back upgliding diphthong (Route 1) or to a long ingliding vowel. In the second instance the diphthong becomes a long (e.g., tense) monophthong /aɪ → a:/ or /aə/. Labov et al. (2006) explains:

> "The /a/ in /aɪ, aw, ah/ is frequently represented by a low central vowel in many dialects, but at the abstract level of the initial position it is a back vowel opposed to /æ/. In the majority of North American dialects, the nucleus of /aw/ is front of center....a chain shift in Southern English, initiated by the diphthongization of long open-o words forces a structural re-interpretation of initial /aw/ as /æw/."

The SVS in the vowel space of Southern American English has been defined with respect to the general principles of chain shifting of vowels as described in Labov, Yeager and Steiner (1972). In applying the principles of chain shifting to encompass impressionistic phonetic descriptions, evidence from historical linguistics as well as spectrographic analysis of the first two formant frequencies of vowels (F1 and F2) is completed. Labov et al. (1972) provide an extension of the three chain shift principles:

Principle I. In chain shifts, tense vowels rise.

Principle II. In chain shifts, lax vowels usually fall, particularly the lax nuclei of upgliding diphthongs.

Principle III. In chain shifts, back vowels move to the front.

In defining tense, lax and chain shift the authors state the following. Tense and lax refer to aspects of vowel production.

> "There is no proposal here to identify tenseness with peripherality, since there are obviously central vowels which are long steady-state monophthongs with all other properties of tenseness. But for the front and back vowels we find that those properties associated with tenseness regularly accompany extreme position on the two-formant plot, approaching the outer perimeter of phonological space. We can therefore translate Principles I and II into forms that can be corroborated on our two formant displays:
>
> **Principle I′.** In chain shifts, peripheral vowels rise.
>
> **Principle II′.** In chain shifts, non-peripheral vowels usually fall.

The rise and fall of vowels in the F1 by F2 plane is defined as a change in height in the nucleus of the vowel, where vowel height is defined as either F1 or the weighted value 2F2-F1. Peripherality is defined as either F2 or the weighted value 2F2+F1. A chain shift is defined as a change in the position of the two phonemes or allophones in which one, the leading element, moves away from the original position either into an unoccupied space (pull-chain) or due to the movement of the final element moving into a space already occupied (push-chain) requiring the movement of the other elements in order to maintain phonological distinctiveness. In either case, since both elements in the shift move in the acoustic vowel space area, chain shifts preserve the distinctive relationship of the two elements.

The SVS is currently characterized by Labov as only the movement of the front vowels and the diphthong /aɪ/. The change involves changes in vowel height of the tense vowels /i/ and /e/ and the lax vowels /ɛ/ and /ɪ/. The most recent definition of the SVS, explained in detail in Labov et al. (2006), describes changes in the Southern vowel system as changes occurring in two separate subsystems.

The first subsystem affects movement of the front vowels /i/, /ɪ/ and /e/, /ɛ/, /aɪ/. The raising of the front vowel /æ/ is currently considered to be occurring throughout the U.S. and not confined solely to Southern speakers. In stage 1 /aɪ/ *bite* is removed from the front upgliding vowels and becomes a monophthong, often with a slight fronting of the nucleus. In Stage 2 /e/ *bait* lowers and centralizes moving from a peripheral (outside) position to a non-peripheral (inside) position. At the same time /ɛ/ *bet* fronts and raises moving from a non-peripheral to a peripheral position. The final result of stage 2 is the reversal of /e/ and /ɛ/ in the vowel space. This reversal is measured by assessing the difference in Hz values of F2 and F1 of /ɛ/ and /e/. When the difference of $F_2ɛ$ -F_2e and $F_1ɛ$-F_1e are both positive Stage 2 of the SVS is complete. Simultaneous to these movements a complementary movement occurs with /æ/ (*bat*) fronting, raising, and ingliding. The vowel moves up from the bottom of the front vowel space concurrent with the rise of /ɛ/. In stage 3 /i/ backs and lowers to the non-peripheral track while /ɪ/ fronts and raises in to the peripheral position in the F1 by F2 vowel space. The final result of stage 3 is the relative reversal of /i/ and /ɪ/ in the vowel space.

The second subsystem change is defined as the Back Upglide Shift. In this chain shift /aʊ/ is fronted to /æʊ/ in words such as *out* or *mountain*. The vowel /ɔ/ glides toward /aʊ/ in words such as *caught*, *law*, or *off*. The vowel movements of the Back Upglide Shift result in a reorganization of the initiating forms /aʊ/, /ɑ/ and /ɔ/ however these phonemes retain their distinctiveness.

Earlier descriptions of the SVS identified the fronting of the back upgliding vowels /u/ and /o/ as part of the chain shift. Labov, Ash and Boberg (2006) report this pattern of back vowel fronting is not specific to the South, but is affecting to some extent almost all North American dialects, although /o/ fronting is maximal in Southern speakers. This dissertation will only explore the front vowel changes.

AAE and WVE in the South

Evidence in support of the SVS and in discussion of the convergence and divergence of the vowel systems of AAE and SWVE speakers in the South has been reported by a number of researchers. Bailey (2001) outlines his perspective on divergence by suggesting many of the features shared by AAE and SWVE not found in other dialects of American English either emerged or became widespread in the post Civil War era during the last quarter of the 19th century. These features are the merger of /ɛ/ and /ɪ/ before nasals, glide shortened /oɪ/ before /l/ and glide shortened or monophthongal /aɪ/ before voiced obstruents. Bailey(2001) credits the spread of these features within AAE and SWVE as the result of the daily close contact of the groups during the late 1800s. Bailey asserts that following the Civil War many SWVE speakers were drawn into the farm tenancy systems as tenants. This process brought AAE and SWVE speakers into close daily contact. He states the increased contact may have had significant linguistic consequences.

Using data from AAE and SWVE Texas speakers participating in a January 1989, Texas Poll, Bailey (1993, 2001) provides a chronology and percent of use by ethnicity (Black/White) for a subset of features of Texas speech. Of particular interest are the features emerging in the period from 1930 to post-1960. These features are the merger of /ɪ/ and /ɛ/ before /l/, constriction of post vocalic /r/, the merger of /ɔ/ and /aʊ/, and monophthongization of /aɪ/ before voiceless consonants. For each of these features, White respondents showed a significantly greater use of the listed features than Black respondents. White speakers used each of the features in 20% to 90% of possible utterances per category while Black speakers used the features in 1% to 39% of possible utterances per category. Bailey (2001) cites the lack of innovative feature use (features emerging between 1930 to post-1960) by Black speakers as evidence of the divergence of SWVE from AAVE during this post WWII period. Bailey (2001) attributes the remaining differences in AAVE and SWVE as a reflection of either the more conservative nature of AAVE or a result of changes in the final singleton consonants produced by speakers of AAVE. He cites the persistence of *r*-lessness and upgliding /ɔ/ as conservative features of AAVE and the deletion of final consonants in words like *five* and glottal co-articulation with devoiced final stops ([bæʔt for *bad*) reflect changes in final consonant production.

Aspects of Bailey's (1993, 2001) argument on the divergence of AAE and SWVE are related to the ideological construct of a pan- or supraregional AAE used by African-American speakers. The argument for a supraregional AAE is not clearly supported by the current evidence. The definitions for who speaks AAE and the contexts in which it is spoken, the existence and status of a standard and a vernacular form of AAE and a clear and concise description of AAE phonology are not in evidence. Lacking these elemental facts of the dialect a clear statement of trajectories of change within AAE and between AAE and WVE is premature.

Further argument on the status of AAE is present at the intersection of language ideology and linguistic evidence. Wolfram (2007) addresses this intersection of ideological construct and linguistic evidence, citing Johnson (2001:606) “Linguists, [like all other interested social actors], are ideological brokers [bidding for] authoritative contextualization […] trying to influence those readings of language debates which will eventually emerge as dominant.” In particular Wolfram (2007) argues sociolinguists have unwittingly created myths regarding AAE, including the supraregional myth, the unilateral change myth and the social stratification myth.

The acknowledgment of AAE as a systematic rule governed system required an ideological acceptance of the dialect as a different not deficit variety of English. Incidents such as the Ann Arbor case (Center for Applied Linguistics 1979) and the Oakland Ebonics controversy (Rickford 1999, Baugh 2000) provided ideological capital for AAE as a distinctive variety of American English. The acceptance of broad similarities in the phonology and morphosyntax within AAE, regardless of speaker socio-economic class or community of residence, brought focus to the cross country feature consensus of AAE as compared to Standard American English. This focus on intra-dialect congruence left little ideological capital to explore how regionally distant speakers of AAE might maintain or create differentiation within the dialect.

Wolfram (2007) suggests the supraregional myth grew out of the early canonical studies of AAE which focused on dialect use in an urban, non-Southern context. Papers by Labov, Cohen, Robins and Lewis (1968) and Wolfram (1969) among others focused on the similarities. Recent studies completed in a variety of geographic settings are more representative of the regional and social demographic diversity of AAE speakers, particularly in the rural south. Papers by Bailey (2001), Mallinson and Wolfram (2002) and Carpenter (2004) are examples of such recent work. Wolfram (2007) cites morphosyntactic traits of invariant/habitual *be* , copula *be* absence, lack of plural –s and possessive –s ; and phonological features of syllable final consonant cluster reduction, labialization of interdental fricatives, and post vocalic *r*-lessness as commonly cited "core features" of AAE. Wolfram (2007) continues "[a]lthough regionality in AAE was admitted in statements such as 'there are no doubt regional differences not yet charted' (Labov, 1972), statements such as this were "practically ignored in presentations and discussions of AAE." Discussion of a supraregional vernacular AAE supersedes discussions on regional diversity in AAE. The supraregional core of AAE has become a fundamental component of the AAE canon. Wolfram (2007) disputes this fundamental view and cites as analogy the contrast of American English to British English. The contrast of American English and British English as types fails to acknowledge the multiple dialects of British and American English and thereby decreases the significance of variation within either dialect, a similar point can be made when contrasting AAE to WVE.

The view that AAE is changing in a singular systematic way across time and geography is not supported by the evidence. Wolfram (2007) cites factors which should be considered in any analysis of change in AAE. These include the regional setting, the size of the community under study, macro- and micro- sociohistorical community events, patterns of community contact with adjacent European American communities and with external African American communities, intra community social divisions, and community cultural values and ideologies. Wolfram (2007) further notes the choice of linguistic variables is also a factor, as different linguistic variables may follow different patterns of change due to the linguistic composition and the sociolinguistic status of the variable.

Three patterns of change have been found in AAE; Hyde County in Eastern NC, in Beech Bottom and Texana in the Appalachian Mountains of NC. Morphosyntactic and phonological data collected from Hyde County AAE and SWVE speakers illustrate a pattern of parallel development in both dialects up to the period of integration, around 1960-1970; a period of convergence during the 1970s-1980s; and dialect divergence in the post-integration period approximately 1980 onward. In Beech Bottom Wolfram (2007) found a flat pattern of change in the morphosyntax and phonology of AAE compared to SWVE. The difference between AAE and the local SWVE (AppE) began decreasing around WWII and has continued through the integration and the post-integration period. AAE speakers in the Beech Bottom region of Appalachia are increasing their use of AppE features while their use of AAE dialect features remains flat. In Texana the change in morphosyntax and phonology of AAE and SWVE had been convergent through the period of integration but has begun to diverge since that time. These three trajectories of change, both divergent and convergent between AAE and SWVE are interesting in their own right; however a focus on the relationship between AAE and SWVE fails to address the question of dialect diversity within AAE. This question has not yet been empirically evaluated.

Variable Selection

The purpose of this dissertation is to evaluate similarities and differences in the vowel productions of AAE and WVE speakers in a small town in western North Carolina and to assess community participation in the SVS. In order to examine both questions six phonetic elements will be measured and analyzed. These are the vowel pairs /i,ɪ/ and /e,ɛ/ the vowel /aɪ/ and the vowel /æ/. The vowels /i ,ɪ, e, ɛ, aɪ/ are identified by Labov et al. (2006) as the vowels of the SVS. The initiating movement, Stage 1 of the SVS is removal of /aɪ/ from the ingliding and upgliding pattern of diphthong production. Labov et al. (2006) have identified two patterns of change in /aɪ/ vowel production which will create room in the vowel space for Stage II reversal of /e, ɛ/ and Stage III reversal of /i, ɪ/ to occur. When vowel /aɪ/ becomes a monophthong the trajectory of the diphthong movement from /a/ and /ɪ/ is reduced. In Route I the vowel /aɪ/ remains in the bottom of the vowel space, produced as monophthong /a:/ allowing space for Stage II and III to occur. In Route II the nucleus of /aɪ/ vowel backs and raises. The nucleus of the diphthong is produced in a lower mid or mid position. This second pattern of raising and backing has been found in speech sampled from eastern North Carolina.

As illustrated in Figure 4 below the General American English production of /aɪ/ as a diphthong (black line) requires use of a relatively large portion of the working front vowel space as the diphthong moves through the production space that both /i/ and /e/ vowel would use as they reverse position with /ɪ/ and /ɛ/ (Figure 5). When /aɪ/ is produced as a slightly raised or fronted monophthong (gray circle Figure 4), as a fronted monophthong or as a diphthong with a backed and raised onset (Figure 5) the incursion of /aɪ/ into the reversal space for /i/ and /e/ does not occur.

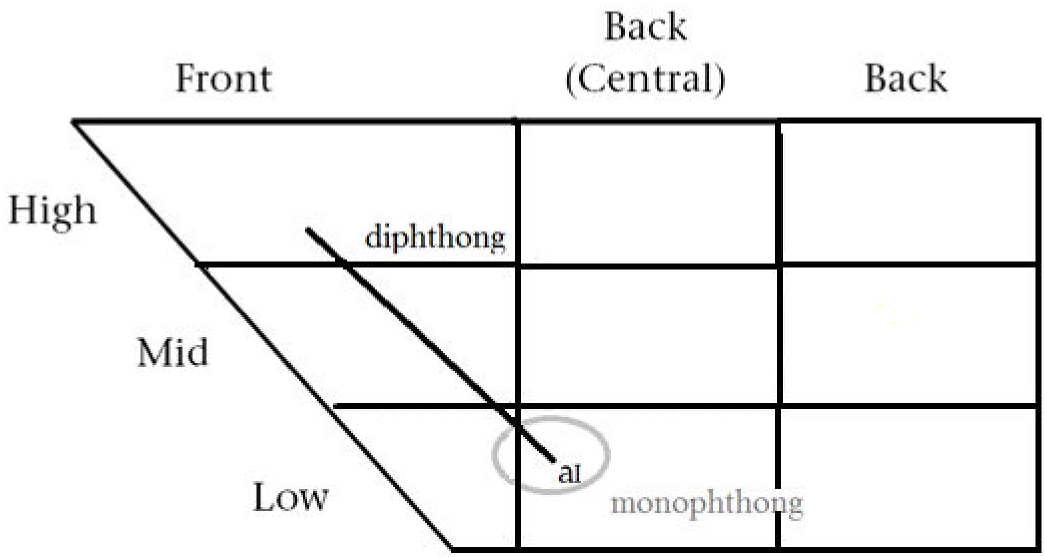

Figure 4 /aɪ/ vowel trajectory General American English

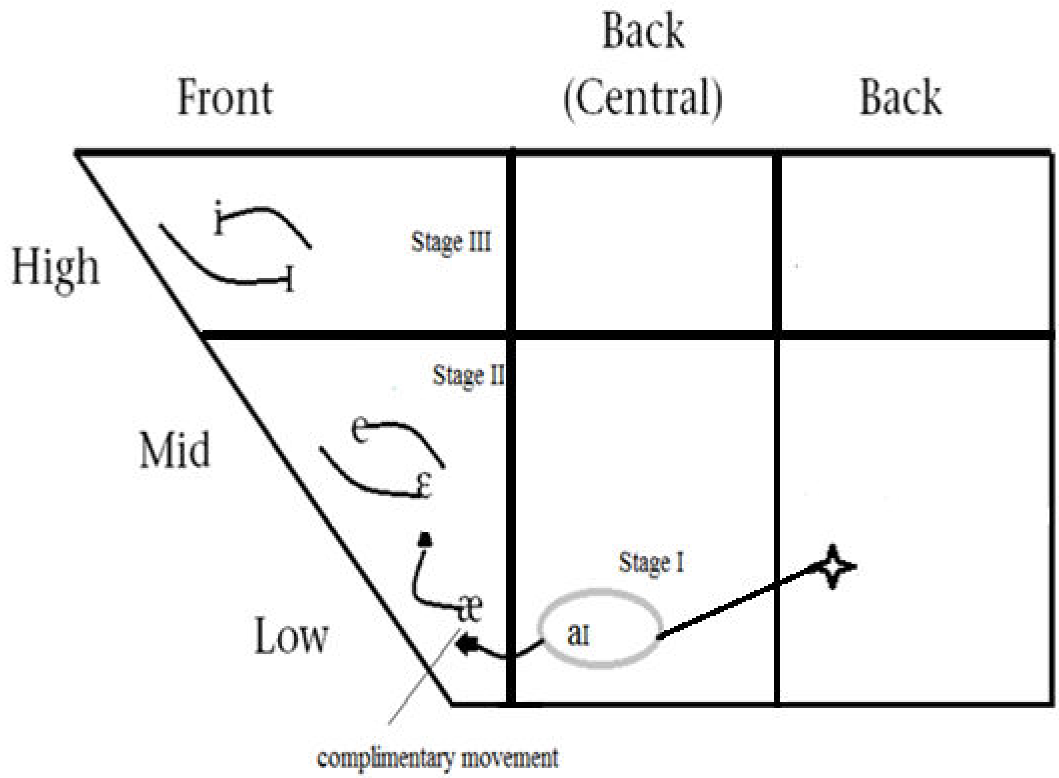

Figure 5 Three Stages of the SVS

According to Labov et al. (2006) the fronting and raising of /æ/ vowel is a common pattern of production for Southern speakers as a complementary but not a component event in Stage II of the SVS.

The vowels /i, ɪ, e, ɛ, aɪ/ will be evaluated for similarities of production by speaker group and for community participation in the SVS.

Chapter 3: The Community

North Carolina

The settlement history of North Carolina is relevant to this dissertation due to differences in the population demographics of AA and EA speakers throughout the state. For example studies conducted by researchers such as Wolfram, Thomas, Childs and Mallinson and others on isolated and enclave communities on the Outer Banks of North Carolina have found distinctive speech productions specific to that geographic location. AAE speakers living in or near the Outer Banks communities have demonstrated productions similar to those presented by WVE speakers in the same community. In western North Carolina similar findings were made. When AAE and WVE speakers live in the same community they share some dialect features. WVE speakers share features consistent with Southern American English yet they retain local dialect features which distinguish local WVE dialect regions from the NC coast to the NC mountains. The facilitating factors for the development of distinctive local dialects may be related to their relative geographic isolation along with other factors such as the language/dialect of the original community members and the proportion of AA to EA community members. Regional dialect diversity in North Carolina may be related to this population distribution.

The region of the southeast that eventually became North Carolina was initially an English land grant colony. A group of English loyalists, the Lords Proprietors, were awarded the Carolina Charter in 1663. This document established a region bounded by the Virginia border on the North, present day Cape Canaveral, Florida to the South, with East to West boundaries of present day Albemarle Sound and the Pacific Ocean (Powell 1989). The Lords Proprietors were eight English gentlemen whose political interactions proved instrumental in the restoration of the English monarchy. Their influence in restoring Charles I to the English throne was rewarded with the charter for the colony of Carolina.

Establishing both a government, and safe settlements on land already occupied by Native Americans proved to be a very difficult task; however communities on the eastern coast of North Carolina were eventually established. Differences in way of life and allotment of monies resulted in opposing factions in the northern and southern portions of Carolina and on December 7, 1710 the Lords Proprietors decided to appoint a governor of North Carolina independent of the Governor of Carolina (Powell 1989). This event separated Carolina into two parts, North Carolina and South Carolina.

In 1729 King George II took control of North Carolina from the heirs of the Lords Proprietors. This change resulted in easier land purchases for English citizens desiring to move to North Carolina. The ease of land purchase along with the encouragement of slavery by the Crown (purchasers were granted 50 acres of land for every slave brought to work in North Carolina) resulted in a steady increase in population from 1730 until near the time of the American Revolution in 1776. The ease of land purchase and the need for large numbers of workers to prepare and cultivate the land led to a pattern of population growth that encouraged English plantations. Populated with large numbers (> 50) of slaves, plantations from the eastern Coastal Plain of North Carolina to the eastern Piedmont evolved into small communities with high concentrations of enslaved Africans among smaller populations of English landowners (Goldfield, 2005). In 1730 North Carolina had a total population of 30,000 including about 6,000 slaves. By 1800 Blacks outnumbered Whites by a margin of two to one in eastern cities such as Wilmington (http://www.learnnc.org/lp/editions/nchist-newnation/5252).

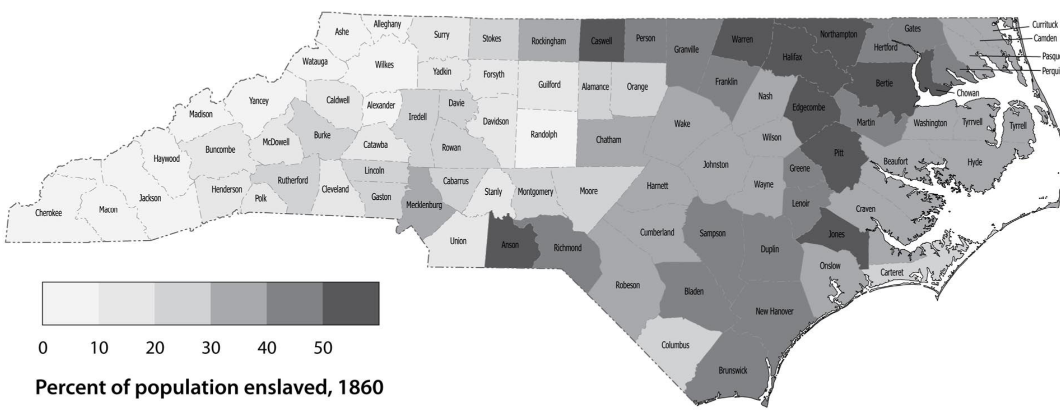

Figure 6 percent enslaved 1860
http://www.learnnc.org/lp/multimedia/12549 Lunk (2009)

While settlement in eastern North Carolina included the development of large plantations, settlements in the west were typically small family farms. Settlement in western North Carolina was actually a secondary migration primarily composed of Scoth-Irish farmers moving down the Great Wagon Road from Pennsylvania. These settlers were moving south in search of affordable land for farming. By 1749 the Scoth-Irish began seeking land grants for property on what is now the border between Iredell and Rowan County. Later English Quakers and German settlers along with secondary migrants from Maryland and Virginia took up residence in Iredell county, so that by 1775 the county was populated by several groups with Presbyterian, Methodist and Baptist churches marking the population variety in Iredell County (Iredell NCGenWeb 2009).

Slavery in western North Carolina, and in Iredell County, was less concentrated than in the eastern counties. Because western NC farms were smaller, less labor was required to cultivate the land. A slave owner in western NC typically owned less than twenty people and sometimes owned only one or two. The percent of the population of people in slavery in 1860 can be seen in the map in figure 6 above (Lunk 2009).

The greatest numbers of enslaved people per square mile were concentrated in the counties along the Virginia border. Only five North Carolina counties had more than 10,000 enslaved people (Edgecombe, Granville, Halifax, Warren and Wake) (Larkins 1944).

Modern Times

Following the Civil War and the Great Migration from the southern states, a large number of African Americans remained in North Carolina. By 1940 Negroes represented less than 30 percent of the total population of North Carolina while Whites constituted 71.9 percent (Larkins 1944). While the total population of Negroes in North Carolina had increased by 1940, the relative number of Blacks to Whites had declined. According to 1940 census records nine counties on or near the North Carolina Virginia border had

Negro populations over 50% these were Scotland, Granville, Edgecombe, Halifax, Bertie, Hoke, Hertford, Northampton and Warren. In western North Carolina 24 counties had Negro populations of less than 10% these included Cherokee, Madison, Yancey, Mitchell, Avery, Macon, Jackson, and Graham. In 1940 70% of North Carolina Negroes and 74% of the White population lived in rural areas. Employment for Blacks and Whites in North Carolina was relatively consistent in the 1940s. According to US census records the three most populous jobs in North Carolina were in agriculture, manufacturing and personal/domestic service. Whites were employed at a rate of approximately 30 % in agriculture and 30% in manufacturing with less than 10% of Whites reporting employment in personal and domestic service. Negroes were employed at a rate of approximately 40% in agriculture, 15% in manufacturing and 35% in personal and domestic service. Neither Blacks nor Whites in North Carolina had large professional classes. Census data from 1940 indicate 4.6% of Negroes and 5.6% of Whites were gainfully employed as professionals. The professional class included school teachers, ministers, lawyers, and social workers.

Educational Opportunities

In a 1944 report on The Negro Population of North Carolina: Social and Economic John Larkins describes the educational system of North Carolina as one of the poorest in the Southeast. He writes (p.44) that North Carolina ranks among the lowest in states according to ability to finance public schools." However, Larkins reported that North

Carolina had more colleges and universities for Negroes than any other state in the United States, although many were private or church supported institutions. In 1944 North Carolina had twelve colleges for Blacks, five state supported, all of which remain open today (North Carolina College for Negroes--now North Carolina Central University; NC A&T State University; Winston-Salem Teachers college now Winston-Salem State University; Fayetteville State Teachers College--now Fayetteville State University; Elizabeth City State Teachers College--now Elizabeth City State University) and seven private or church supported institutions of which four (Shaw University, Livingstone College, Bennett College for Women, and Barber-Scotia College) remain operational in 2010.

Primary and secondary education for Blacks and Whites in North Carolina was not equally funded although the teachers were closely matched in terms of their education and preparation. Using a standard index score of 800 which indicated graduation from a standard college with the required professional training; Larkins reports the average training of Negro teachers in 1941-1942 was 776.4 while the White teacher rate was 792.8. An index score of 700 indicated four years of accredited high school with an additional three years of standard college. Class size in North Carolina elementary schools was 32.5 pupils for both White and Negro teachers. In high schools the rate was approximately 27 students per teacher for Negroes and 24.2 students per teacher for Whites. In the 1940s both Black and White students attended school with an average of more than 90% daily attendance (Larkins, 1944)

In a landmark decision in the case <u>Brown et al. v. Board of Education of Topeka Kansas</u>

(1954), the United States Supreme court required the public schools throughout the United States to be integrated. This decision was not fully implemented in the public schools in Statesville/Iredell county until 1968, some fourteen years following the Supreme Court decision. Federal court records indicate Iredell county schools began a movement toward a unitary school district in 1964. In that year the United States Department of Welfare approved a freedom of choice plan for Iredell County Schools. This plan operated from 1964 through the 1967-68 school year. Under this plan residents of Iredell County were free to attend any school in the county. In February of 1970 Terry Ann Chambers et al. appealed a lower court decision as to whether Iredell County had in fact established a unitary school system. The United States Fourth Circuit Court of Appeals found in favor of the defendants citing a distribution of Black and White pupils by school consistent with the population of Black (23%) and White (77%) students in the school district. In addition, the court found no pattern of racial discrimination against teacher hiring stating "No qualified black teacher applicant has been denied a job by the Board of Education or its staff, and there is no proof in the record of any discrimination in teacher employment" (423F.2d 613 No. 14243). The integration of the public schools in Iredell County and Statesville City resulted in the closing of all of the historically Black schools except one Morningside School which was renamed Alan D. Rutherford Elementary School. This building served as a public school until 2002.

The Community

Statesville is located in Iredell county. The community is less than an hour by car from the major metropolitan areas of Charlotte N.C. (31 miles to the south), and the Triad (Winston-Salem, Greensboro, High Point (42 miles east). According to US census records the population of the city of Statesville is 26,414 (30% AA, 51% EA, 9% Hispanic, with the remainder mixed race or other). Iredell County has a population of approximately 156,000 residents (12% AA, 84% EA). The community is located in the foothills of the Appalachian mountains approximately 100 miles from Asheville, North Carolina. Settled by Scotch Irish Presbyterians and German Lutherans the town of Statesville was founded in 1789. Historically the primary occupations in Statesville and Iredell County were farming/agriculture, with the related industries of textiles (cotton and cloth mills), animal feed mills, tobacco curing and furniture manufacture. In more recent times the mills and furniture manufacturing have declined. According to the report from the 2009 Iredell County Planning Board industrial/manufacturing and retail services are the primary employment in the county. The 2009 median income in Iredell County was $62,873.00 with an unemployment rate of 12.2%.

Statesville/Iredell county residents are likely to live in the town by choice. Two major metropolitan areas lie less than fifty miles away. If residents wish to move to a larger metropolitan area the distance is not great. This close proximity to metropolitan areas provides Statesville residents with multiple opportunities for interaction with persons in those communities. As participation in the SVS has been associated with living in a small town in the Inland South , Statesville/Iredell county is an excellent community in which to evaluate community participation in the SVS. The community is relatively small, population less than 30,000 residents in the city, and the community is near the Inland South.

Principles of Dialect Acquisition

A primary hypothesis of this dissertation is that public school integration during the 1960s and 70s provided opportunities for dialect contact between AA and EA children who would otherwise never have spent time together in extended communicative interactions. This hypothesis continues Bailey's (2001) assertion that daily interaction between Black and White speakers during the farm tenancy period following the Civil War likely had significant linguistic consequences on the speech productions of both Black and White speakers. Due to this linguistic contact it is hypothesized that the vowel systems of both AA and EA children were influenced by each other and that the result of this daily interaction would be a vowel system that is similar along many parameters. Support for this hypothesis is found in Chambers (1992) who hypothesized a set of eight principles for second dialect acquisition of the same language. The principles were generalizations made based on the behavior of six children transplanted from Canada to Southern England. The subjects acquired many features of Southern England English and lost many features of Canadian English. Chambers principles are applicable to the present work as this work examines a possible route of acquisition for the sub-segmental perception and production rules; and the precipitating factors, of an externally motivated vowel chain shift. If AAE and SWVE child speakers in a community are restricted from daily verbal interaction and maintain distinct communication systems it is unlikely the

AAE speakers would participate in the vowel chain shifts occurring in the SWVE community. An area of investigation that has not been previously reported is how these two distinct systems would interact if the children acquiring the local regional WVE and AAE were allowed to interact on a daily basis. This is the pattern of interaction that began in many communities when public schools were integrated.

The gathered data for this dissertation will be examined for consistency with two of Chambers (1992) eight principles. First Principle 2.4 Acquisition of complex rules and new phonemes split's the population into early acquirers and later acquirers. If AAE and WVE speakers maintain distinct dialects with separate rules there is no expectation for similarity in participation of the SVS. The SVS has a relatively complex rule for /aɪ/ monophthongization. In some communities /aɪ/ occurs as a diphthong for all speakers in all environments. In other communities including the one under study (Labov et. al., 2006) /aɪ/ is a monophthong before voiced elements and finally (e.g. *tie, tied, high school*) and a diphthong before voiceless elements (e.g., *tight, bike, etc.*). The rules related to /æ/ raising and the reversal of /i/, /ɪ/ and /e/, /ɛ/ are subphonemic, and occur in stages (Labov et. al., 2006) with /e/, /ɛ/ reversal moving to completion prior to reversal of /i/, /ɪ/. Based on Chambers principle 2.4 and Labov's (2006) model of participation in the SVS , it is expected that the older generation of WVE speakers is fully participating in the SVS while the older AAE speakers are not. Younger WVE speakers would be expected to be early acquirers of the shift while younger AAE speakers would be late acquirers. The SVS model would be available from both the parent group and the peer group for the younger WVE speakers. For the young AAE speakers only minimal aspects of the SVS would be present in the parent group. A more advanced model would be produced by the WVE peer group and possibly by the WVE speaking teachers of the younger AAE speakers.

The second principle to be considered is Principle 2.7 Eliminating old rules occurs more rapidly than acquiring new ones. Chambers (1992) states the process of dialect acquisition involves not only coming to sound more like the speakers of the new dialect, but coming to sound less like the speakers of the old dialect. While Chambers is referencing speakers transplanted from one dialect region to another, this principle may be applicable to children who were kept apart in one generation but allowed to interact in another.

Taking the position posited by Bailey (2001), that AAE and WVE were more alike prior to WWII and began to diverge afterward, we would expect to see a pattern of difference in the vowel systems of AAE and WVE speakers born after WWII and before school integration (divergent group), a pattern of similarity in AAE and WVE for speakers born after 1968 (school integration group) but also a pattern of similarity in AAE and WVE for speakers born before WWII (pre divergent group). This study does not separate speakers into young (school integration), older (divergent group) and oldest (pre-divergent group), but instead separates speakers into two groups pre- integration and post- integration. While data was collected from some speakers born in the 1920s and 1930s (aged 70+ in

2006-2009) the majority of pre-integration speakers were born after WWII.

Conflict, Community Conventions and Divergence

AAE and WVE demonstrate patterns of both divergence and convergence. Wolfram (2007) cites factors such as population density of AAE to WVE speakers, interpersonal interactions, access to public education, literacy, overall community size and the particular grammatical structures evaluated may influence the judgment of AAE and WVE as divergent. In studies completed in both historically isolated and historically majority African American communities in North Carolina, this research group has found three patterns of change in AAE. These patterns are 1) a receding pattern where local dialect features historically shared by both AAE and WVE speakers are being replaced in the AAE community by AAE features; 2) a pattern of receding distinctive AAE features that are being replaced with dialect features more consistent with the regional WVE dialect features; and 3) a curvilinear model where groups of AAE speakers are using either fewer AAE and more regional WVE dialect features or decreasing the use of regional WVE features in favor of the AAE features. Both the strong and the weak divergence hypothesis positions contend that the changes occurring which result in the adoption of features not associated with local regional WVE are 1) due to an exocentric group affiliation among speakers of African American descent and 2) resulting in a broadly defined dialect shared by people with a common ethnic background but no common geographic or interpersonal interaction.

The data in support of this claim have been gathered from a variety of sources including disparate groups of AAE speakers separated by physical location, and age, or from AAE speakers living in isolated, enclave communities or in high density AAE communities. While this evidence may be valid for the communities in which it was gathered it does not provide insight into the motivations for the maintenance of specific features of AAE by specific groups of AAE speakers. The data are also not systematically representative of AAE speakers residing in areas of the US that are neither urban nor enclave (geographically isolated) nor densely populated with AAE speakers.

While the weak position of the divergence hypothesis allows for the possibility of the development of regional variation in AAE patterns 2 and 3 above, neither the strong nor the weak position allow for the development of locally unique AAE features within the community. An important consideration in the possible development of regional variation in AAE is the influence of Black and White contact. Wolfram's studies in North Carolina have indicated a core set of AAE features alongside substantial convergence to WVE in both Hyde County and Appalachian AAE. Both of these areas represent enclave and isolated communities of AAE speakers. Thomas found ethnic differences in a study of /o/ fronting in Wilmington NC. Wilmington is a city in the eastern part of the state with large Black/ White disparities in education and income a recent history of extreme racial violence. It is unlikely Black and White speakers in this city interact without implicit knowledge of these disparities. This type of inherent social conflict, with disparities in wealth and perceived social value may be relevant to the establishment and maintenance of a conflict model of community interaction. For example Wilmington has a recent history of racial conflict. In the 1970's this conflict erupted in racial violence including fire bombings and arson. Several people were arrested (the Wilmington Ten[2]) and spent nearly a decade in jail before being released. The factors of Black/White population density and daily contact, access to education, along with surface and underlying racial tensions are likely to affect the distribution of racially relevant linguistic variables within the dialects as both the frequency and type of interpersonal interactions are likely to be affected by the development and maintenance of interpersonal relationships. These interactions may present as one of several patterns of dialect divergence, convergence or change. All of the North Carolina communities previously cited differ substantially from Iredell County, both in the population percentages of Black and White residents, the distribution of wealth and educational opportunity, and the history of relative racial animosity within the community.

The current study occurs in a stable rural community with no recent history of racial violence and animosity. The conservative nature of the community is expressed in its rural character and in the relative stability of the population. Differences in dialect in the community may be more easily associated with community variation and are less likely to be unduly influenced by disparities in education, wealth, opportunity or aspiration to an external dialect model as AAE speakers living in the community are likely there by choice not circumstance as urban communities lie 40 miles to the south (Charlotte) and 40 miles to the east (Winston-Salem, Greensboro, High Point).

[2]The Wilmington Ten were a group of civil rights activists that spent more than ten years in jail following convictions on arson and conspiracy. The group was eventually freed in 1980 when the convictions were overturned on a technicality. The group counted among its members the Rev. Ben Chavis CEO of the NAACP from 1993-1994.

Chapter 4: Theoretical Framework

Sociophonetics

This dissertation will take a sociophonetic approach to evaluate generational sound change in the form of vowel shift and to evaluate vowel space similarities by gender, age group and ethnicity in a community of rural Southern speakers. Foulkes and Docherty (2006) provide a definition of sociophonetic research as the study of variation where the indexed factor is at least *partially* socially constructed and cannot be fully explained by universal principles such as those of acoustics and aerodynamics. In particular sociophonetic variation refers to variable aspects of phonetic or phonological structure where the production of alternative forms correlates with social factors. Sociophonetics is a method of linguistic inquiry that integrates theoretical aspects of sociolinguistic investigation with the methods of data analysis typical of instrumental phonetics.

Since the mid 1990s the measurement of phonetic variables to explore central questions in sociolinguistics has been an evolving trend. Studies of socially-structured variation have provided multiple opportunities for the examination of fine phonetic detail in the analysis of linguistic variation. Hay and Drager (2007) identify the foundation of sociophonetics in the early work of Labov (1966, 1972) in New York and Martha's Vineyard (1963). These analyses of the systematic frequency distribution of phonetic variables by age, gender, social class, speaker style and integration into the loca community were inspirational in the development of sociophonetics. Further studies by Wolfram (1969); Cedergren (1973); Trudgill (1974); Guy (1981); Milroy (1987) are listed by Hay and Drager (2007) as a few examples of studies of socially conditioned phonetic variation inspired by the early work of Labov.

Variation and the Apparent Time Hypothesis

A major development of these early studies was the apparent time hypothesis (Labov, 1963, 1966, 2001). This hypothesis posited that real time data from early recordings could provide information on changes in speech over time. For example change could be observed by examining the same linguistic variable (e.g. phrase final /ing/ production) in recordings of older speakers and current productions of younger speakers. The apparent time hypothesis assumes an individual speaker's phonological system remains constant throughout adult life. Differences in older and younger speaker's production of the observed variable could represent changes in progress (Bailey 2001, Hay and Drager 2007). This hypothesis was challenged by Harrington et al., (2000, 2005). In this study of Queen Elizabeth's vowel production during Christmas broadcasts made from the early 1950's until the late 1990's, Harrington et.al. (2000, 2005) found a shift in the Queen's vowel system in a pattern consistent with the path of change of younger speakers. Harrington et al. (2000, 2005) findings indicate changes in apparent time must be cautiously evaluated since older speakers may be influenced by ongoing language change, albeit to a lesser extent than younger speakers. This similarity in patterns of change in apparent time by older and younger speakers would likely result in an underestimation of the speed of change (Hay and Drager 2007).

Careful interpretation of data is required to differentiate changes in apparent time from the process of age grading. Labov (1994) describes age-grading changes in individual linguistic behavior over a lifetime within individual community stability. A linguistic variable may be present in the youngest generation of speakers, declining in the middle aged group and nearly absent in the oldest group. An opposite pattern is also possible as younger speakers acquire a linguistic variable as they age. In order to differentiate changes in apparent time from age-grading sociolinguistic information must be included in the analysis. Ethnicity and social class have been effectively used (e.g. Feagin 1979, Labov 1966) to identify age grading in the increasing or decreasing use of stigmatized features by age.

The socially indexed variables used in sociophonetic analysis are typically the same as those used in sociolinguistic studies. These include gender, ethnicity and age. Social class and income have also been successfully used to identify patterns of usage of linguistic forms. Variation within these broadly defined categories has been successfully pursued by researchers such as Eckert (1989 a, 2000). In her study of phonological variation in a suburban Detroit high school Eckert (1989 a, 2000) discovered inter-ethnic and inter-generational variation in patterns of participation in the NCS in a group of WVE speaking teenagers. The variation was based on the teen’s orientation to school and schoolbased activities or to the community and life outside of high school. The NCS is a pattern of vowel change phenomena hypothesized to be occurring in many WVE speakers in the cities of the industrial North (e.g. Detroit, Buffalo). The NCS is phonetically defined by measurements of first and second formant change consistent with the raising of the low front vowel /ae/ *bat* and the lowering and fronting of the back vowels /ɑ/ *bought* and /ɔ/ *cot*. This pattern occurs in concert with the lowering and backing of the front vowels /ɛ/ *bet* and /ɪ/ *bit*, as well as the backing of /ʌ/ *but* perhaps to the position formerly occupied by /ɑ/ *bought*. Eckert's (1989a, 2000) data illustrate that the binary use of index variables may fail to capture group internal phonological variation. Attention to fine phonetic detail can provide insight into group internal socially relevant meaning. The current study seeks to evaluate variation in apparent time by examining linguistic variables produced by speakers from two age cohorts. The first group aged 50+ at the time of recording was selected to encompass community members who had been a witness to the segregation and Jim Crow lifestyle of North Carolina in the 1930s, 40s 50s and 60s, both as children and as young adults. There is no intent in this text to explain these relationships only to define them in the context of the community under study. The second group aged 18-50 was chosen to represent the post integration community members. This younger group was less likely to have participated in racially segregated schooling and social interactions. By examining these two groups of community members it is hypothesized that the influence of group inclusion and exclusion on dialect variables may be explored.

The Speech Community and the Conflict Model

In the Labovian framework a core of common values along with group agreement on the social value of linguistic forms are the bases of a linguistic community. Milroy and

Milroy (1993) recognize this consensus community model but argue that the persistence of non-standard dialects within a community “is more readily interpret[ed] as evidence of conflict and sharp divisions in society than … evidence of consensus.” Citing work completed on English in Philadelphia (Labov & Harris, 1986) Milroy and Milroy (1993) find support for a conflict, not a consensus model in the distribution of linguistic variables. A re-analysis of the Philadelphia data (Labov & Harris, 1986), identified phonological and morphological change occurring as linguistic differentiation alongside the progressive segregation of Black and White networks in Philadelphia. Milroy and Milroy (1993) explain that the use of a conflict model would allow the variables of class and ethnicity to be explicitly related to one another, treated as related variables, or levels of a variable, in this data. In a consensus model class and ethnicity are treated as separate variables. Milroy and Milroy (1993) further this argument by reflecting that "a social class model based on conflict, division and inequality can [better account] than [a] consensus [model, for] many patterns of language variation uncovered by the detailed work of sociolinguists on phonological and morphological variation".

With respect to Southern American English this conflict model of social class can be readily applied. In a discussion with Feagin (NWAV, 2008) on her study of variation and change in Alabama English she revealed, unsurprisingly, that her study consisted only of members of the White community in part, because it would have been improper for her to complete the necessary extended in depth interviews with Blacks. This conversation was contextualized by the implicit social knowledge of two Southern females. It is and perhaps continues to be improper for a young Southern White woman to spend extended time alone with Blacks.

Implicit in studies on Black and White speech relationships in the South is an unspoken and often unrecognized conflict between Black and White people. Any discussion of divergence and convergence in the dialects of Black and White speakers that does not explore the nature of the relationship between the two groups is incomplete. In some Southern communities Blacks and Whites may have a minimal history of conflict and be loosely associated with each other, while in other communities there may be a history of violence and aggression. When violence and aggression are recent in the history of the group consensus and peace in daily interactions may be primarily observed as a convention, necessary for the maintenance of daily functioning and community stability. These issues of racial interaction in the South are rarely explored in sociolinguistic research on variation and change.

The historical convention of slavery is acknowledged but few statements are made regarding the years of racial intimidation and exclusion eventually codified in Jim Crow and Black Laws (Pilgrim, 2000). Even less work addresses the sociolinguistic impact of school integration and the current move to school re segregation through the use of community based school assignments (e.g. Charlotte, NC 2008 and continuing; Raleigh, NC 2010). School integration in many communities was completed via forced bussing. However the integration of housing did not follow in many areas of the United States.

The current movement in many communities towards a neighborhood school model is effectively resegregating the school system as the communities surrounding individual schools remain segregated. Sociolinguistic analyses of these events in Southern history as they relate to any hypothesized convergence and divergence of Black and White speech is lacking[3].

Networks within and across class and ethnic lines are likely to impact the maintenance, transmission and diffusion of dialect variables. Milroy and Milroy (1993) argue that strong informal social ties in a community create an environment conducive to the maintenance of non-standard dialects in rural or urban environments. Within these social networks variables such as class, gender, and network strength interact variably in different communities to express variation and change within that community.

Intracommunity variation

The construct of ethnic identity for African Americans remains a highly politicized matter. The divergence of production patterns in Black and White speakers in rural communities may be more fruitfully explored by appealing to the Principle of Intracommunity Variation. The Principle of Intracommunity Variation as defined in Wolfram & Thomas (2002) theorizes that speakers living in small relatively self reliant communities may show intracommunity variation correlated with local social or ethnic

[3] Bailey 2001 refers to changes in interactions between Black and White speakers in the pre and post Civil War era, but does not discuss the impact of school integration on linguistic change in younger generations of speakers (e.g., post 1960).

boundaries or individual variation. This type of variation was identified in the speech of the sole African American speaker living in a community of Anglo Americans in Ocracoke, North Carolina (Wolfram, Hazen & Tamburro 1997). The female speaker, over 90 years old at the time of the interview, had lived on the island for most of her life. She moved to Philadelphia for a few years as a young adult, but otherwise had always lived on Ocracoke. This lone female AA resident was a member of the sole AA family that had lived on the island for close to 140 years. The speaker did not demonstrate substantial alignment with the majority local phonology. For example, her production of the vowel /aɪ/ remained distinct from the local pronunciation of /aɪ/ as /ɔy/. A comparison of her /aɪ/ productions indicate low rates of ungliding to /a:/. The speaker retains older production of this vowel. She neither fully aligns with contemporary AAE phonology, nor fully aligns with the phonology of Ocracoke Vernacular English (OVE). This speakers lack of participation in the regional OVE productions may be due to her retention of the divergent phonology originally brought to the island with her family. It must be noted that while the AA speaker data analyzed in Wolfram, Hazen & Tamburro (1997) is representative of a speaker from a family living on Ocracoke Island it is difficult to contextualize this speaker as an accepted member of the local community. One of the most striking comments is a quote from an older Anglo American resident that the AA speaker and her sister were known as 'Nigger Mildred and Nigger Muse'. The AA speaker and her siblings were not allowed to attend public school on the island. Her social interaction with other community members was not equitable. The AA speaker recalls "attending" dances at the local community center. Her participation however was standing outside the building listening to the music while looking through the windows to see the other young people dancing. The speaker served as a domestic employee in the homes of Anglo Ocracoke residents. Her life on Ocracoke and her linguistic interactions appear to be largely consistent with the segregation and isolation experienced by many other African Americans in the South.

The discussion of ethnic identity in a rural context is a multi-layered and complex set of arguments explored briefly by Fridland (2003) in her analysis of network strength and participation of African Americans in the Southern Vowel shift in Memphis Tennessee. While Memphis is not a rural community Fridland's (2003) argument for local African Americans to favor a local Memphis identity over a more broadly defined African American identity may be instructive. Fridland's (2003) research found that Blacks in Memphis with the strongest ties to other Blacks were the most advanced in their participation in the SVS, while Blacks with lose ethnic ties were less advanced. She attributed these findings to an index of local Memphis affiliation in the Black speakers with strong ties to the African American community. Strong ties to African American culture would seem to predict low participation in regional vowel chain shifts as the divergence hypothesis suggests these strong ethnic ties are responsible for the movement of some AAE speakers towards a supra-regional AAE. The problem with the application of the divergence hypothesis to Fridland's (2003) data, however, is the reasoning that only Black speakers with strong ties to other Blacks would index local affiliation. Again the question of system internal features in AAE that promote the elements of vowel rotation associated with the SVS arises.

Wolfram and Thomas (2002) discovered both dialect convergence and divergence in the speech of African Americans and Whites in Hyde County North Carolina. Hyde County is a rural coastal community known to have been settled by Europeans around 1710. By 1754 Hyde County reported 183 slaves. African Americans have been continuous residents in Hyde County since their first arrival as slaves. The population of African American residents reported for Hyde County in 2000 had decreased from the high of 44.3% recorded in the 1890 census records. The percentage of African Americans in relation to Whites has remained between approximately 20% and 40% for close to 300 years.

Wolfram and Thomas (2002) provide the results of morphosyntactic and vowel space analyses completed on speech produced by a total of 49 speakers divided into four age groups. The 35 AAE speakers were represented as follows: young 14-23 years (12 speakers); middle-aged 32-43 years (6 speakers); senior 55-70 years (6 speakers); elderly 77-92 years (6 speakers). The 14 WVE speakers were represented: elderly 77-92 years (6 speakers); young 15-27 years (8 speakers). Only subjects judged to be vernacular dialect speakers were used.

The features analyzed were specific to either the Pamlico Sound dialect or to AAVE. Features examined for the Pamlico Sound dialect: past tense leveling to *weren't*; 3rd person plural *–s* marking; and for AAVE: copula/auxiliary absence and 3rd singular *–s* absence. These structures were examined in four generations of AAE speakers and two generations of WVE speakers to determine patterns of convergence and divergence in the dialects of Black and White speakers across time.

The distinctive Hyde County vowel productions of /oɪ/,/aʊ/ and /o/as in *tide, out,* and *coat* can be realized in the following ways: /oɪ/ as in *tide* can be produced as [ɑe~ɒe~ ɑˆe]; /aʊ/ as in *out* can be realized as [aɵ ~aɞ] gliding straight up; or as the front un-rounded glides [ae~aɛ]; or as the front rounded glides [aɵ ~aɞ]. The oldest variant production of *out* is [aɵ ~aɞ] and [ae~aɛ] represents the youngest. The vowel /o/ as in *coat* in Hyde County is typically fronted with the nucleus typically shifted to a central position. The nucleus of /o/ may be slightly lowered.

The analysis of vowel productions of older and younger AAE and WVE speakers in Hyde County revealed a pattern of decreasing distinctiveness in the vowels produced by WVE speakers. Over the generations the WVE speakers have been losing the distinctive productions of /aɪ/ and /aʊ/ while retaining fronted /o/. The pattern of /o/ fronting is widespread in the South.

AAVE speakers in Hyde County show /aɪ/ production before voiced obstruents consistent with other published reports of AAE production. The pattern for /aʊ / and for /o/ production for the Hyde County AAE speakers evolved from /aʊ/ produced as [ao~ɑo] for Older AAE speakers to [aː ~ aɐ] for younger Hyde County AAE speakers. The production of /o/ was [ɜu] for both older AAE and younger AAE speakers. The Hyde County AAE productions were considered by Wolfram and Thomas (2002) to be more consistent with local WVE productions in other parts of the South.

Wolfram and Thomas (2002) found evidence of both convergence and divergence in their apparent time analysis of the speech of AAE and WVE speakers in Hyde County. Although Wolfram and Thomas (2002) conclude AAE in younger Hyde County speakers is moving toward non local patterns of AAE production they also discuss the commonality present in vernacular dialects around the world. This unifying property proposed in Chambers (1995) and reported in Wolfram and Thomas (2002) is described as the principle of vernacular dialect congruity and operates as a natural linguistic process in social contexts less constrained by the overt prescriptive norms that would impede these naturally occurring changes. In surveys of socially subordinate dialects spoken in the US and abroad researchers such as Wolfram and Schilling-Estes (1998), USA, Trudgill (1990), England, and Chesire (1990) other locations, a uniform tendency is found to: expand the regularization of once-irregular plurals (e.g. two sheeps); regularize past tense forms (e.g. They growed up); adopt negative concord (e.g. They didn't do nothing); and to stop syllable-onset inter-dental fricatives (e.g. this =[dɪs]). Wolfram and Thomas (2002) suggest that some linguistic patterns found in AAE can be attributed to parallel independent development via general processes of analogy and the universal linguistic tendency for linguistic movement toward unmarked forms. The linguistic arguments presented by Wolfram and Thomas' (2002) for changes in Hyde County AAE which are consistent with universal tendencies of vernacular dialects are more well aligned with the prevalent linguistic evidence than any argument that attributes these changes to a symbolic supraregional social alignment of AAE speakers.

A complete analysis of a dialect must assess systemic aspects of the linguistic code as it is socially realized as part of the speaker's affiliations of gender, class, age, SES, and local group membership. These data must be examined in the context of rule governed language change and must be carefully evaluated for both externally (social) and internally (systemic) motivated language change.

Accommodation Theory and the Divergence Hypothesis

Giles, Coupland and Coupland (1991) define accommodation theory as a basis for sociolinguistic explanation. Accommodation theory can describe social consequences related to attitude, attributes, behavior and communication, ideology and macro-societal factors, intergroup variables and processes, discourse practices in natural settings, and individual life span and language shift. Speech accommodation theory was introduced in Giles (1973). He identified the phenomenon of interpersonal accent convergence during an interview situation and termed the practice 'accent mobility.' This identified phenomenon was a re-interpretation of the Labovian (1966) notion of 'attention to speech' (e.g., an interpersonal accommodation to prestige speech). Giles (1973) argued the use of casual speech may occur not because of the status of the interviewer but because the interviewer, subject to the same sociolinguistic forces as the interviewee, shifted to a less standard form when the interview was supposedly over but the recording continued. The use of prestige phonological variants could be related to the context of the communication interaction not the status of the speakers. From this early work and additional studies completed by researchers such as Ball, Giles, and Hewstone 1985; Coupland et al. 1988; Gallios et al. 1988 among many others, theories of convergence and divergence have evolved.

The Divergence Hypothesis and AAE

Bailey (2001) explores evidence in support of the divergence hypothesis of the increasing difference of AAE and WVE. This hypothesis "holds that, regardless of its origins, AAVE and White vernaculars were at one time more alike than they are now." Bailey (2001) asserts the greatest changes have occurred in the period since the close of WWII.

An argument against AAE and the divergence hypothesis is presented in Butters (1989). He argues against the hypothesis not on the basis of difference in individual linguistic variables as produced by Black and White speakers, but on the construct of the argument and the assumptions underlying it. Butters (1989) writes the argument is framed as argument from causation. Citing Bailey and Maynor 1989: pp7-8:

> … demographic patterns have changed over time and … these changes have sometimes created discontinuities in patterns of communication. Such discontinuities create the ideal communicative situation for divergence…The divergence of the black and white vernaculars is a similar response to discontinuities in patterns of communication.

Butters (1989) writes that events such as the Great Migration, the movement of and segregation of Blacks into the inner cities, are listed as the social developments resulting in the formulation of Black speech communities which have only marginal interaction with White communities. These social changes lead Bailey and Maynor (1989) to conclude that although Black and White vernaculars were at one time converging, they are now moving in opposite directions, diverging from each other. Butters (1989) further criticizes Bailey and Maynor (1987) for resting their evidence of divergence on the use of be 2 (habitual be) along with "brief allusions to features cited in Labov (1985) — narrative –s and vowel fronting and in Bailey and Maynor (1989)--changes in /r/ loss rates. Butters (1989) further states the presented linguistic evidence for divergence is not robust. Instead the argument rests upon an interpretation of the social changes that occurred between1930 and 1989. Butters (1989) argues, the divergence hypothesis is based on the logic that;

> "Blacks as a group are increasingly more isolated in American society
> The supposed isolation overwhelms all socially cohesive forces linking Blacks to the superculture therefore; Linguistic divergence is increasingly taking place and itself [is] a powerful factor in the supposedly increasing isolation of Blacks in contemporary American society."

As Butters (1989) and Wolfram (2007) argue a conclusive statement of divergence in the speech of Blacks and Whites in the South is not warranted based on current evidence. The linguistic facts paint a picture of complex relationships of change and variation within and between AAE and WVE, not unlike the historical context of the dialects. In order to fully assess the patterns of variation and change within these two ethnic groups we must design experiments and interview techniques which will elicit a variety of styles and registers from a variety of comparable AAE and WVE speakers. It is necessary to stratify groups of AAE speakers in a manner consistent with WVE speaker stratification if we are to compare both within and between speaker groups and assess the true nature and relationship of the dialects.

Convergence

Convergence can be defined as an individual speaker strategy to adapt to another's communication behaviors in linguistic, prosodic, and nonverbal features including speech rate, pauses, utterance length, use of phonological variants, smiling, gazing etc., (e.g. Feldstein 1972; Argyle 1969; Webb 1972). The studies showed convergence in both laboratory and naturally occurring verbal interactions. The patterns of convergence have been shown to occur in many languages including English (Coupland 1984), Hungarian (Kontra and Gosy 1988) Frisian and Dutch (Gorter 1987; Ytsma 1988) Hebrew (Yaeger-Dror 1988) and others. Giles et al. (1991) argue convergent communicative acts reduce interpersonal differences and internal individual variability (e.g., speaker is consistently congruent with the communication partner and decreases her own individual variability).

Divergence

Giles et al. (1991) defines divergence as the way in which speakers accentuate their speech and non-verbal differences between themselves and others. A well known experiment completed by Bourhis and Giles (1977) illustrated the use of accent to highlight divergence by Welsh speakers with a strong national identity. The experimenter, a speaker of the more standard RP English, questioned the viability of the Welsh speaker's language -- "a dying language with a dismal future". Following this question the Welsh speakers tended to increase the use of Welsh accents. Some speakers answered this and the following more neutral questions using English interspersed with Welsh words and phrases. This type of linguistic divergence can be used in interethnic contexts to maintain group or personal identity (Hart, Carlson, and Eadie 1980). Both convergence and divergence can be upward, toward a prestige model, or downward, away from a prestige model (Giles and Powesland 1975). Convergence can occur on some levels and not on others (Ferrara 1991; Giles et. al 1987), and convergence and divergence are not mutually exclusive (Bilous and Krauss 1988).

A relevant distinction in the assessment of convergence and divergence is the socio psychological nature of relative perceptions. As defined in work completed by Thakerar, Giles, and Chesire (1982) Street and Hopper (1982) and further supported by research completed by Niedzielski (1999) and Hay et. al. (2006) sociopsychological responsiveness is based on the listener's knowledge and expectations of the linguistic status of the speaker. The listener's perception of a speaker's production as either convergent or divergent to a known linguistic pattern is dependent on various social and cognitive biases of the listener. These researchers found that a listener's stereotyped expectation of a social group can influence the manner in which speakers are determined to sound. Niedzielski (1999) found listeners changed their judgments of speakers /aʊ/vowel productions based on whether they received an answer sheet with the word 'Canadian' or 'Detroiter' at the top. Hay et al. (2006a) reported similar changes in responsiveness for New Zealand listeners. This group changed their judgments of /ɪ/ vowel production depending on whether the word 'Australian' or 'New Zealander' was presented at the top of their answer sheet. These studies show that lay listener perceptions of patterns of convergence or divergence toward or away from a particular model can be substantially influenced by the listener's perception of the social group under study not simply the phonetic product. Instrumental phonetic measurement of speaker variables removes inherent social bias toward or away from a particular perspective. Individual and social bias by lay listeners in the assessment of speaker production is unlikely to ever be completely eliminated. Awareness of the propensity of all listeners including researchers to be influenced by their psychosocial knowledge in the categorization of phonological elements can be acknowledged. This knowledge is helpful in recognizing individual speaker tendencies towards perceptions of convergence or divergence based on listener bias and psychosocial knowledge.

First dialect acquisition

Green (2002) posits the question: What do speakers know when they know AAE? What does any speaker know when they know a communication system? They demonstrate implicit knowledge of a set of rules regarding the syntax, semantics, phonology, morphology and pragmatics of the system. It is the patterned application of these rules in real and hypothesized communicative contexts that verify the speaker as a competent user of the communication system. Labov (1964) illustrated that the process of acculturation to group speech norms typically occurs during a person's formative years, prior to age nineteen. His research on the acquisition of Standard English by children and adolescents indicated that children's knowledge of the linguistic norms for acculturation to the adult speech model consistent with the class background of the child begins when children are as young as eight. At that age, the children Labov sampled demonstrated approximately 50% conformity to adult norms. Between the ages of 20 and 39 however, the conformity value was approximately 84%. Labov notes however that college educated speakers may have command of a full range of speaking styles, inclusive of both the vernacular or neighborhood grammar learned in the pre-adolescent years and the standard style used in prestige forms. It is possible speakers have command of two systems, both Standard English and AAE. If this is fact then it does not support the contention that AAE use is socially stratified. Instead it only further supports the lack of empirical evidence as to when, by whom and for what linguistic purposes AAE is used by speakers with command of both AAE and Standard English.

The process of phonological acquisition is discussed in Vihman (1996) as a pattern of "emergent systematicity." The "emergent systematicity" of the child's phonological system as described in Vihman (1996) refers to the pattern of language (dialect) specific phonological acquisition demonstrated universally by oral language learning children with typically developing perceptual and productive capabilities. The emerging phonological system is characterized by a series of stages of acquisition and production of sound/symbol forms.

This linguistic acquisition is further discussed by Ferguson and Farwell (1975). They describe three characteristics of the transition from the pre-verbal to the verbal stage in language development. The process begins with an initial period of relatively accurate production of the sound/symbol target of adult words followed by a later reduction in production accuracy. Next, phonological selectivity of particular early word targets begins. This is followed by the extension of variability in the production of word targets. Vihman (1996) elaborates on such a process: “as children develop they have an increase in variability and a loss of phonetic accuracy.” This change is viewed as a cognitive reorganization (learning) in the shift from phonetic to phonological organization of the sound/symbol products. A child's first word-like productions can be thought of as the first step in the acquisition of the ambient phonology.

The acquisition of dialect-specific phonological rules likely occurs during the later stages of phonological development. During this period phonetic details including word formation (morphology) and context variation of morpheme shape not due to general phonological rules (morphophonemics) occurs. The acquisition of phonological rules which are more consistent with natural processes (e.g. voicing assimilation) tend to occur early and continue to be produced in the expected manner with minimal variation. Less natural forms tend to be acquired later (MacWhinney, 1978; Slobin, 1989). The frequency of production and other variables such as transparency and reliability of semantic and/or phonological conditioning affect rule acquisition. The process of overgeneralization of a rule to cases where it should not apply is taken as the hallmark of actual rule learning. In this process of the overextension of rules conditioned by morphological, gender classes, conjugation or declensional classes (Slobin, 1985a, 1993) the child acquires systematic knowledge of the language. These processes would continue through childhood until the child has mastery of the adult forms. This is not likely to occur before age 18 although by age 12 the child is likely to show command of most adult forms (Labov, 1964). Chambers (1992) described eight principles of dialect acquisition. Of particular interest to this dissertation are his principles regarding phonology. Principle 2.3 Simple phonological rules progress faster than complex ones, 2.4 Acquisition of complex rules and new phonemes splits the population into early and later acquirers and 2.7 Eliminating old rules occur more rapidly than acquiring new ones. These principles are applicable to the discussion of the acquisition of a second dialect of the same language. This phenomenon has been observed in children exposed to a second dialect at a young age.

Acquisition of a second dialect of the same language

Research by Chambers (2002) on children in Toronto, Canada revealed that children relocated to a different dialect region at a very young age have the dialect of their peers, not their parents. Termed the Ethan Experience this phenomenon is intriguing as the children do not note a difference between the dialect of their parents and peers. Instead the children claim that their parents and peers sound the same. The complete acquisition of the local dialect may be attributable to the child learning the set of phonological rules consistent with the local dialect as the template for speech production; while viewing the parent productions as an acceptable variation of the local dialect. The parent productions may occur with such low frequency in comparison to the environmental input as to be statistically ineffective in influencing the child's acquisition of the local dialect. In this example the child acquires the phonological rules of the local environment without acquiring any of the phonological rules of the home dialect. While not a direct example of Chamber's principles listed above this example may be representative of the impact of high frequency exposure to one dialect and low frequency exposure to another. The result was receptive knowledge of both dialects with expressive use of the local high frequency dialect.

Children environmentally exposed to dialect variation before the age of 12 would be expected to have variable acquisition of the local phonology based on Chambers principles of phonological acquisition. An example of the variable acquisition of the local dialect is examined by Tagliamonte and Molfenter (2007). They explore the phonological rule acquisition of young children transplanted from Canada to England. Three children (the children of Tagliamonte) moved from Ottawa, Canada to York, England. By the end of their stay the children demonstrate variable acquisition of local dialect productions. The acquired local dialect productions correlate with the ages of the children on arrival to York and their acquisition of the phonological rules. Ranging in age from two years to five years on arrival the children acquired variable competence in the production of two local variants, voiced medial /t/ and a glottalized variant /ʔ/. All three children 'sounded' British at the end of their six-year stay in York, but none of the children acquired consistent use of the variants comparable with the productions of the York young adults (aged 20-27). Since the children moved back to Toronto before reaching the age of the young adults they were compared to, it is unclear if their continued exposure to the York dialect would have resulted in native-like production of the local variants. A definition of what constitutes a simple versus a complex phonological rule is inferred rather than defined in Chamber's principles. The ability of the children in this study to acquire and use the variables assessed would imply that these phonological rules are not complex. As a result of their move to York the phonological rules learned by the Ottawa children prior to their move to England were not replaced. Instead the children learned a second of phonological rules which were used with more frequency than the original set, but did not completely replace them.

A different perspective on rule complexity is observed in the case of children exposed to a new phonological rule in Philadelphia, Pennsylvania. Payne (1980) assess phonological rule learning for the acquisition of the short /a/ pattern in Philadelphia. In this study the majority of children, aged 10-14 when they arrived in Philadelphia, did not acquire even the simple rules of the pattern. These results may indicate that the phonological rules of the children evaluated may be quite stable at ten years of age. Although the short /a/ pattern of Philadelphia is very complex and is described as only fully learned by children whose parents are also speakers of the dialect, the failure of the new arrivals to learn the simple rules of the dialect may point to both the complexity of the short /a/ pattern and the stability of the 'home' dialect in this group of speakers.

These patterns of variable phonological rule learning by children exposed to a second dialect of the same language prior to age 12 point to the possibility that AAE and WVE speaking children exposed to the variable rules of each other's phonological systems may acquire and use simple phonological rules. Depending on the frequency of environmental input of the phonological rules and the age of the children when the exposure was initiated a phenomenon similar to the Ethan effect may occur where the young children develop a receptive phonology inclusive of the rules of both dialects and an expressive phonology reflecting the rules experienced most frequently. The dialect of the speakers is likely reflective of the speakers peer group.

The dialect contact is hypothesized to have been initiated during the period of school integration(1968 and continuing. In the community under study the outcome of the post-integration dialect contact depends in large part to the pre-integration relationship of AAE to WVE. While the population of African Americans in the community has ranged from approximately 12%-30% since the early 1900s (U.S. Census statistics) meaning that any random sample of speech in the community would reveal a greater relative frequency of production of WVE compared to AAE; there was no random interaction in the pre-integration period. During the period between 1870 and 1968 AAE and WVE speakers in the community under study were segregated in all public accommodations and services. This included housing; neighborhoods were either all Black or all White; schools; a separate school system operated for Blacks and Whites; worship; churches were either all Black or all White; and employment; if Blacks and Whites worked in the same place they had separate entrances to the building, separate bathrooms, separate jobs and job titles, Blacks were not allowed to supervise Whites etc., This manner of living was common practice and is common knowledge for persons from the southern United States.

AAE and WVE in the South

Evidence in support of the SVS and in discussion of the convergence and divergence of the vowel systems of AAE and SWVE speakers in the South has been reported by a number of researchers. Bailey (2001) outlines his perspective on the divergence theory by suggesting many of the features shared by AAE and SWVE not found in other dialects of American English either emerged or became widespread in the post Civil War era during the last quarter of the 19th century. Aspects of Bailey's (1993,2001) argument on the divergence of AAE and SWVE are related to the ideological construct of a pan- or supraregional AAE used by African-American speakers. The argument for a supraregional AAE is not clearly supported by the current evidence. The definitions for who speaks AAE in which contexts it is spoken, the existence and status of a standard and a vernacular form of AAE and a clear and concise description of AAE phonology are not in evidence. Lacking these elemental facts of the dialect a clear statement of trajectories of change within AAE and between AAE and WVE is premature.

Arguments on the status of AAE occur at the intersection of language ideology and linguistic evidence. Wolfram (2007) addresses this intersection of ideological construct and linguistic evidence, citing Johnson (2001:606) "Linguists, [like all other interested social actors], are ideological brokers [bidding for] authoritative contextualization […] trying to influence those readings of language debates which will eventually emerge as dominant.” In particular Wolfram (2007) argues sociolinguists have unwittingly created myths regarding AAE, including the supraregional myth, the unilateral change myth and the social stratification myth.

Wolfram (2007) suggests the supraregional myth grew out of the early canonical studies of AAE which focused on dialect use in an urban, non-Southern context. Papers by Labov, Cohen, Robins and Lewis (1968) and Wolfram (1969) among others focused on the similarities found during a critical analysis of difference. Recent studies completed in a variety of settings are more representative of the regional and social demographic diversity of AAE speakers, particularly in the rural south. Papers by Bailey (2001), Mallinson and Wolfram (2002) and Carpenter (2004) are examples of such recent work. Wolfram (2007) cites morphosyntactic traits of invariant/habitual *be* , copula *be* absence, lack of plural –s and possessive –s ,; and phonological features of syllable final consonant cluster reduction, labialization of interdental fricatives, and post vocalic *r*-lessness as commonly cited "core features" of AAE. Wolfram (2007) continues “[a]lthough regionality in AAE was admitted in statements such as ‘there are no doubt regional differences not yet charted’ (Labov, 1972), statements such as this were “practically ignored in presentations and discussions of AAE.” The belief in a supraregional vernacular AAE supersedes the belief in regional diversity in AAE. The supraregional core of AAE has become a fundamental component and part of the canon of AAE description. Wolfram (2007) disputes this fundamental belief and cites as analogy the contrast of AAE to WVE is akin to the contrast of American English to British English.

The contrast of American English and British English as types fails to acknowledge the multiple dialects of British and American English and thereby decreases the significance of variation within either dialect.

The idea that AAE is changing in a systematic way across time and geography is not supported by the empirical evidence. Wolfram (2007) cites a number of factors which must be considered in any analysis of change in AAE. These include the regional setting, the size of the community, macro- and micro- sociohistorical events, patterns of contact with adjacent European American communities and with external African American communities, intra community social divisions, and cultural values and ideologies. He further notes the choice of linguistic variables is a factor, as different linguistic variables may follow diverse patterns of change based on the linguistic composition and the sociolinguistic status of the variable. Three patterns of change have been noted in AAE speakers in Hyde County in Eastern NC, in Beech Bottom and Texana in the Appalachian Mountains of NC. Morphosyntactic and phonological data collected from Hyde County AAE and SWVE speakers illustrate a pattern of parallel development in both dialects up to the period of integration, approximately 1960-1970, a period of convergence during the 1970s-1980s, and a pattern of dialect divergence in the post integration period approximately 1980 onward. In Beech Bottom Wolfram (2007) presents a flat pattern of change in the morphosyntax and phonology of AAE with respect to SWVE. A core set of AAE features has developed and remained present at a relatively constant level alongside AppE until around WWII. The pattern of difference between AAE and the local SWVE

(AppE) began decreasing around WWII and has continued through integration and the post integration period. AAE speakers in the Beech Bottom region of Appalachia are increasing their use of AppE features while their use of AAE dialect features remained flat. In Texana the pattern of change in morphosyntax and phonology of AAE and SWVE had been convergent through the period of integration but has followed a pattern of divergence since that time. These three different patterns of divergence and convergence of AAE and SWVE in these communities are interesting in their own right however a focus on the relationship between AAE and SWVE fails to address the questions of dialect diversity within AAE. This question does not seem to have been addressed in an empirical manner by any researcher up to this point.

Chapter 5: Methods

Introduction

One goal of this research is to examine the relationship between Southern AAE and Southern WVE in a relatively stable rural community in order to evaluate claims of AAE as a singular dialect resistant to regional sound change events. First this project will examine vowel production patterns against social group membership to determine if the vowels front vowels /i,ɪ,e,ɛ,æ,aɪ/ are produced in a similar manner. Then this project will examine these to determine if any speaker group in this community has vowel movement consistent with the SVS, a regionally occurring vowel chain shift.

Vowel shifts span generations. In order to determine if community members are participating in the SVS measurements of /aɪ/ diphthongization, a measurement of the relative movement of the glide from the nucleus of the two vowel token, and a calculation of the difference in F1 and F2 of the vowel pairs /i, ɪ/ and /e, ɛ/ will be made. To determine similarity and difference in the vowel system of AAE and WVE speakers measures of vowel duration, vowel space area, and the Trajectory length and spectral rate of change in the F1 and F2 formant contours will be calculated, and compared by the social parameters age group, race/ethnicity, and gender. The data set has been separated into an older and younger age cohort. This separation of speakers by age will separate the sample into a pre- and post- school integration group. Because Iredell County did not develop a private segregated school system, so called "seg academies"[4], (Allen v. Wright et al. 1984) following public school integration (approximately1967 forward) age group and school integration status are an undifferentiated confound and will be treated as the single variable age group.

Previous sociophonetic research has validated the use of phonetic measurement to illustrate social variation in vowel production. In research by Adank, van Hout and Smits (2004) on the vowel system of Northern and Southern Standard Dutch measures of vowel duration was one of several metrics used to evaluate similarities and differences of vowel production by gender and region. Their research was completed with recordings from 160 standard Dutch speakers completing a read speech task. The Dutch speakers were stratified by speech community (country), gender and age. The results for vowel duration showed a significant effect for gender. The female speakers showed significantly longer durations than the males. The productions of the Southern Standard Dutch women were the longest. Adank et al. (2004) report a finding of females producing vowels of longer duration. These findings suggest comparisons of vowel duration by social variables are a productive method to evaluate sociolinguistic variation.

Jacewicz, Fox and Salmons (2007) have demonstrated a method to evaluate the mean normalized vowel space area using the five vowels /i/, /æ/, /ɑ/, /u/, /oɪ/. The five vowel

[4] Parties lack standing to sue where the policies of a government agency are alleged to be insufficient to prevent school segregation. Supreme Court of the United States Argued February 29, 1984 Decided July 3, 1984.

tokens were measured from the /hVd/ words *heed, had, hawed, who'd, hoyd.* The purpose of the study was to investigate the size of the vowel space used by speakers in three distinct dialect regions to determine if there were regional differences in the size of the vowel space consistent with regional vowel change patterns. Nine male and nine female speakers from each region: Western NC a region participating in the Southern Vowel Shift; Madison WS, a region participating in the Northern Cities Shift; and central Ohio a region not participating in regional vowel change patterns variation; were used. The researchers completed two measures of vowel space area, one measure of the four vowel space area [i æ ɑ u] consistent with the well known American English vowel quadrangle and a second measure including the vowel /oɪ/ to encompass the additional working space of the vowel production area. These two measurements were completed on the mean normalized values of measurements taken at the 20% and 35% points of the vowel's duration. Vowel space area was calculated using Heron's method. The results of a three way ANOVA using the factors gender, dialect, and measurement location was completed for both the 4 and the 5 vowel space area. No significant difference was found in the vowel space area based on the measurement location. The results for the 4-vowel space area showed significant dialect differences even when the effects of speaker gender were minimized as a result of the normalization process. For the 5-vowel space area no effect of either gender or dialect was found. The results of the study indicate that while the shape of the vowel space may differ the overall mean normalized vowel space area remains the same across dialects.

Community

The foothills region in and around Statesville N.C (Iredell County) was chosen as the site for this study due to its location in North Carolina and the relative population and demographic stability of the community. Statesville is a small town located at the intersection of two major thoroughfares Interstate 77 and Interstate 40. Immigration of new families to the area is a common occurrence. The area is situated less than 50 miles from the major metropolitan areas of Charlotte N.C. (38 miles south), and the Triad, Winston-Salem, Greensboro, High Point (42 miles east). The community under study is neither an enclave nor a major metropolitan area. Rather it is a small town whose residents have the opportunity for frequent and regular contact with members of larger metropolitan areas for shopping and commerce. Sampling speakers from this type of community contrasts with previous studies where the samples of AAE speakers have been members of urban, isolated or enclave communities (e.g. Labov 1969, Wolfram 1969, Childs and Mallinson 2004, Fridland, 2003).

Research Design

The research design is experimental. This project will determine whether the speech of AAE speakers living in and around Statesville, North Carolina, display characteristics of SVS which is a phenomenon currently evident in the local regional standard dialects of many Southern communities. The vowels selected for analysis are the following: /i/, /ɪ/,/ /ɛ/,/e/, /æ/,/ɑ/, /u/, /ʊ/, /o/, /ɔ/, /ɚ/, /aɪ/,/oɪ/, /aʊ/ as produced in the words *heed, hid, head, hayed, had, hod, whod, hood, hoed, hawed heard, hide, hoyd, howed*. The vowels of interest for the SVS are /i/, /ɪ/,/ /ɛ/,/e/, /æ/,/ and the diphthong /aɪ/. The vowels /i/, /æ/,/ɑ/,/u/, and the diphthong /oɪ/ will be used to assess vowel space area. Measurements for all 14 vowels are required to calculate values for vowel space normalization and to provide data to plot and measure vowel space area. The measure of trajectory length will be discussed. It will also be used to assess the relative monophthongization of the diphthong /aɪ/.

Predictions

According to Labov's model of transmission and incrementation (2001; 2007), each successive generation should produce a more advanced (changed) form of the vowel. It is expected that the most advanced vowel changes will be found in the youngest group. If AAE is affected by the SVS and if the shift is currently active in this dialect area, it is predicted that lax front vowels /ɪ, ɛ/ will be fronting and raising in response to the expected pattern of the SVS. Consequently, the youngest speakers' vowels should show the most advanced forms of fronting and raising. However, if the SVS is no longer active the above pattern will not be found. In fact, the data in Labov et al. (2006) show a recession of the SVS in younger WVE speakers with decreasing proximity of /i/ to /ɪ/ and / ɛ/ to /e/.

Both consensus (cf., Labov & Harris 1986) and conflict (cf., Milroy and Milroy 1993) in community defined sociolinguistic values have been identified as external factors precipitating linguistic differentiation. In a discussion on the mechanisms of linguistic change Milroy and Milroy (1993) write " the vitality and persistence of non-standard vernacular communities uncovered by many researchers... investigating both urban and rural dialects is more readily interpretable as evidence of conflict and sharp division in society than as evidence of consensus. In an investigation of the speech productions of a single long time African American resident in a remote island Anglo American community Wolfram, Hazen, and Tamburro (1997) find the AA speaker retains individually distinctive phonological forms when she is surrounded by speakers sharing and using a common local dialect. The African American speaker is arguably a resident and not a community member on the island. Her singular presence and social place in the society is differentiated by the other community members. She does not attend school with the children in the community. She does not participate socially with peers in the community. She is segregated physically, socially and linguistically. While Wolfram, Hazen, and Tamburro (1997) indicate no evidence of overt actions of violence or aggression have never been directed toward the speaker and her family this tacit acceptance of their presence is not an act of sharing. It can be argued the historical segregation of the family was more consistent with conflict (eg., the denial of public education). In the community under study segregation, physical, social, and linguistic, was experienced by the older speaker group. It was not experienced by the younger speaker group.

The younger speaker group both AA and EA were physically, socially and linguistically integrated in childcare facilities, intramural sporting activities, public school activities, access to public libraries, use of public pools, etc. The comparison of the younger AA and EA speakers is predicted to be consistent with the experiences of the Canadian children transplanted to England in Tagliamonte & Molfenter (2007). When children from one dialect group are exposed to a second dialect of the same language simple phonological rules are acquired. It is expected that the common dialect features of Southern American English in this dialect region, such as /aɪ/ vowel production as a diphthong before voiced elements, will be present for all speaker groups. The emerging participation of younger AA speakers in the SVS is predicted based on their interaction with EA speakers for whom the SVS is also expected. The relative numbers of AA speakers in the community (approximately 20%) compared to the relative number of EA speakers (approximately 70%) would predict greater transference of EA linguistic features to AA speakers. This prediction is based strictly on the expected mean frequency of production of linguistic tokens in the integrated environment. If particular features of either the home dialect of WVE or AAE hold specific sociolinguistic value their acquisition cannot be predicted, because their value is defined internally by the speech community, regardless of whether a consensus or a conflict model of community is applied.

The older AAE and WVE speakers are predicted to have divergent vowel productions with respect to the SVS. If the front vowel movement of the SVS is a socially motivated (external) vowel change, then the segregation of AAE speakers from WVE speakers during the period following WWII would physically, socially, and linguistically segregate AAE and WVE speakers. The social motivation that was present historically in the WVE community would not be anticipated in the AAE community for pre-integration speakers. For younger AAE speakers (post-integration) the opposite would be true. The younger AAE speakers would be exposed to WVE speakers both child and presumably adult (eg., teachers from the local community) who were fully participating in the SVS during the 1970's and 1980's. Based on Chambers principle 2.4 the younger WVE speakers would be early acquirers of the SVS and the younger AAE speakers would be late acquirers. This would predict the younger WVE speakers would evidence a more advanced production of the SVS than the younger AAE speakers.

Chambers principle 2.7 ',Eliminating old rules occurs more rapidly than acquiring new ones,' further favors the acquisition of aspects of WVE by younger AAE speakers. This prediction is based on both the relative number of WVE models and speakers compared to the number of AAE models and speakers in the community, and to the relative integration of the AAE speakers into the community.

Normalized vowel space area is predicted to be larger for AAE speakers than for WVE speakers. This prediction is based on the presumed fronting of the back vowels found in WVE speaker groups throughout the United States. If WVE speakers are strongly fronting the back vowels /u/ and /ʊ/ while AAE speakers maintain these productions as back vowels, then the relative distance of /i/ from /ʊ/ will be decreased for WVE speakers, resulting in a smaller vowel space for WVE speakers. Since /u/ fronting is a distinctive linguistic variable it is unclear if it will be socially distributed by ethnic background in the younger members of the study community.

Vowel duration for AAE and WVE speakers is predicted to be differentiated by ethnic group membership. This prediction is based on earlier research on prosodic and intonational differences in AAE. Green (2002) reports on findings from Tarone (1972, 1973). Tarone found AAE speakers using a wider pitch range and falsetto voice in conversational speech. It is well known that pitch perception is correlated with relative values of F1 and F2 in the acoustic vowel space. Pitch change is a temporal phenomenon and occurs over the course of the vowels duration. If AAE speakers use greater pitch range it is predicted they will have greater vowel duration in order to complete the perceptually salient pitch changes. While the relative time requirement for acoustic pitch change is an unknown variable (How much time does the speaker need to produce a perceptually salient pitch change and how much time does the listener require to discriminate the change?) The prediction of longer vowel duration for AAE speakers is based on the binary construct that some change requires more time to complete than no change. If AAE speakers do use wider pitch range they will require more time and thus use longer vowel durations than WVE speakers.

Based on previous research on AAE and WVE in western North Carolina and throughout the southern United States, the relative number of AAE speakers in the community; the relative integration of the older and younger AAE speakers into the community via employment and civic responsibilities for the older speakers; and academic, social, and community activities for the younger AAE and WVE speakers; both similarities and differences in vowel productions are anticipated. The integration of the younger AAE and WVE speakers physically, socially, and linguistically provides motivation for the development of linguistic similarities based on shared community values. It is likely the younger post-integration group shares more linguistic similarities than the older pre-integration group.

Data Collection

Data collection was completed in Statesville, North Carolina and surrounding communities in Iredell County (e.g., Salisbury, Troutman etc.,) The recordings were completed as field recordings in quiet rooms of the participants homes, a meeting room in a retirement apartment building, an empty store front in downtown Statesville, and the public library. This data collection procedure was employed for several reasons. The local community did not have laboratory recording facilities. Field recordings facilitated participation for the oldest participants who lacked transportation to a central facility. By completing all recordings as field recordings parity was maintained across experimental locations. All recordings were completed with the same portable recording equipment.

Participants

Data was collected from two generations of speakers of each dialect group (AAE and WVE). The groups were defined by age. Adults aged 19-49 were included in the younger group. Adults aged 50+ were included in the older group. 8 males and 8 females were used in each age and ethnic/racial group. A WVE female aged 49 was included in the older group, and an AAE male 45 was included in the older group. These speakers were deemed appropriate for use in the older group due to their relative relationship to members in the younger group. The WVE female included in the older group was the mother of one of the younger WVE females (aged 23). The AAE male included in the older group was maternal uncle to four of the younger AAE males (aged 23-34). Actual enrollment figures are listed in the Appendix K. Total enrollment was 64. Four speakers were excluded due to evidence or statement of stuttering (disfluency) or inability to accurately complete the research protocol. Prior to the enrollment in the study, the participants were surveyed to assure they were born and raised in the area or moved to the area prior to age 8. All participants were literate although one speaker was legally blind secondary to facial trauma that occurred when he was an adult. This speaker had the words spelled aloud to him and he “read” the word based on its spelling representation. The recordings were conducted in a single thirty to forty-five minute session. Session length depended on the time the speaker required to complete the read speech task and the length of the informal interview. Subjects were paid $15 for their time. Subjects were paid whether or not they were able to complete the study. All subjects did complete the study although as previously noted some subjects were not able to accurately follow the study protocol and their data was not included in the analysis.

Stimuli

The stimuli consisted of single words in the ‘neutral’ consonantal context hVd. The tokens used as stimuli were *heed, hid,* ***hey'd****, head, had, hod, who'd, hood, hoed,* ***hawed****, heard, hide, how'd,* and ***hoyd.*** This frame produced three nonsense words highlighted in bold above. It must be noted the Haw is a river in eastern North Carolina. The hVd pattern and at least one of the nonsense words was introduced to the speaker during the practice session. The specific vowels of interest to this study are the front vowels /i/, /ɪ/, /ɛ/, /e/, /æ/ and the diphthong /aɪ/. These vowels /i/, /ɪ/, /ɛ/, /e/ and the diphthong /aɪ/ are currently defined as elements of the SVS. Labov et al. (2006) has indicated /æ/ raising is widespread and not specific to the SVS. The six listed vowels will be examined in relationship to overall vowel space to assess community participation in the SVS.

Following the collection of the monosyllabic tokens, an elicited sample of conversational speech was recorded. Subjects were engaged in a dialogue regarding favorite foods, work, education or changes and similarities in the community between the speaker's childhood and the present day. These topics were chosen in order to elicit the use of a less formal register in conversation. The analysis of these data is not included in this dissertation.

Equipment and Protocol

The speech samples were collected using a PC laptop computer model HP Compaq model HSTNN-C18C running Windows XP Professional OS. Recordings were completed using a SHURE head mounted high-quality microphone model SM1OA. A PreSonus TubePre pre-amplifier Model A41510C Class 2 Transformer was used to preamplify the microphone signal. The signal was recorded onto the hard drive of the computer using a specially designed computer programs written in MATLAB. The hVd words were recorded at a sampling rate of 44.1 kHz using a 22-kHz anti-biasing filter. The microphone was positioned between 1.5 and 3 in. from the speaker's lips using a head mount. All speakers produced a short set of sample tokens prior to the recording of the test stimuli. This procedure was used to make sure that the equipment and recording program were running properly, the speaker was familiar and comfortable with the setup, and to modify the gain on the recording equipment to prevent peak clipping.

Each speaker was seated in front of a 19 inch flat screen computer monitor at a comfortable viewing distance. The stimulus words appeared on the computer screen in random order. The words were yellow and appeared against a black background to decrease the likelihood of glare on the screen obscuring the word. The words were centered on the screen and were approximately three inches in height. Each word was present on the screen until the word was accurately produced and both the speaker and the examiner were satisfied with the production. Words were re-recorded if the speaker produced the wrong word or if the speaker began speaking too early or too late during the open recording time (3-7 seconds) and either the beginning or end of the word was not recorded. Speakers could request to re-record a word if desired. The speaker was instructed to say the word as he/she thought it should be pronounced. The subject's voice was recorded onto the hard drive of the computer. Each of the fourteen words appeared three times for a total of forty two utterances. There were three different randomization schemes. Each subject was randomly assigned to one of the three schemes. No scheme consisted of consecutive presentations of the same word.

Acoustic Analysis

The acoustic measures included vowel duration, formant pattern, the magnitude of formant change (trajectory length) and vowel space area for each speaker. Prior to acoustic analysis, the recorded speech samples were down sampled to 11.025 kHz. There were 2688 tokens of vowels in *h*V*d* context (14 vowels x 3 repetitions x 64 speakers) for acoustic analysis. The conversational speech samples will be analyzed at a later time.

Vowel Duration

Vowel duration was measured from the waveform view in the computer program Adobe Audition. Wideband spectrograms were consulted to make segmentation decisions. The measured vowel duration included both the initial and final consonant formant transitions. Vowels were measured from the onset of voicing consistent with the zero crossing of the first instance of periodic modulation of the waveform to the offset of voicing consistent with the loss of energy in the spectrogram consistent with the definitions of vowel onsets and offsets from Peterson and Lehiste (1960) and Hillenbrand et al. (1995).

Formant Patterns

Formant patterns were measured based on sampling the frequencies of the formants (F1, F2, and F3) at 20%, 35%, 50%, 65%, 80%-point of each vowel's duration. These values were obtained by using an automated program written in MATLAB. On the basis of vowel onset/offset information obtained from measurements of vowel duration, the MATLAB analysis program determined the appropriate measurement locations within the vowel and automatically extracted the first three formants at each measurement point. The program displayed these measurements along with FFT and LPC spectra at each measurement point (marking the position of the extracted formants along the LPC spectra). Formant frequencies were extracted using 14-pole LPC spectra and 25-ms Hamming window (512-point analysis window) and 98% pre-emphasis. From these spectra, formant peaks were extracted. The LPC spectrum was computed using an 18-pole filter. Readjustment of these parameters was available for specific voice samples (e.g., for speakers with particularly high fundamental frequencies). This was required for seven female speakers four AAE and three WVE speakers.

Formant Frequency Change

Formant frequency change was measured using values of trajectory length (TL) and spectral rate of change (SROC). TL is a measure of the total formant frequency change over the course of the vowel's duration in the F1 by F2 plane. This measure allowed for the measurement of curves in the assessment of formant change over time. The procedure as described in Fox and Jacewicz, 2009 was used. This method calculates TL as a measure of vowel section length (VSL) between each of the temporal points (e.g. 20-35, 35-50, 50-65, 65-80).

One VSL is calculated as the square root of the sum of formant one at time one minus formant one at time two quantity squared plus the sum of formant two at time one minus formant two at time two quantity squared .

$$VSL=\sqrt{(F1t1-F1t2)^2+(F2t1-F2t2)^2}$$

These measures were completed for each two consecutive slices as indicated above. Overall formant TL is calculated as the sum of the four VSL sections:

$$TL=\sum_{n=1}^{4} VSL_n$$

SROC is a measure of the amount of formant frequency change over time that may reveal differences in the way dialects utilize vowel dynamics for vowels within the same production category. SROC can be used to estimate how quickly formant changes occur in time. SROC is calculated from two separate meaures TL_roc for 60% of the vowel's duration and VSL_roc. TL_roc for 60% of the vowel's duration is defined as

$$TL\_roc = \frac{TL}{0.60 \times v\_dur}$$

An additional measure vowel section roc (VSL_roc) is used to calculate change for each individual vowel section based on the temporal location measurements (20%-35%, 35%-50%, 50%-65%, 65%-80%).

$$VSL\_roc_n = \frac{VSL_n}{0.15 \times v\_dur}$$

Vowel Space Area

Vowel space area was calculated using Heron's method as applied in Jacewicz, Fox and Salmons (2007). Mean vowel space was calculated for both Hz values and normalized values of the extended vowel space /i æ u ɑ oI/. Vowels were normalized using the Lobanov z-score transformation.

$$D_i \text{ Lobanov} = \frac{F_i - \mu_i}{\sigma_i}$$

Where the mean formant frequency across all system vowels is subtracted from the formant value for a given vowel and the result is divided by the grand mean standard deviation.The actual normalization calculations for this work were completed using the NORM suite (Kendall and Thomas 2010).

The averaged F1 and F2 values of /i æ u/, / u æ ɑ/, and / u ɑ oɪ/ were calculated using the 35% duration measure. These three triangles were calculated using Heron's method:

$$\text{Area} = \mathit{SQRT}\,(s(s-a)(s-b)(s-c))$$
$$\text{where } s= (a+b+c)/2 \text{ or perimeter}/2$$

To estimate the area of the 5-vowel space the area of the 3 component triangles was calculated and summed. The 35% area was used as Jacewicz, Fox and Salmons (2007) found these values characteristic of the unreduced working vowel space. Measurements at later points in the vowels duration result in a more centralized representation of the vowel space and would portray a reduced vowel space area.

Internal Validity

All segmentation decisions were hand checked by the author and then re-checked using a Matlab program that displays the segmentation marks superimposed over a display of the token's waveform. A second trained rater independently analyzed a randomly selected 50% (1344) of the tokens for consistency in measurement. Less than 5% (68) of the tokens were inconsistent between raters. The inconsistencies were rechecked by both the author and the trained rater and the inconsistency fell to 26 tokens or less than 2% discrepancy between raters. The discrepancies were corrected by re-measuring the suspect tokens.

Analysis of Data

This research has two specific goals. The first goal is to assess the relationship between AAE and SWVE in the community under study to determine if patterns of convergence or divergence are present in older and younger generations of male and female speakers. The second goal is to determine if any groups in the community are participating in the SVS. To assess the relationship between AAE and SWVE in older and younger male and female speakers the following measures were completed.

Subject Groups

Subjects were divided into groups by age, gender, and race/ethnicity.

females	Gender 1-male 2-female	Race/ethnicity 1-EA 2-AA	Age 1-older 2-younger	**males**
	1	1	1	(8) older white
(8) older white	2	1	1	
	1	2	1	(8) older black
(8) older black	2	2	1	
	1	1	2	(8) younger white
(8) younger white	2	1	2	
	1	2	2	(8) younger black
(8) younger black	2	2	2	
32 female speakers				32 male speakers

Table 10 Speaker Groups

Measurements were completed for each individual speaker as previously described. Values of vowel duration for each of the 14 vowels, and F1 and F2 values at the 5 equidistant temporal points were calculated. These values were entered into a spreadsheet and means were calculated for each measure for each of the fourteen vowels. The mean values were then used to calculate the following measures.

Vowel Space Area

One question under study in this work is similarity and difference in the dialect of AAE and WVE speakers of Southern American English as spoken in Iredell County NC. Jacewicz, Fox and Salmons (2007) completed vowel space analysis of males and females in three dialect regions of the US. Using the mean normalized vowel space values for the 35% duration value of the corner vowels /i, æ,ɑ,oɪ,u/ as produced in the words *heed, had,* *hawed, hod, whod* these researchers found the overall vowel space area used by male and female speakers in these three dialect regions did not differ significantly as a function of dialect. This study will assess if the variable race/ethnicity in a comparison of AAE and WVE speakers has any effect on vowel space area.

The F1 by F2 values for males and females were calculated then normalized using the vowel extrinsic normalization Lobanov z-score transformation. Several researchers (c.f., Adank 2003, Adank et al. 2004) have found the Lobanov z-score transformation to be an effective method to remove physiological differences while maintaining social variation.

The normalized five vowel space was plotted in the F1 by F2 plane for each of the eight speaker groups. The normalized plots for the groups were separated by gender for clarity of presentation. An ANOVA of the area values using the dependent variable vowel area and the independent variables age group, gender, race/ethnicity was completed to compare effects of age (pre- or post-integration) group, gender and race/ethnicity on use of the vowel space. Main and interaction effects are reported.

Participation in the Southern Vowel Shift

Labov et al. (2006) assessed participation in the SVS by measuring formant change in the F1 by F2 plane for evidence of three changes. These are monophthongization of /aɪ/, relative change of position of the vowels /e/ and /ɛ/ and relative change of the position of the vowels / i/ and /ɪ/. These changes are described respectively as Stage I, Stage II and

Stage III of the SVS.

The F1 and F2 means were used to calculate trajectory length for the /aɪ/ diphthong. A diphthong by definition is composed of two vowels. The monophthongization of /aɪ/ is a relative measure related to the movement in time from nucleus or onset through the glide to the offset. Although /aɪ/ monophthongization before voiced elements as produced in *hide* is not expected for this sample of speakers, a measure of relative vowel movement from the onset through the glide can be completed. This measure may provide data to determine if /aɪ/ vowel production in this community is diagnostic of group membership. The analysis of /aɪ/ vowel production was diagnostic for the AAE and OVE speakers in Wolfram, Hazen, and Tamburro's (1997) analysis of dialect variation on Ocracoke Island. Analysis of variance with the dependent variable trajectory length and the independent variables gender, age group and ethnicity were completed. Main and interaction effects were calculated.

Labov et al.'s, (2006) research group assessed speaker participation in the first two stages of the Southern Vowel Shift by calculating measures of associated with Stage 1 and Stage 2 participation. Stage 1 is the percent of /aɪ/ speech tokens with glide deletion. Stage 2 is the sum of the differences F2ɛ- F2e and F1e - F1ɛ. When Stage 2 of the SVS is complete the result of the difference calculation is a positive value. Repeated Measures Analysis of Variance was completed for the vowels of the Southern Vowel Shift with the dependent variables Frequency Slice (e.g., F1_1, F1_2...F2_5) and the fixed factor age, gender, ethnicity to assess patterns of difference in vowel production.

by calculating participation in Stage 1 as percent glide deletion of spontaneous speech /aɪ/ tokens and participation in Stage 2 as the sum of the differences F2ɛ- F2e and F1e - F1ɛ. When Stage 2 of the SVS is complete the result of the difference calculation is a positive value. This dissertation will evaluate community participation in the SVS using a calculation of /aɪ/ monophthongization and the difference value calculation of /e/ and /ɛ/ described by Labov et al., (2006).

Chapter 6: Data Analysis

Results

Data analysis will begin with a description of the non-normalized F1 x F2 plots of the front vowels /i, ɪ, e, ɛ, æ/ and the diphthong /aɪ/ presented in Figure 7 (males) and Figure 8 (females) below. In all plots the speakers, AA or EA are identified, as representative of the ethnic dialect of either AAE or WVE. The plots represent the mean values for each speaker group, separated by gender, for each vowel at the five measured temporal points (20%, 35%, 50%, 65%, 80%) of the vowel's duration. The temporal points t1 and t5 will be identified t1, by an open token, and t5 by a filled token. Figure 7 presents the mean values for the male speakers categorized by age group and ethnicity. These descriptive plots are presented in order to contextualize the proceeding statistical analysis and to examine the tokens for similarity and for production consistent with group participation in the SVS. The plots provide a general overview of the mean speaker productions by group.

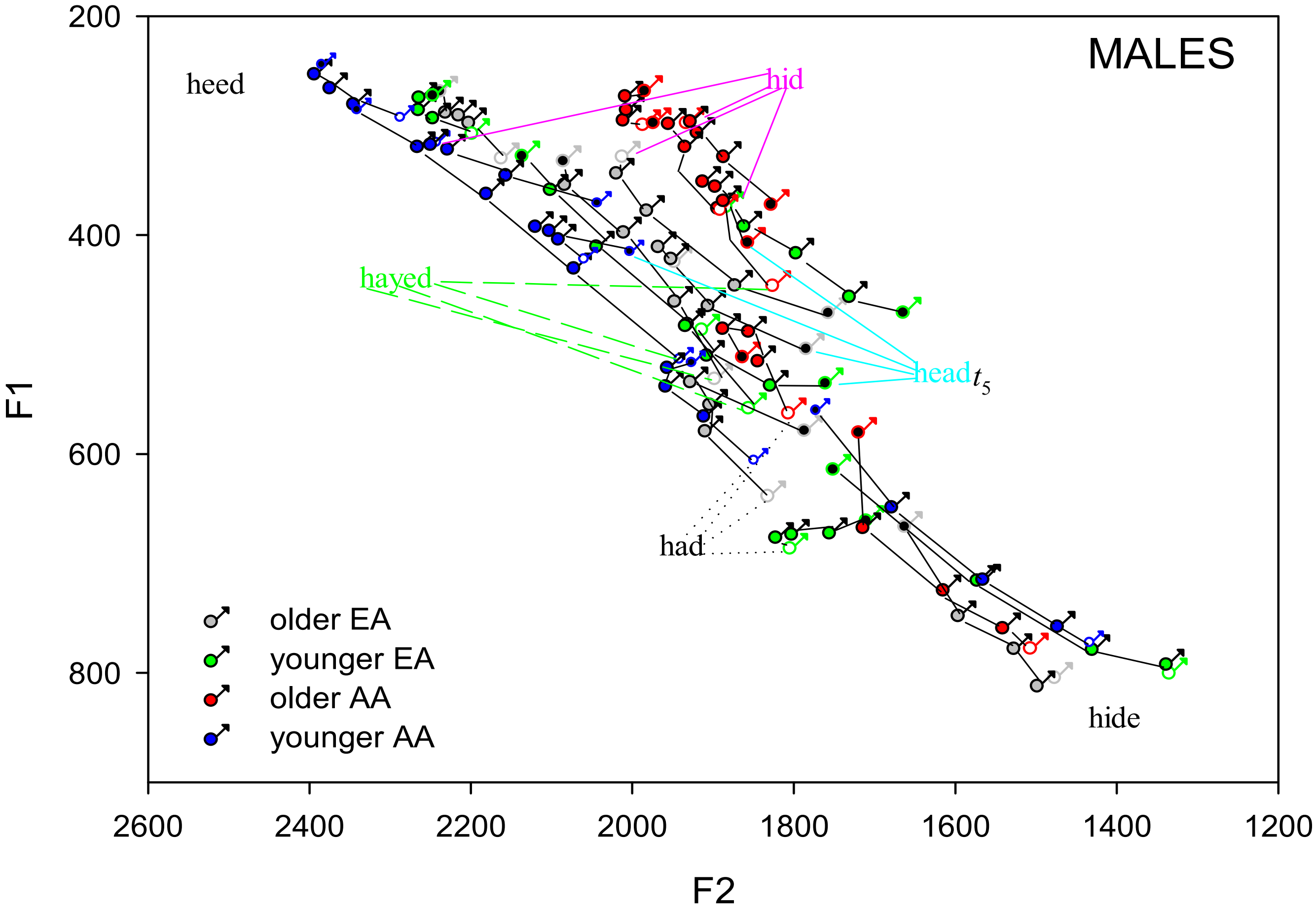

Figure 7 Front vowels male speakers

In Figure 7 Front vowels males, the vowel /aɪ/ will be examined first. This vowel appears to be produced with diphthong-like movement by all four groups. In the community under study /aɪ/ vowel is typically not produced as a monophthong before voiced elements, as in *hide*. Both older and younger AAE and WVE male speakers produce /aɪ/ vowel in a similar manner with onset beginning between approximately (F2) 1300-1500 and (F1) 750-900. The trajectory of movement for /aɪ/ is long and fronting with decreasing F1 and increasing F2 values for all groups. The /aɪ/ vowel appears to move least for older EA males and greatest for the younger AA males. Both the older and younger EA speakers show minimal movement of /aɪ/ vowel between t1 and t2 with greater movement from t3-t5. The AA older and younger male speakers also have closely spaced values at t1 and t2 with greater movement in t3-t5. All male speakers produce t5 of /aɪ/ vowel in the vicinity of t1 of /æ/ vowel. These movements allow /aɪ/ vowel to maintain a frequency change in F1 without entering the trajectories of movement for the relative reversals of /e, ɛ/ and /i, ɪ/. It is interesting to note that both AA and EA older speakers produce t5 of /aɪ/ vowel backer than t4. Younger AA and EA speakers produce t1 and t2 of /aɪ/ vowel much lower and backer than their respective older counterparts. These movements suggest generational differences in /aɪ/ production.

Vowel /æ/ is sometimes produced as a breaking diphthong in Southern American English (Labov et al. 2006). The breaking of the vowel is an up and back movement where a decrease in F2 occurs with a concurrent increase in F1. In breaking the movement of /æ/ vowel over time from t1-t5 resembles a half circle. This movement is seen in the /æ/

vowel productions of the older male EA speakers in Figure 7. Also apparent is the general fronting and raising of /æ/ vowel by all speaker groups to a forward position in the vowel space. All groups produce /æ/ anterior to both /e/ and /ɛ/. The younger AA males produce /æ/ with changes in F1 and F2 but the changes do not result in the same half circle pattern seen in the /æ/ productions of the older EA males. The direction of movement for /æ/ in the younger AA males is the same as for the older and younger EA males and opposite the direction of movement of the older AA males.

The relationship between the vowels /e/ and /ɛ/ is examined for similarity across groups and for evidence of relative reversal of position consistent with Stage II of the SVS. For the older EA males, the vowel /ɛ/ as produced in *head* is raised with respect to the vowel /e/ in the word *hayed.* This is evident at t1-t3 of *hayed* which occurs at the same F1 height as t3-t5 of *head*. While the F2 values of the older EA male tokens are close, they remain separate, with no overlap observed. The younger EA male speakers produce vowel /ɛ/ in a more raised and fronted position than vowel /e/. The t1-t2 productions of /e/ overlap the t3-t5 productions of /ɛ/. This is consistent with the fronting and raising of /ɛ/ vowel simultaneous with the backing and lowering of /e/ vowel in Stage II of the SVS. The older AA male speakers produce t1-t5 of /ɛ/ vowel coincident with t1-t2 of /e/ vowel. This is also consistent with Stage II of the SVS. Finally the younger AA male speakers produce t1-t5 of / ɛ/ coincident with /e/ vowel. In addition t1 of /e/ is produced lower and backer than t2-t5 of /ɛ/ vowel. These non-normalized productions of /e/ and /ɛ/ by all of the male speaker groups are consistent with the vowel rotation of Stage II of the SVS.

The relative reversal of /i/ and /ɪ/ is Stage III of the SVS. For the younger male AAE speakers t1 for /i/ vowel and t1 for /ɪ/ are produced very close to each other in the vowel space. The difference in production of these two tokens is a falling F1 for /i/ (raising) and a rising F1 for /ɪ/ (falling). For all groups /i/ vowel is produced with less frequency change than /ɪ/. It is unclear if this movement is consistent with Stage III of the SVS. It is possible the of production at t1 for /i/ and /ɪ/ will move towards each other in successive generations of AAE male speakers and eventually reach a point where relative reversals of the tokens occur.

For older male AA speakers the height of F1 for /i/ and /ɪ/ is similar at t1 however the height and frontness of /e/ vowel at t3-t5 falls precisely between the F1 onsets of /i/ and /ɪ/. This change in height and the front to back relationships between /i/ and /ɪ/ vowel is not seen in either the older EA or younger EA speakers. Both of these groups have clearly separate height and front to back relationships of /i/ and /ɪ/. In fact the distance between the vowels in the younger EA speaker group appears to be greater than the distance between the vowels produced by the older EA speakers. Neither group of EA speakers appears to be moving toward Stage III of the SVS. Both the younger and older AA speaker groups appear to be moving forward in both Stage II and Stage III of the SVS in the absence of evidence (based on the current data set) of monophthongization of /aɪ/, Stage I of the SVS.

In Figure 8 Front Vowels female speakers /aɪ/ vowel is again produced with a falling F1 and rising F2 by all female speaker groups. All female speaker groups demonstrate this pattern of production. All female groups produce /æ/ vowel in a manner consistent with the breaking pattern of the Southern drawl. When comparing the older and younger generations of AA and EA speakers it is evident the /æ/ vowel is produced with successively greater F1 values (lowering). All female speakers appear to be fronting /æ/.

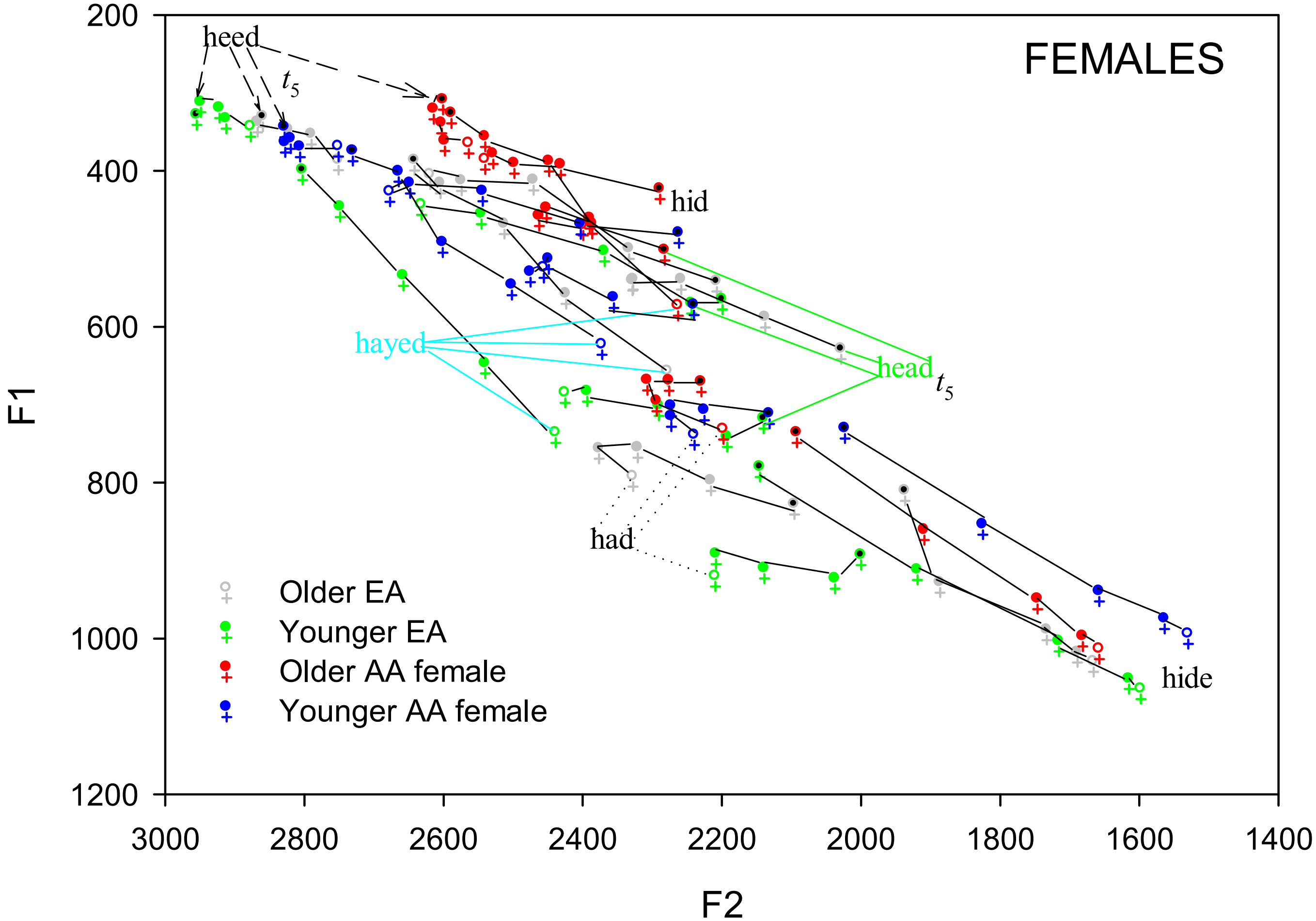

Figure 8 Front vowels female speakers

An observation of the possible reversal of /e/ and /ɛ/, reveals that only the older AA females have vowel productions consistent with the Stage II reversal of the SVS. These speakers have /ɛ/ vowel productions in front of /e/ vowel at t2, t3, and t4. The onset of vowel /e/ is observed to be well below and in front of the onset of /ɛ/ vowel at t1. At t5 the vowels move in opposite directions with /e/ vowel rising (falling F1) and /ɛ/ vowel falling (rising F1). This manner of production may be used by the older AA females to maintain the semantic distinctiveness of the two vowels. In relative terms the younger AA female speakers produce t1 of /e/ lower but still fronter than /ɛ/ vowel. For this group /ɛ/ vowel at t1-t5 is produced higher (lower F1) than /e/ vowel although their relative front back positions remain unchanged. It must be noted the two vowels are produced with relatively close (less than 200 Hz difference) F2 values. Although the older AA female speakers produce the /ɛ/, /e/ vowel pair with much closer F1 and F2 values it is unclear if the younger AA speakers are in the process of advancing this stage of the SVS. The older and younger EA speakers both have higher F1 values for /e/ than for /ɛ/. For both older and younger EA females /e/ remains in front of /ɛ/.

While the onsets (t1) of /i/ and /ɪ/ appear to be relatively close for older AA females no female speaker groups have near reversal of this vowel pair consistent with Stage III of the SVS.

The descriptive plots indicate that both the AA and EA speakers have relative movements of /e/ and /ɛ/ vowel production patterns consistent with early participation in the Stage II of the SVS. The older male and female AA speakers have near reversals of this vowel pair. The younger AA speakers maintain productions with very close production of /e/ and /ɛ/. The t2-t4 values are consistent with movement toward reversal. The offsets of both vowels move in opposite directions (t5). Only the older AA male speakers have movement of /i/ and /ɪ/ vowel consistent with participation in Stage III of the SVS. Additional analyses of the means was completed to determine if the productions observed in the descriptive plots were statistically significant. Duration values were also analyzed.

Vowel Duration

As displayed in Figure 9 and Figure 10 below systematic differences in vowel duration as both a function of vowel quality and speaker group membership were found. A visual inspection of the graphs show greater duration of all vowels for AA speakers. Within this group it can be generally observed that older female AA speakers have the longest vowel durations (cyan blue/bar 7 of 8), followed by the younger female AA speakers(gray/bar 8 of 8). The older and younger AA males produce vowels of similar duration. In general the older EA females produce vowels of greater duration than the younger EA females. Older EA males produce vowels of decidedly longer duration than younger EA males. The overall pattern appears to be AA greater than EA, older greater than younger, female greater than male. Finally vowels produced with greater articulatory openness appear to achieve longer durations.

Duration

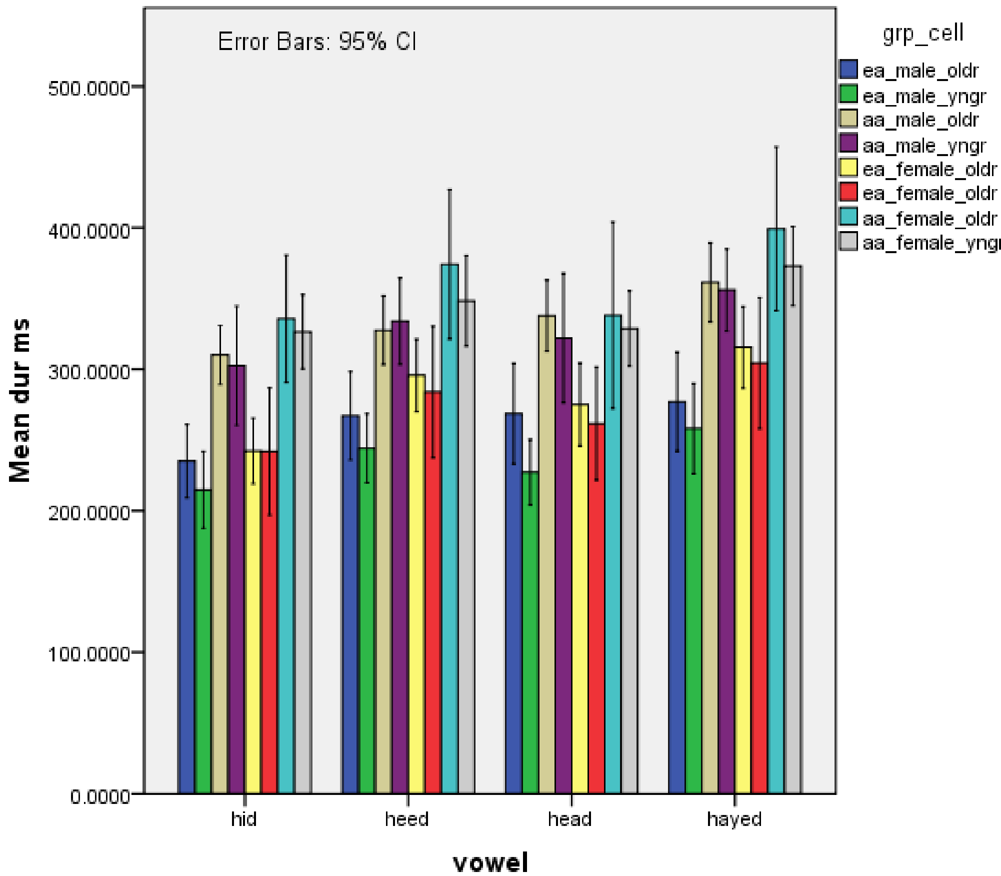

Figure 9 Vowel Duration /i/, /ɪ/, /e/, /ɛ/

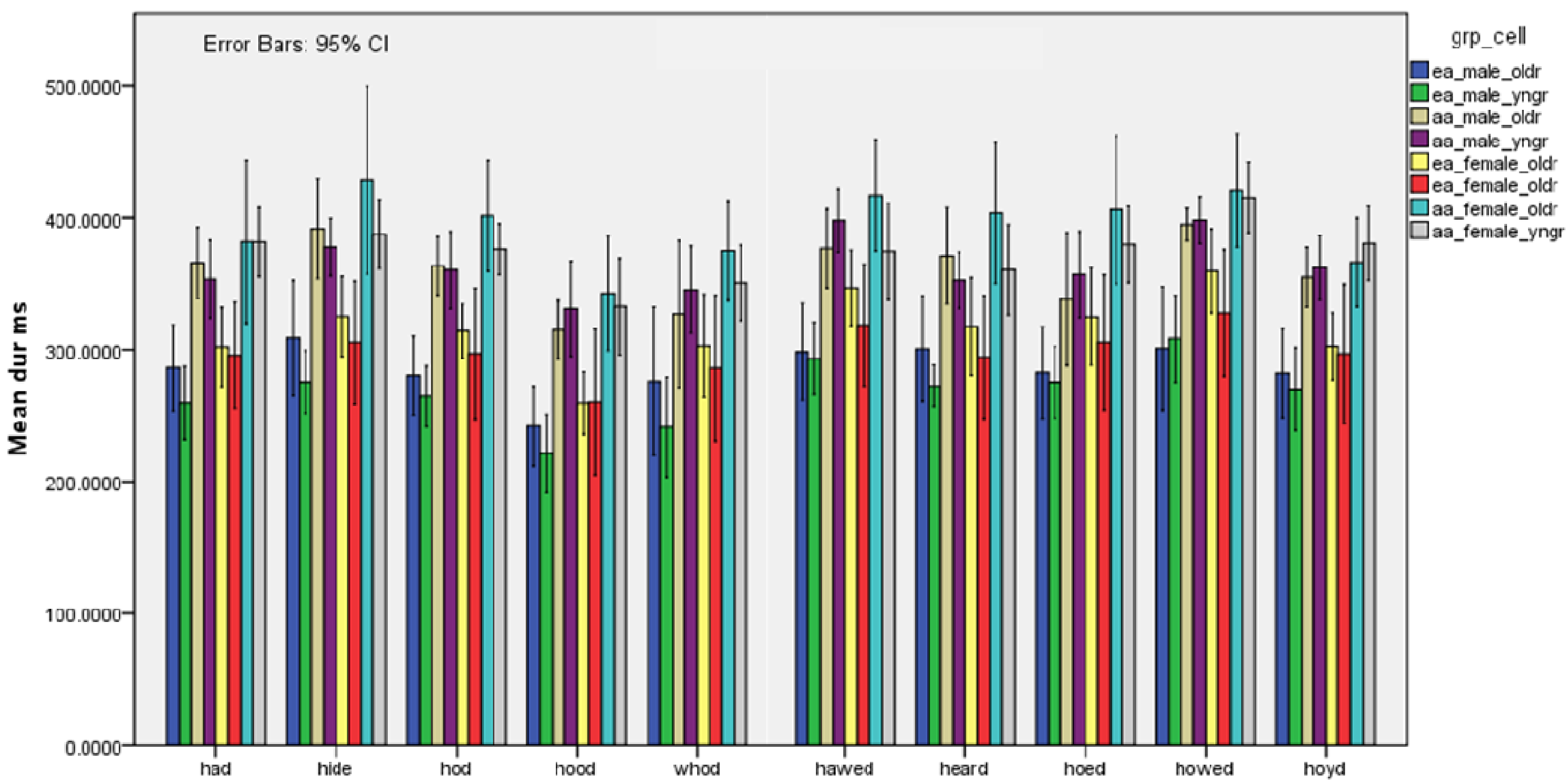

Figure 10 Vowel Duration other

In order to analyze the observed differences in vowel duration for significance analysis of variance (ANOVA) were completed. In addition to significance values, a measure of effect size--partial eta squared (η^2)-- is also reported. The ANOVA was completed with the dependent variable vowel duration for the 14 vowels and the independent variables age group, ethnicity, and gender. As expected the within-subject effect of mean duration between vowels was significant ([F 13, 728 = 60.22]), p<0.001, η^2= 0.518]) . This finding is consistent with the intrinsic differences in vowel duration as a property of vowel openness. Overall group mean vowel duration values ranged from 276 ms for /ɪ/ as in *hid* to 332 ms for /ɑ/ as in *hod* (See Appendix B and C for a complete list of group mean vowel duration values and comparisons by sub group).

Differences based on the independent variables age group, gender, and ethnicity were evaluated. The between subject effects revealed significant differences by gender and ethnicity. Main effects were found to be significant for gender ([F ([1,56 =6.69]), p=0.012, η^2= 0.107]) and ethnicity ([F ([1, 56 =77.51]), p<0.001, η^2= 0.581]). Females (335.96 ms) had greater mean vowel duration than males (312.47 ms), and AA speakers (364.19 ms) had greater mean vowel duration than EA speakers (284.23 ms). These results indicate the observed patterns of greater vowel duration by females and by AA speakers are statistically significant. No interaction effects were found to be significant.

Five separate ANOVA were completed for the five front vowels of the SVS. A Bonferroni correction was applied to each analysis to account for multiple comparisons. The results of the analyses for *heed, hid, hayed, head,* and *had*, are presented. For all five vowels a significant difference was found for either gender or ethnicity or both. For these five vowels there was no significant difference for age group. None of the ANOVA's revealed significant interaction effects between categories. For *heed* the difference was ([F ([7, 56 =8.87]), p<0.001, η^2= 0.526]). There was a significant main effect for gender ([F ([1, 56 =9.607]), p=0.003, η^2= 0.146]) with female durations(325.58 ms) greater than male (293.24 ms). For ethnicity the main effect was ([F ([1, 56 =49.29]), p<0.001, η^2= 0.468]), with AA durations (364.04 ms) greater than EA (272.78 ms). For *hid* the difference was ([F ([7, 56 =11.30]), p<0.001, η^2= 0.585]). A significant main effect was seen for gender ([F ([1, 56 =4.431]), p=0.040, η^2= 0.073]) with female duration of (286.63 ms) and male (265.65 ms). For ethnicity the difference was ([F ([1, 56 =73.130]), p<0.001, η^2= 0.566]) with AA duration (318.75 ms) greater than EA (233.52 ms). Differences for *hayed* were ([F ([7, 56 =9.977]), p<0.001, η^2= 0.555]). The main effect of gender was ([F ([1, 56 =9.87]), p=.003, η^2= 0.15]); female (348.01 ms) with male(313.21 ms). The main effect of ethnicity was ([F ([1, 56 =57.05]), p<0.001, η^2= 0.505]); with AA (372.45 ms) and EA (288.77 ms). *Head* values were ([F ([7, 56 =6.575]), p<0.001, η^2= 0.451]) with only the main effect of ethnicity significant at ([F ([1, 56 =40.268]), p<0.001, η^2= 0.418]). with AA duration of (331.75 ms) and EA of (258.16 ms). Finally for *had* the difference was ([F ([7, 56 = 9.737]), p<0.001, η^2= 0.549]). The main effect of gender was ([F ([1, 56 =4.901]), p=.031, η^2= 0.08]) with female duration (340.33 ms) and male (316.35 ms). For the main effect ethnicity the difference was([F ([1, 56 =61.286]), p<0.001, η^2= 0.523]) with AA duration of (370.73 ms) and EA duration of (285. 97 ms).

The five individual ANOVA point to robust mean differences by ethnicity with large F values and large values of partial eta squared. The partial eta squared values indicate at least forty percent of the variance accounted for in each vowel was related to ethnic group membership. The lack of interaction effect between gender and ethnicity points towards vowel duration as a defining characteristic of both ethnic group membership and gender in this experimental task. A similar finding in other examples of recorded speech from this group of speakers would indicate vowel duration is a valid measure of both ethnicity and gender in this community. The female vowel durations would be expected to be shorter than males if biological differences such as breath support and lung volume were involved in expressions of vowel production in this task.

As illustrated in Figures 9 and 10 there are systematic differences in vowel production by group membership. The lack of any interaction effects and the nature of the speech task, elicited speech, require a cautious interpretation of the significant differences found in these data. The increased duration values of female speakers and AA speakers may both be attributable to attempts to produce clear speech by these speakers. Since no interaction effects are present this conservative interpretation of the duration differences for these data is judged to be appropriate.

Calculation of the vowel space area

The vowels selected for analysis of vowel space area were /i, æ, u, ɑ, oɪ/. These five vowels were used to encompass the largest portion of the vowel space area. Jacewicz, Fox and Salmons (2007) demonstrated that these vowels effectively characterized the total working vowel space area in cross dialectal comparisons where both monophthongs and diphthongs are produced. The vowel space area was calculated using the F1 and F2 values as described in Jacewicz et al., (2007) and previously in Chapter 5 of this work. Vowel space area was calculated using F1 and F2 values from the 35% duration point of each of the five vowels. Figure 10 and figure 11 below present the non-normalized vowel space area plots for male and female speakers respectively, while figure 12 and figure 13 present the normalized vowel space area. In the normalized plots a scaling factor was applied. The scaling factor is the Lobanov z-score formula provided by Tyler and Thomas (2010) in the NORM on-line normalization suite. Only the mean z-scores computed separately for each speaker were used in statistical analysis.

Scaling Scheme for Lobanov z-score transformation

$$F'_1 = 250 + 500\,(F^N_1 - F^N_{1MIN}) / (F^N_{1MAX} - F^N_{1MIN})$$
$$F'_2 = 850 + 1400\,(F^N_2 - F^N_{2MIN}) / (F^N_{2MAX} - F^N_{2MIN})$$
$$F'_3 = 2000 + 1200\,(F^N_3 - F^N_{3MIN}) / (F^N_{3MAX} - F^N_{3MIN})$$

Following a description of the vowel space area an analysis of variance (ANOVA) with the dependent variable vowel space area and the independent variables gender, ethnicity, and age group was completed. The areas of the normalized vowel space areas were evaluated for mean differences based on group membership. In addition to significance values, a measure of effect size--partial eta squared (η^2)-- is also reported.

In Figure 11 below, group differences are observed in use of vowel space. Older and younger EA males produce /i/ vowel *heed* in a similar manner. The vowel is more fronted for older and younger AA males than for EA males. Younger AA males produce /i/ with the greatest amount of fronting. In this figure /æ/ vowel appears to be lowering in the younger generations of males. The back vowels /oɪ/ and /u/ are produced farthest back in the vowel space of AA speakers. Younger AA males produce the vowel with the greatest amount of backing, lowered F2. Compared to the older EA males, younger EA speakers appear to be in the process of fronting /oɪ/ and backing /u/.

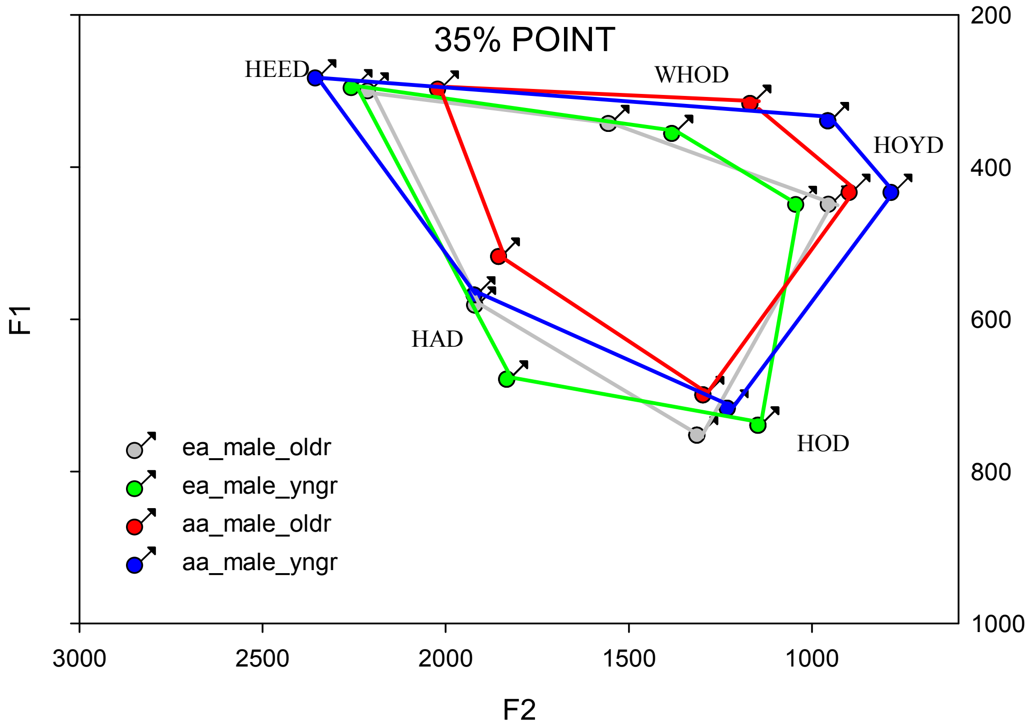

Figure 11 Vowel Space Area Males

In Figure 12 differences in use of vowel space area by older and younger generations of speakers is apparent. For females the younger EA speakers have the most fronted productions of *heed* with younger AA females also producing this vowel in an extreme high front position. The vowel /æ/ as in *had* is produced lower in the F1 x F2 plane for

EA females than for any other group. The difference in /æ/ vowel production for older and younger AA speakers is minimal. The vowel /ɑ/ *hod* is produced in a similar manner by all female speakers. However the back vowels /u/ and /oɪ/ are produced differently based on both ethnicity and age group. The /u/ vowel is fronted to a high mid position in the vowel space of younger and older EA speakers with the greatest degree of fronting seen in the younger EA group. For AA females /u/ vowel remains in the back. The production of /oɪ/ vowel is produced in the most extreme back position by younger AA females. Both older and younger EA females and older AA females produce /oɪ/ in similar locations.

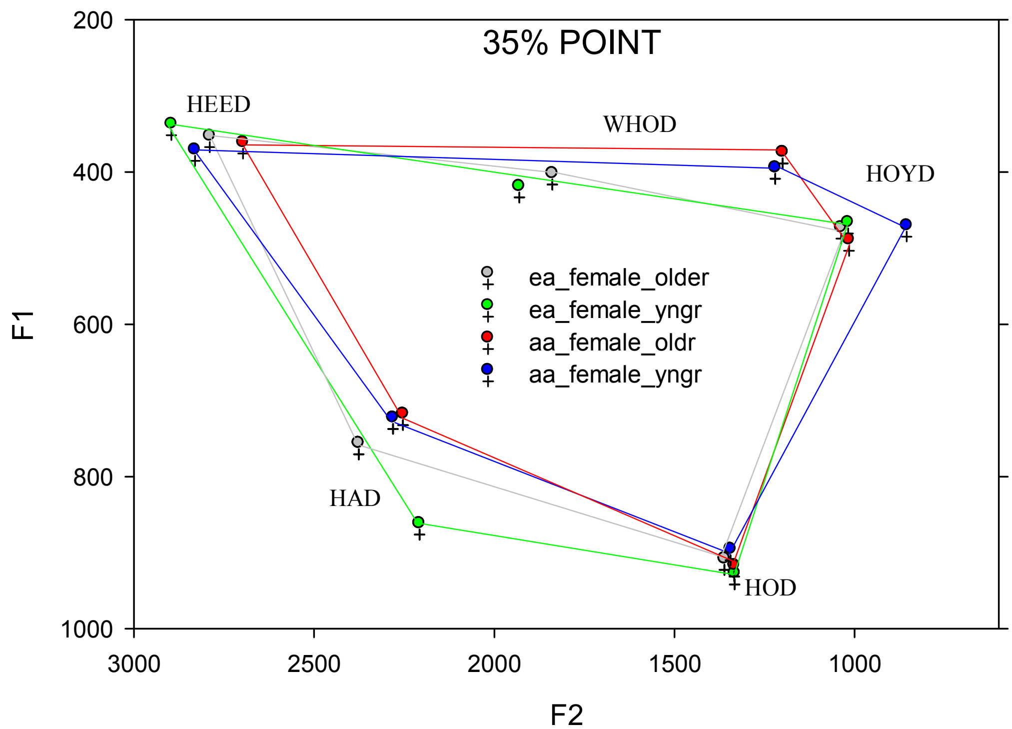

Figure 12 Vowel Space Area Females

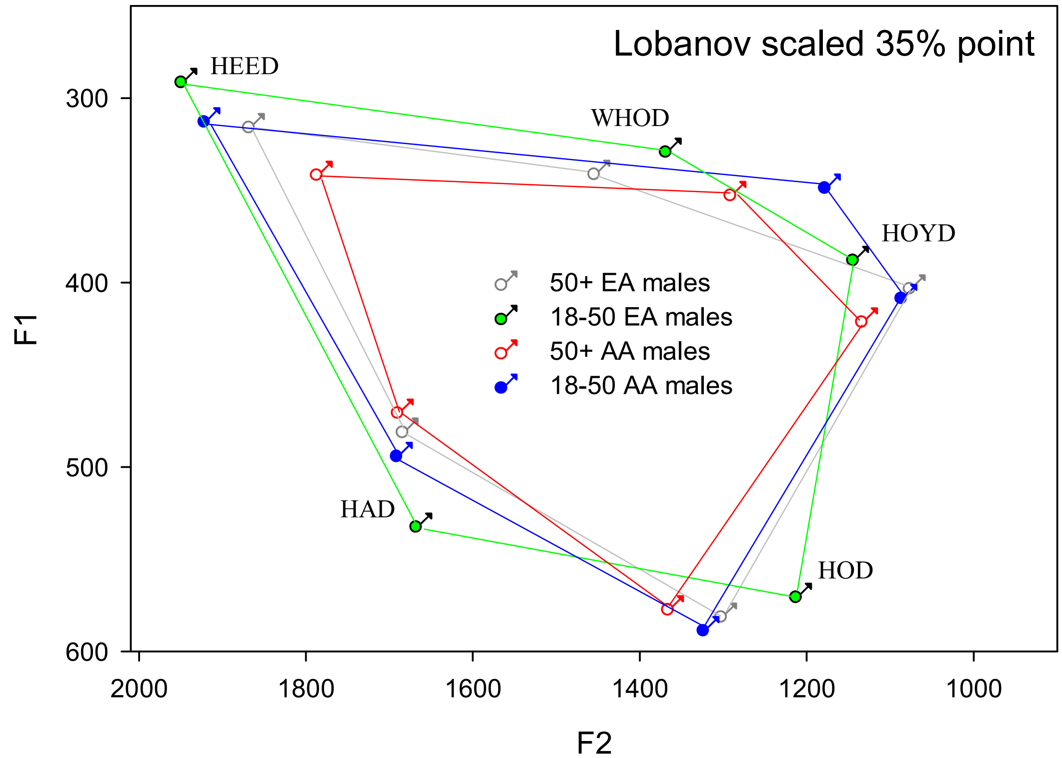

Figure 13 mean z-score vowel space area males

Figure 13 presents the mean normalized vowel plots of the male speakers. The Lobanov normalization process has been found by researchers such as Adank (2004) to be effective in removing inherent physiological differences while maintaining social variation. Interpretation of these plots must be carefully considered as the scaling factor used to convert the z scores to values consistent with the Hz distribution may result in unanticipated artifacts being added to the display. In Figure 13 above the relative positions of vowels by speaker group remain generally consistent with the non-normalized plots. Noted differences are seen for /i/ vowel production where younger EA speakers have a higher and more front production than younger AA males. All other vowels remain in relative positions consistent with the non-normalized plots.

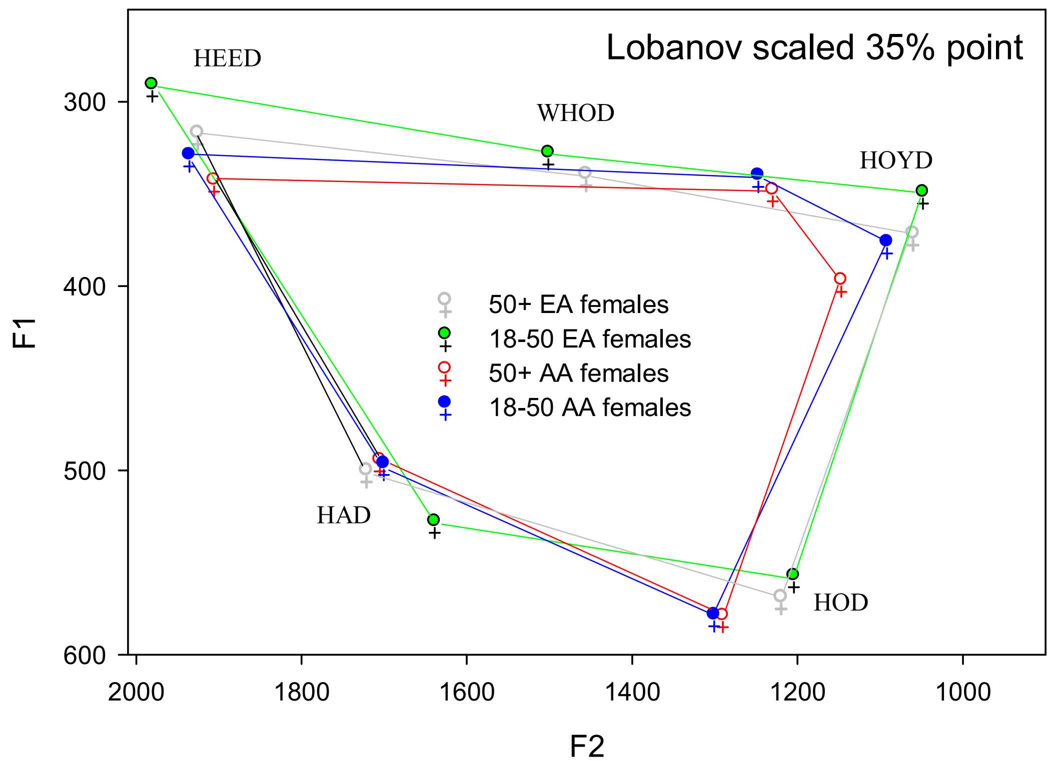

Figure 14 mean z-score vowel space area females

Figure 14 presents the mean normalized vowel space area plots for the female speakers. In the normalized plots the /ɑ/ vowel as produced by the AA older and younger females is lower and more front than the tokens produced by older and younger EA females. The /oɪ/ vowel is located farther back in the vowel space for EA females in the normalized plots than in the non-normalized plots. The relative positions of the other vowels remain relatively consistent. The 35% point of /oɪ/ vowel is generally higher and backer for the female speakers than the male. EA females appear to have more front productions of /u/ vowel. In general the younger EA speakers have the most backed productions of /ɑ/

vowel, the lowest productions of /æ/ vowel and the most fronted productions of /i/ vowel. The extreme production of the corner vowels by the EA female speakers may result in a different sized vowel space area for the EA female speakers. Overall the vowel space area plots illustrate different shaped vowel space areas for AA and EA speakers both male and female. The use of the scaling factor and transformation in the normalized plots removes the apparent expansion of the female vowel space seen in the non-normalized plots.

Two separate analyses of variance (ANOVA) were completed. The first ANOVA compared the normalized vowel space area for each of the eight groups. A significant difference was found ([$F_{7, 56} = 6.52$, $p<0.001$]). A Tukey HSD post hoc analysis grouped the vowel space area values into homogenous subsets. Table 11 illustrates that the sizes of the vowel space areas are grouped primarily by age group with older speakers producing smaller vowel space areas than younger speakers. The overlap groups center on the younger AA females and older EA females.

5pt AREA

	group cell	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD[a]	aa_males_older	8	3.598004		
	ea_males_older	8	4.211690	4.211690	
	aa_females_older	8	4.406372	4.406372	
	aa_females_younger	8	4.519926	4.519926	4.519926
	ea_females_older	8		4.662049	4.662049
	aa_males_younger	8		4.685527	4.685527
	ea_females_younger	8		5.105612	5.105612
	ea_males_younger	8			5.495802
	Sig.		.087	.107	.057

Table 11 Normalized vowel space area
Means for groups in homogeneous subsets are displayed.

A second analysis of variance was completed with dependent variable vowel space area and the independent factors age group, gender, and ethnicity. A main effect of gender was not significant however both ethnicity ([F 1, 56 =12.91, p=0.001, η^2=0.187]) with EA means (4.87) greater than AA (4.302); and age group ([F 1, 56 =21.582, p<0.001, η^2=0.278]) with younger means (4.952) greater than older (4.220) were significant. The only significant interaction was between gender and age ([F 1, 56 =8.284, p=0.006, η^2=0.129]). The z-score vowel space area for younger males was greater, (5.1) than for younger females (4.8). The older male (3.9) vowel space area was smaller than the older female (4.53).

The expected difference in male and female vocal tract size and the resulting gendered variation in vowel space area appears to have been eliminated through the normalization process as no main effect for gender was found. The significant main effects found for ethnicity and age group indicates there may be group inherent differences in the use of vowel space area. The gender by age group interaction provides evidence of gender specific generational differences in use of vowel space area. The finding of similarity in vowel space area by age group provides some support for the hypothesis that post-integration speakers produce vowels in a similar manner, as the vowel space area size for post integration speakers by gender is the opposite of the pre integration group. It is noted that generational differences in vowel production based on either age grading or physiological changes remain an alternative interpretation of the observed similarities. Minimal ethnic divergence and a common direction of vowel change in this community should also be considered as part of any alternative analysis.

In order to evaluate the interaction effects of gender and age group, a third ANOVA was completed with speakers grouped only by age and gender. The factor ethnicity was not included. A significant difference was found ([F 3, 60 = 8.824, $p < 0.001$]). The post hoc Bonferroni pairwise comparisons revealed the significant mean difference was between the vowel space area of the older male speakers (3.90 z-score) and the younger male (5.09) and female speakers (4.81). There was no significant difference between the older males and older females (4.53 z-score) nor the younger males (5.09) or females (4.81).

This finding provides limited support for the hypothesis of socially relevant similarities in the use of vowel space area in the post integration group. The finding of no statistically significant difference in the vowel space area of the older females with the younger speakers may be interpreted as support for the hypothesis that female speakers lead socially relevant sound change events. Importantly there was no ethnic difference between either the older AA and EA females, nor the older AA and EA males. It must be noted an alternative argument is that use of vowel space area is not dialectally contrastive, a finding reported by Jacewicz et. al (2007).

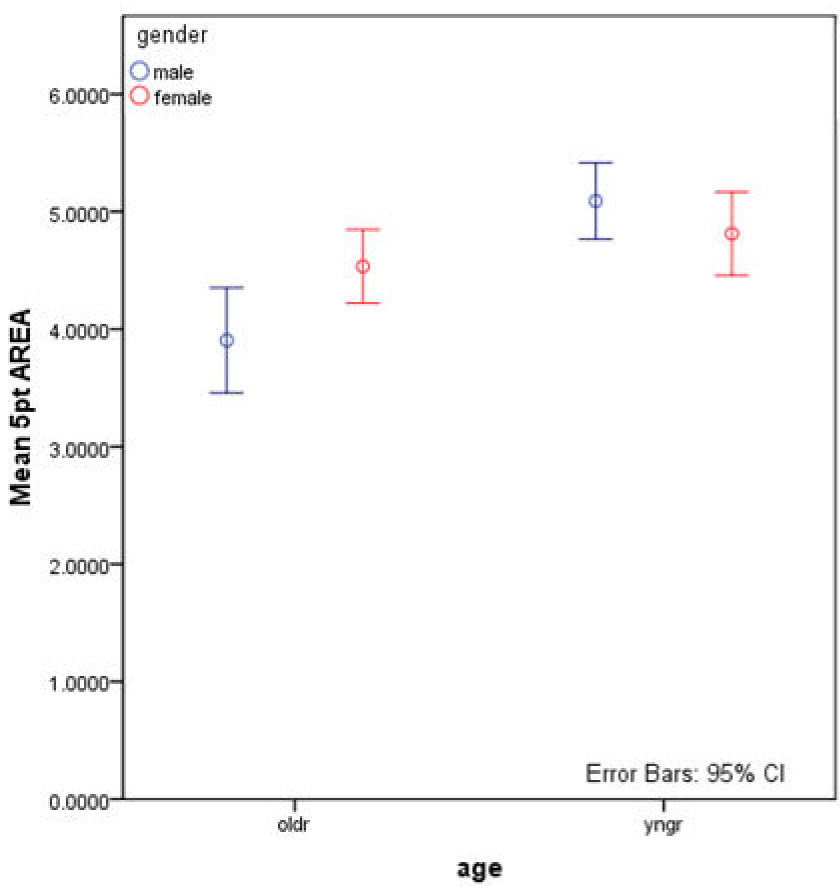

Figure 15 z-score gender and age interaction

Spectral Change

Acoustic measurements of formant frequency change over time in a vowel token can be expressed as time variant spectral change. Fox and Jacewicz (2009) completed a study of cross-dialect variation of the formant dynamics of American English vowels. Their results revealed that trajectory length and spectral rate of change (SROC) were effective measures for capturing dialect variation in the dynamic properties of vowels. Trajectory length (TL) was calculated by sampling F1 and F2 at five equidistant points over the vowel's duration (20-35-50-65-80%) then estimating the amount of change between each temporal point. The trajectory length value is an expression of the magnitude (amount) of formant movement. SROC was calculated by evaluating the TL over the 60% portion of the vowel and analyzing the nature of vowel change between the five measurement points. SROC characterizes the rate of change (how quickly or slowly the change occurs) over the course of the vowels duration. Fox and Jacewicz (2009) further determined that the three values, duration, TL and SROC provided effective characterizations of dialect variation. For example their results for vowel /ɪ/ as produced in the word *hid* showed North Carolina speakers had longer duration, greater TL and faster SROC than the /ɪ/ token produced by Ohio speakers. The researchers attributed these observed patterns to differences in the nature of dynamic formant change for each dialect. This dissertation will use TL and SROC to evaluate similarities and differences in the vowel productions of AAE and WVE speakers living in the same community. The extralinguistic variables gender, age group and ethnicity will be used to define speaker groups.

Trajectory Length

TL is a measure of the magnitude of formant change through the vowel space. TL can capture data present in the curves and directional changes common in Southern American English diphthong productions previously described in chapter 5. In figures below the carrier words are used to identify the intended vowels. Although three separate plots are used to meet the space requirements of the dissertation format a single repeated-measures ANOVA with the independent factor TL for the six vowels /i, ɪ, ɛ, e, æ, aɪ/ against the dependent variables gender, ethnicity and age group was completed. The listed vowels were chosen as all are associated with the SVS. The plots of TL for the vowels as produced in the words *heed, hid, hayed, head, had, hide* are presented in figures 16, 17, and 18 below.

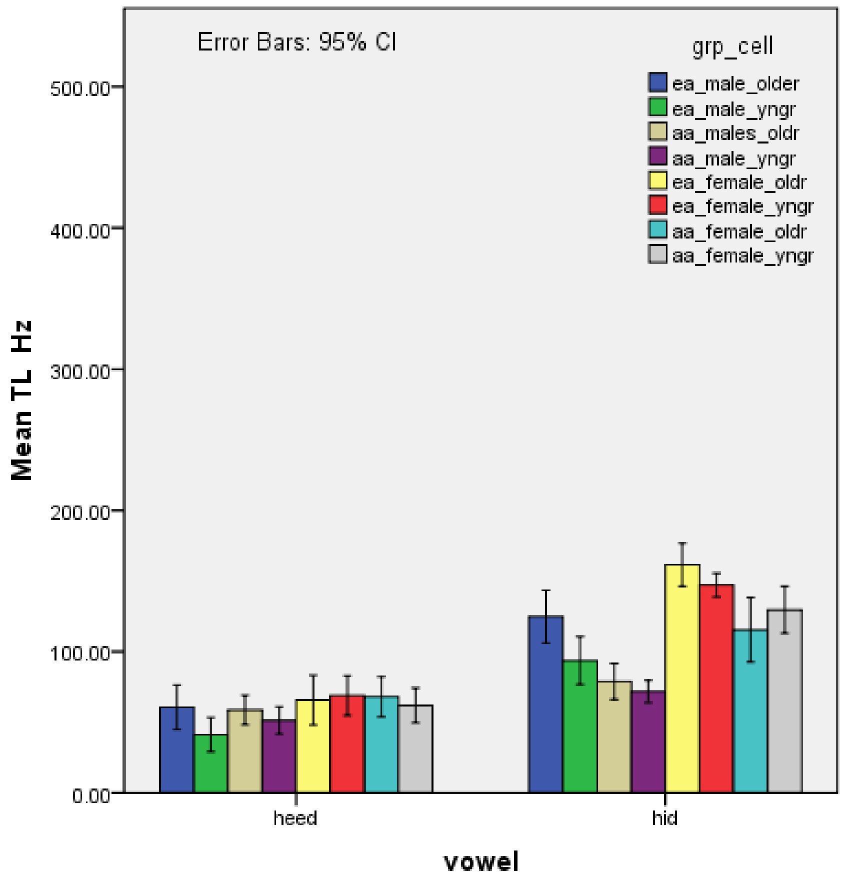

Figure 16 mean TL *heed, hid*

Figure 16 presents the TL data for the vowel pair *heed* and *hid.* The plots show that all groups have greater TL for *hid* than *heed.* This indicates similarity in TL across groups. When evaluating productions by gender and ethnicity, there appears to be a decrease in TL for both vowels by younger speakers for all groups except younger AA females. The younger AA females appear to have an increased TL for *hid.* For the vowel *heed* there appears to be a decrease in TL for the younger males. The decrease appears more definitive for younger EA than younger AA males. A similar pattern is observed in *hid* vowel productions for the younger males.

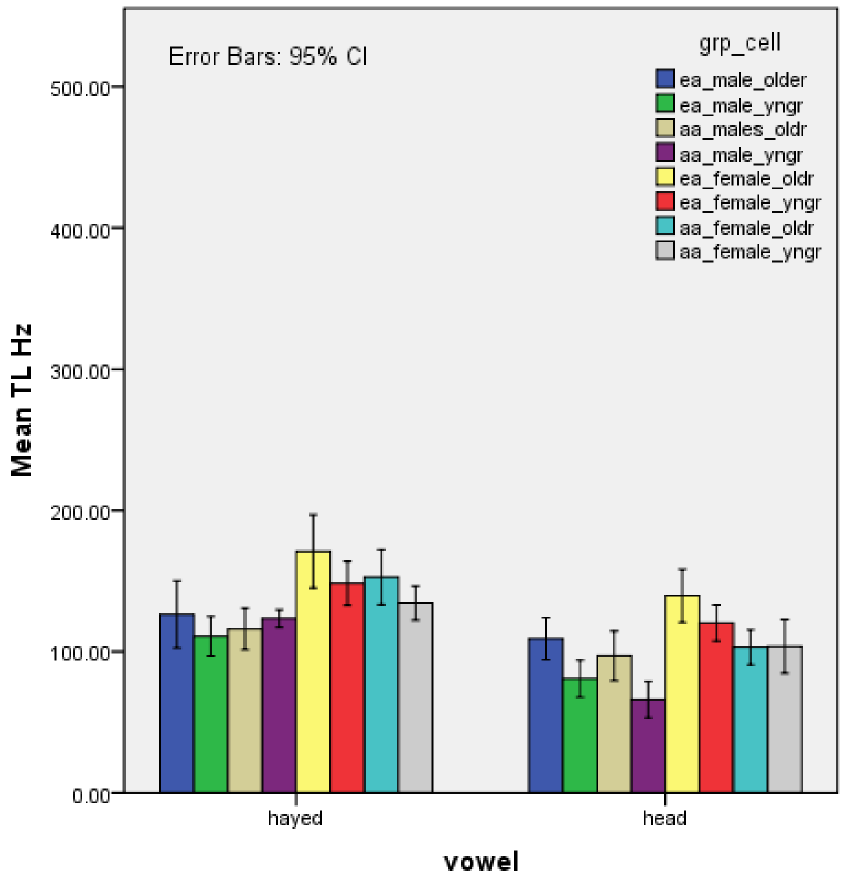

Figure 17 mean TL *hayed, head*

Figure 17 illustrates TL for the vowel pairs *hayed* and *head*. In Figure 17 the greatest group internal distinction between productions of *head* and *hayed* is in the younger AA male group. The TL for *head* is less for all younger speakers compared to their older gender and ethnicity matched counterparts. The exception to this observation is seen with younger AA females who produce both *head* and *hayed* in a manner nearly identical to older AA females.

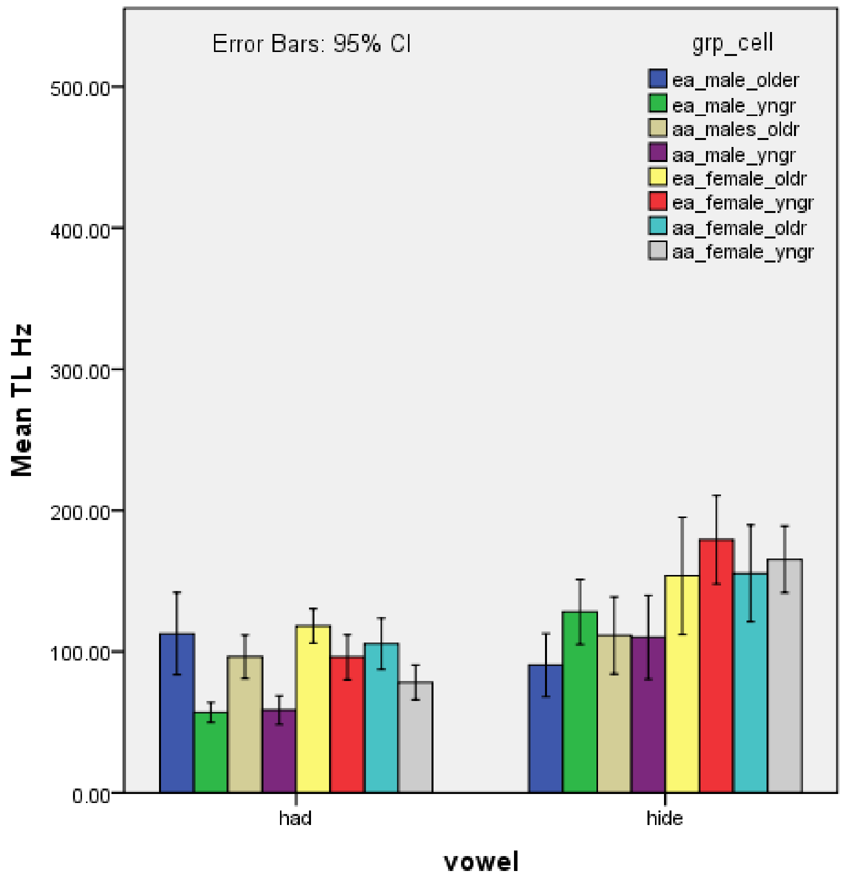

Figure 18 mean TL *hide, had*

Figure 18 is a display of the mean TL values for the vowel pairs *had* and *hide.* The TL of *hide* is greater than *had* for all groups except the older EA male speakers. As a group female speakers produce both *hide* and *had* with greater mean TL than males. These production patterns appear to indicate difference by gender with older EA males demonstrating the most difference.

As this work is primarily interested in similarities of the front vowels associated with the Southern Vowel Shift an ANOVA was completed with the within-subject factor TL and the between subject factors gender, ethnicity, and age group for the vowels /i, ɪ, e, ɛ, æ/ and the diphthong /aɪ/. The analysis revealed a significant difference in TL ([F5, 52 =91.1, p<0.001, η^2=0.898]). Main effects of gender ([F 1, 56 =36.7, p<0.001, η^2=0.396]) ethnicity ([F 1, 56 =5.294, p=0.025, η^2=0.086]) and age group ([F 1, 56 =4.430, p<0.040, η^2=0.073]) were all significant. The obtained results indicate that at least one TL was significantly different and that each extra linguistic variable had some effect on TL. No interaction effects were found to be significant. Based on the lack of interaction effect found in the obtained values TL may not be an effective indicator of socially distinctive vowel production in this community.

In order to further assess this relationship separate ANOVA's were completed for each of the six vowels of the SVS. A Bonferroni correction was applied for multiple comparisons. The dependent variable vowel, either *heed, hid, hayed, head, had* or *hide* was evaluated against the independent variables gender, ethnicity, and age with the following results. For the vowel *heed* no significant differences were found ([F 7, 56 =1.960, p=0.077, η^2=0.197]). For the vowel *hid* significant differences were found ([F 7, 56 =5.62, p<0.001, η^2=0.413]). Main effects were found for ethnicity ([F 1, 56 =10.72 p=.002, η^2=0.161]) with EA speakers (131.31 Hz) trajectory length greater than AA (100.72 Hz), and for gender ([F 1, 56 =25.171, p<0.001, η^2=0.310]). Female speakers(139.45 Hz) produced greater TL than male speakers (92.58). There was no main effect for age group and there were no interaction effects. For the vowel *hayed* a significant difference was found ([F 7, 56 =2.97, p=0.010, η^2=0.271]). There was a main effect for gender with females (148.68 Hz) producing greater trajectory length than males (141.17Hz). No other main or interaction effects were found.

For the vowel *head* a significant difference was found ([F 7, 56 =4.70, p<0.001, η^2=0.37]). Main effects were found for ethnicity ([F 1, 56 =11.69, p=0.001, η^2=0.173]) EA (121.22 Hz) greater than AA (88.96 Hz); gender ([F 1, 56 =8.59 p=0.005, η^2=0.133]) with females (118.93 Hz) greater than males (91.25 Hz); and age group ([F 1, 56 =5.12, p=0.028, η^2=0.084]) with older speakers (115.77 Hz) greater than younger (94.408 Hz). An interaction effect was found for ethnicity by sex ([F 1, 56 =4.458, p=0.039, η^2=0.074]) with EA females (145.03 Hz) greater than EA males (97.42 Hz) and AA females (92.83 Hz) greater than AA males (85.09 Hz). No other interaction effects were found.

For the vowel *had* a significant difference was found ([F 7, 56 =3.13, p=0.007, η^2=0.281]). A main effect was found for age group ([F 1, 56 =13.60, p=0.001, η^2=0.195]) with older speakers (108.16 Hz) producing greater trajectory length than younger (72.176 Hz).For the vowel *hide* no significant differences were found ([F 7, 56 =1.414, p=.218]).

For the six vowels of the SVS four revealed significant differences in production by group membership however only two *hid* and *head* revealed differences in production by ethnicity. It is interesting to note that although the duration main effects found AA speakers and female speakers produced significantly greater duration values. The trajectory length of *hid* and *head* reveal AA speakers produce shorter trajectory length than EA speakers. No consistent patterns of difference in production of the six vowels is found in these measures of trajectory length.

Spectral Rate of Change

SROC provides information on the rate of frequency change over time. When comparing vowel pairs the greater SROC value indicates movement over a greater distance in a shorter period of time (e.g. faster rate of change). Figures 19, 20, and 21 below provide graphical displays of the SROC for the vowel pairs *heed* and *hid*, *hayed* and *head*, *had* and *hide*. As with the TL plots space and formatting requirements necessitate the use of three separate figures. The value SROC is defined as the trajectory length divided by 0.60 multiplied by the duration value.

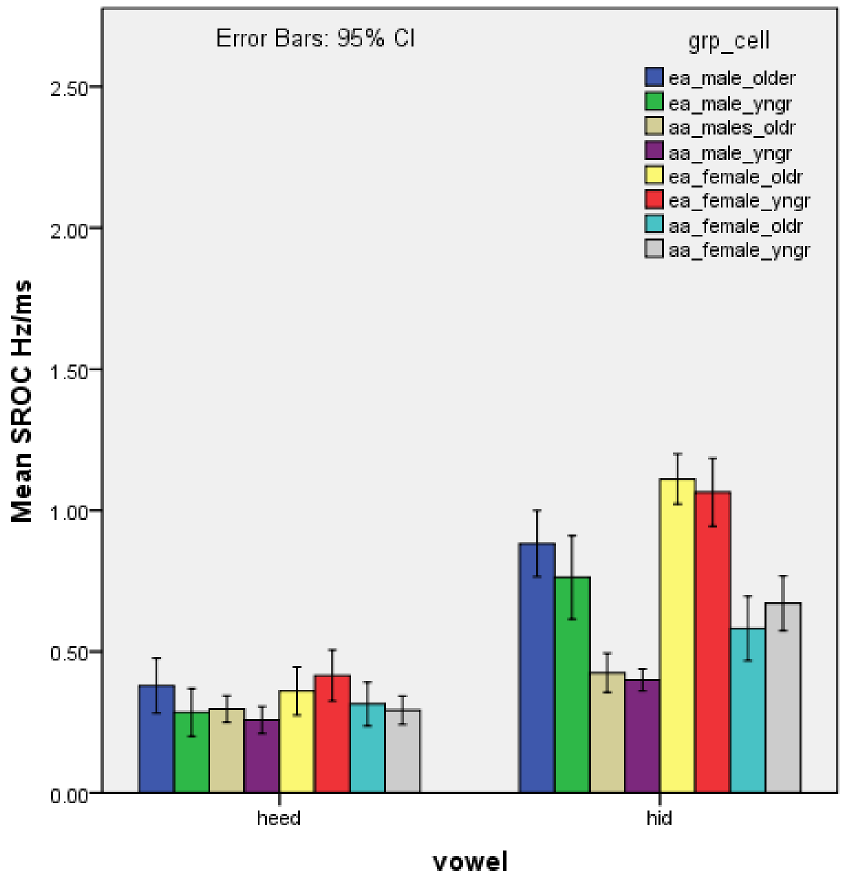

Figure 19 mean SROC *heed, hid*

In Figure 19 the vowel pairs as produced in the words *heed* and *hid* are presented. All speaker groups appear to have greater SROC for the vowel in *hid* than for the vowel in *heed*. EA speaker groups appear to have much greater SROC for *hid* than their AA counterparts. For the vowel *hid,* AA females appear to have greater SROC than AA males, as do EA females compared to EA males. For this vowel younger AA females show an increasing SROC compared to older AA females. This pattern is opposite to that seen for older and younger EA females. For the vowel *heed* younger EA females are the only group that appear to produce the vowel with an increase in SROC compared to the older EA females.

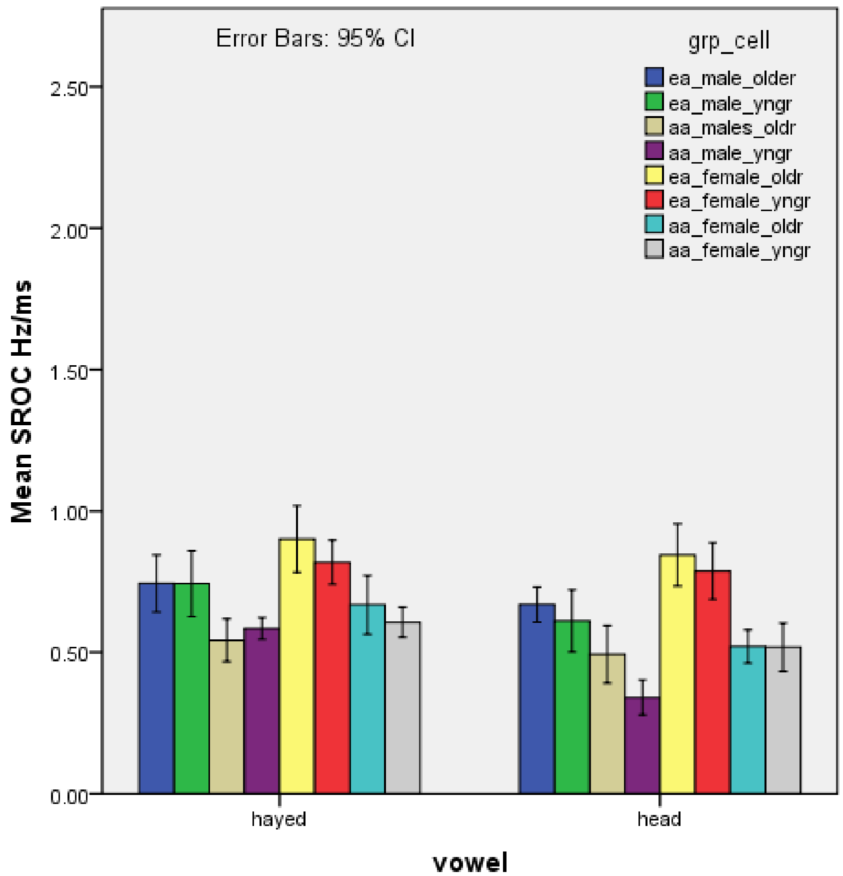

Figure 20 mean SROC *hayed, head*

Figure 20 illustrates SROC production for the vowel pairs in *hayed* and *head*. Female SROC is greater for both age and ethnic groups. Both older and younger EA males and females produce the pairs in a similar manner. A similar pattern is observed for AA older and younger male and female speakers. Cross ethnically it appears the younger male speakers produce *head* with shorter SROC than the older males. The difference in SROC of *head* for younger AA speakers appears large. Overall the SROC values suggest EA speakers produce vowel tokens that move a greater distance in a shorter period of time.

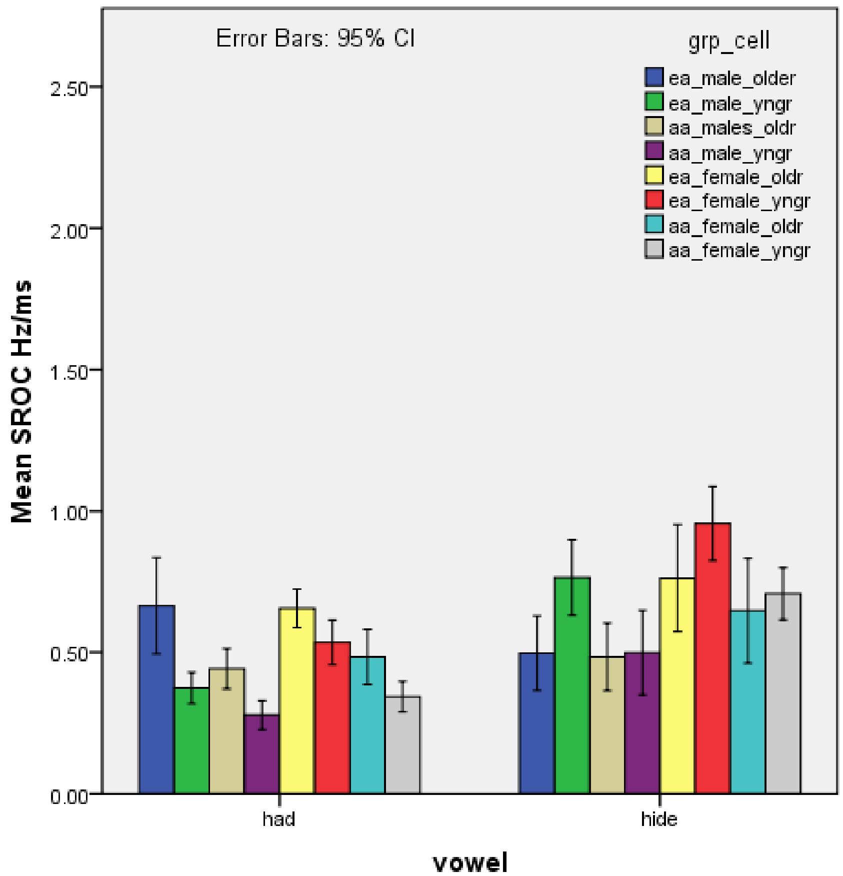

Figure 21 mean SROC *had, hide*

Figure 21 presents the graphical display of SROC for the vowel pair *had* and *hide*. SROC for this pair appears to be more closely associated with generational differences than with gender and ethnicity. The older EA males are the only group with greater SROC for *had* than for *hide*. For *had* there appears to be a decrease in SROC for all younger speakers, while for *hide* younger EA speakers have increased SROC. The younger AA speakers appear to have SROC productions that are consistent with older AA speakers. The overall relative SROC appears greater for the younger EA speakers than the AA group.

A repeated measures ANOVA of SROC was completed for the six vowels with the dependent variable SROC and the independent variables gender, ethnicity, and age group. The SROC was found to be significant ([F 5, 280 =43.741, $p<0.000$, $\eta^2=0.439$]). This measure indicates that at least one group of vowels had a statistically different mean SROC value. The main effect of gender was ([F 1, 56 =22.381, $p< 0.001$, $\eta^2=0.286$]) with female speakers (0.649 Hz/ms^2) producing greater SROC than male (0.518 Hz/ms^2). This indicates the variable gender accounted for 28.6% of the variability in SROC productions. The main effect of ethnicity was ([F 1, 56 =60.796, $p < 0.001$, $\eta^2=0.521$]) with EA speakers (0.692 Hz/ms^2) producing SROC greater than AA speakers (0.475 Hz/ms^2). This interaction points to a strong impact of ethnicity (52%) in accounting for the observed variability among SROC means. These findings indicate SROC value may be a useful measure to differentiate or define vowel productions by group membership in this group of speakers. There was no main effect of age group and there were no significant two and three-way interaction effects.

In order to further evaluate differences in group productions of the front vowels an ANOVA was completed for each of the six vowels of interest *heed, hid, head, hayed, had, hide* with the following results.

For the vowel *heed* there was no significant difference in the group means of SROC production ([F 7, 56 =1.221, p=.307]). This indicates the vowel was produced with similar SROC by all groups. For the vowel *hid* a significant difference was found ([F 7,56 = 13.77, $p<0.001$, $\eta^2=0.632$]). The main effects of gender and ethnicity were significant while the main effect of age group was not. The effect of gender ([F 1,56 = 21.79, $p<0.001$, $\eta^2=0.28$]) was greater for female speakers (.858 Hz/ms^2) than males (.618 Hz/ms^2). The effect of ethnicity ([F 1,56 = 71.95, $p<0.001$, $\eta^2=0.56$]). EA speakers (.956 Hz/ms^2) revealed that EA speakers exhibited greater SROC than AA speakers (.521 Hz/ms^2). There were no significant interaction effects for *hid.*

Significant main effects were found for the vowels *hayed, head, had* and *hide*. For *hayed,* ([F 7,56 = 3.96, p= 0.001, $\eta^2=0.331$]). Main effects were found for gender ([F 1,56 = 4.64, p=0.035, $\eta^2=0.077$]). SROC values for female speakers were (.748 Hz/ms^2) with values of (.654 Hz/ms^2) for males. The effect of ethnicity was ([F 1,56 = 21.25, $p<0.001$, $\eta^2=0.275$]). EA speakers (.802 Hz/ms^2) produced greater SROC than AA speakers (.600 Hz/ms^2). There was no main effect of age group. There were no significant interaction effects. For *head* ([F 7,56 = 7.58, $p<0.001$, $\eta^2=0.486$]). Main effects were found for gender ([F 1,56 = 10.81, p=0.002, $\eta^2=0.162$]). SROC values for female speakers were (.667 Hz/ms^2) with values of (.527 Hz/ms^2) for males. The effect of ethnicity was ([F 1,56 = 37.284, $p<0.001$, $\eta^2=0.4$]). EA speakers (.728 Hz/ms^2) produced greater values of SROC than AA speakers (.467 Hz/ms^2). There was no main effect of age group. There were no significant interaction effects. For *had* there was a significant difference between groups ([$F_{7,56} = 4.35$, $p= 0.001$, $\eta^2=0.352$]) however a different pattern of significant main effects was exhibited. There was no main effect from gender but there were main effects for ethnicity and age. No interaction effects were significant. The main effect of ethnicity was ([$F_{1,56} = 12.66$, $p=0.001$, $\eta^2=0.184$]). EA speakers (.558 Hz/ms^2)had greater values of SROC than AA speakers (.388 Hz/ms^2). The main effect of age group was ([$F_{1,56} =14.002$, $p<0.001$, $\eta^2=0.2$]). Older speakers (.563 Hz/ms^2) produced greater values of SROC than younger speakers (.384 Hz/ms^2). Finally for the vowel *hide* a significant difference between groups was seen ([$F_{7,56} = 2.32$, $p= 0.038$, $\eta^2=0.224$]). Again there was a main effect of both gender and ethnicity with no main effect of age group. The main effect of gender ([$F_{1,56} = 7.18$, $p=0.010$, $\eta^2=0.114$]). SROC values for female speakers were (.770 Hz/ms^2) with a value of (.562 Hz/ms^2) for males. The effect of ethnicity was ([$F_{1,56} = 4.27$, $p=0.043$, $\eta^2=0.71$]). EA speakers (.746 Hz/ms^2) produced greater values of SROC than AA speakers (.585 Hz/ms^2). No interaction effects were found to be significant.

Participation in the SVS

The SVS has most recently been characterized (Labov et al., 2006) by three inter-related vowel movements. These movements are Stage 1 the monophthongization of the diphthong /aɪ/, Stage 2 the relative change in location of the vowels /e/ and /ɛ/ and Stage 3 the relative change in location of the vowels /i/ and /ɪ/. As previously discussed one geographic location fully associated with all three vowel movements is the Inland South. The extra linguistic values most consistently correlated with participation in the SVS are geography, residence in the Inland South, and age. Older speakers (≥50) are more likely to have all three components of the SVS than younger speakers (≤ 25). Data from Labov et al., (2006) show a regression of the SVS in the younger speakers. Speakers not living in the Inland South or the Texas South are typically participating in only Stage 1 or Stage 1 and 2 of the SVS.

Monophthongization of /aɪ/

The community under study is in a region in the South where the vowel /aɪ/ is expected to be a monophthong before voiced elements and finally (e.g. *tie, tied, high school*) and a diphthong before voiceless elements (e.g., *tight, bike, etc.*) (Labov et al., 2006). The vowel tokens evaluated in this work were produced in an h V d frame. The final stop /d/ is a voiced obstruent. The members of this speech community would be expected to produce this element as a monophthong. However as illustrated in the non-normalized descriptive F1 by F2 plots this element was produced with a diphthong like movement with an origination of the token near /a/ and movement over the course of the vowel's trajectory towards /ɪ/. The token /aɪ/ was produced low in the relative bottom front of the vowel space by all speaker groups. The final height of the glide at t5 of /aɪ/ reached only to the region of /æ/ production. This may result perceptually in /aɪ/ sounding less diphthongal and less like /aɪ/ as the glide does not enter the production region of /ɪ/. The vowel produced in this community may sound more like /aæ/.

The EA female speakers produce fronted /æ/ and maintained /aɪ/ production as a relative diphthong. The other speaker groups raised, or raised and slightly fronted /æ/ while maintaining /aɪ/ vowel as a diphthong with a rising (decreasing value) F1 over t3-t5. The most relevant feature of /aɪ/ vowel as produced by these speakers, is that although the vowel has a glide like movement, the F1 change is greater than the change in F2. This results in /aɪ/ production that does not appear to enter the production area of /ɛ/ vowel, a movement that might interfere with the Stage 2 reversal.

Labov et al., (2006) calculated /aɪ/ monophthongization as a percentage of monophthong versus diphthong production during spontaneous speech. This study uses data collected in a read speech task. This study will evaluate /aɪ/ monophthongization by comparing trajectory length for /aɪ/ vowel to trajectory length for the vowels /i/ and /e/ as produced in the words *heed* and *hayed*. Again referring to Figure 7 and 8 the production of /i/ vowel occurs as a relative monophthong while /e/ is produced with a more diphthong like quality. Since TL evaluates the amount or magnitude of frequency change over the course of the vowels duration it is expected that TL for /i/ produced as a relative monophthong would be less than /e/ produced as a relative diphthong. The TL value for / aɪ / would be expected to be more consistent with the value for /i/ if /aɪ/ is produced as a monophthong and more similar to /e/ if produced as a diphthong. The obtained TL values for /i/, /e/ and /aɪ/ are presented in Figure 22 below.

As illustrated below the TL of /aɪ/ is greater than the TL of /i/ as produced in *heed* and similar to the TL of /e/ as produced in *hayed*.

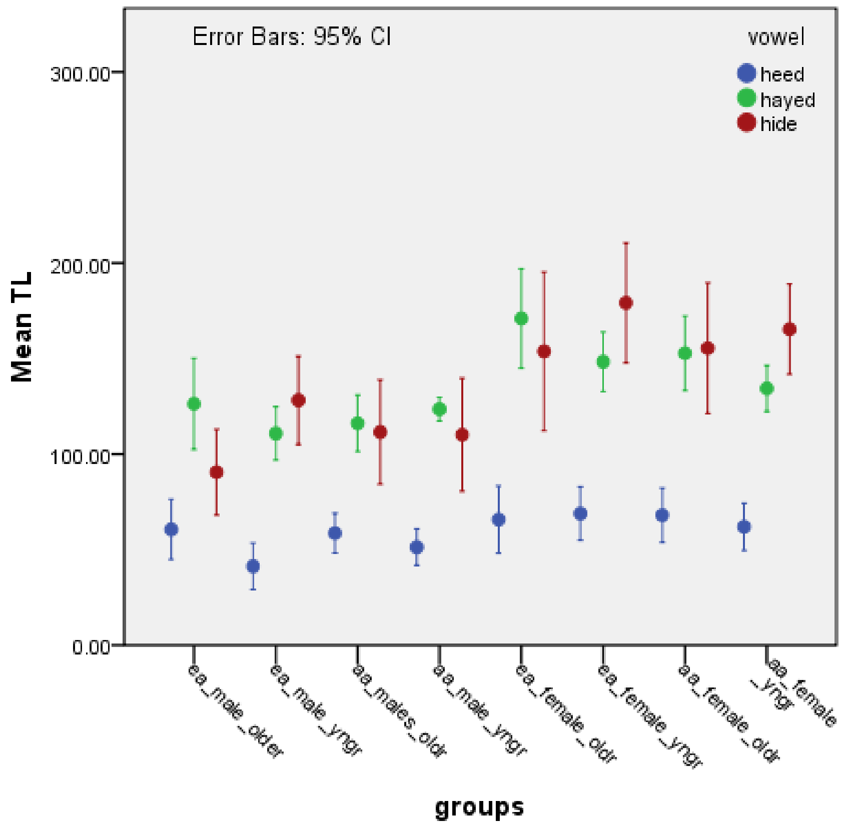

Figure 22 TL *heed, hayed, hide*

A repeated measures ANOVA was completed with the dependent variable monophthong representative of the three TL values for *heed, hayed* and *hide* and the independent variables age, ethnicity, and gender. The within subject effects indicate at least one mean TL value is significantly different ([F 2, 112 =75.0, p<0.01, η^2=0.573). The mean TL of *heed* was 59.6 Hz; the TL of *hide* was 136.8 Hz; the TL of *hayed* was 135.4 Hz. A pairwise comparison indicated the trajectory length for /i/ vowel was significantly different than the TL for both /aɪ/ and /e/ while /aɪ/ and /e/ were not significantly different from each other. This indicates the observed diphthong like production for /e/ in *hayed* is not significantly different than the observed diphthong like production for /aɪ/ in *hide.* Only the main effect of gender was significant ([$F_{1, 56} = 21.1$ $p < 0.001$ η^2 0.273]) with females producing greater TL than males for all three vowels. The female TL means were *heed* 66.2 Hz, *hayed* 151.6 Hz, *hide* 163.4 Hz; while the male TL means were *heed* 52.9 Hz, *hayed* 119.2 Hz, and *hide* 110.1 Hz. No other main or interaction effects were found to be significant.

TL is a measure of the magnitude of spectral change in the F1 x F2 plane. The difference in TL value for /aɪ/ vowel with respect to /i/ and /e/ is not consistent with the production of /aɪ/ vowel as a monophthong for this group of speakers in this speech task. Based on these results /aɪ/ vowel is produced as a relative diphthong for this group of speakers not a relative monophthong. The production location for /aɪ/ below or in front of the production area for /æ/ and /ɛ/ would still however move /aɪ/ out of the production space necessary for Stage II of the SVS. If it is found this community is participating in the SVS then its pattern of /aɪ/ production does not cleanly fit with either Pattern I, /aɪ/ monophthongization, or Pattern II, back upgliding of /aɪ/, described by Labov et al. (2006). The observed vowel productions in this community may be representative of a subsystem of Pattern I or a separate pattern altogether.

A regression analysis was completed to evaluate the effect of gender, ethnicity, and age group, along with income and education level for participation in Stage 1 /aɪ/ vowel monophthongization and Stage 2 reversal of /e/ and /ɛ/ of the SVS. Since the measurement of /aɪ/ vowel TL for this community is not consistent with monophthongal vowel production the linear regression will only provide information on likely correlations between /aɪ/ vowel production and social variables. The variables entered for the regression were the categorical variables gender (Male/Female), ethnicity (EA/AA), age group (Younger/Older), Education (No college;_NC, Some College;_C, College Grad_CG), Income (Lo Income < 25K, Mid Income 25-50K, Hi Income >50K). A regression analysis predicting TL of /aɪ/ vowel from the listed categorical variables was completed using the enter method. A significant model emerged ($F_{7,56} = 4.04$ $p=0.00$, $\eta^2 = 0.253$). Significant values are shown in Table 12 below.

Predictor Variable	Beta	p
Hi_income	NS	NS
Mid_Income	NS	NS
AA	NS	NS
Female	58.170	p<.001
Ed_C	-37.408	p=.040
Ed_CG	NS	NS
Oldr	NS	NS

Table 12 TL of /aɪ/ vowel

Only category membership as female with some college was significantly associated with the TL of /aɪ/ vowel. The other variables used as part of the enter method of regression analysis did not significantly contribute to the model. The regression analyis was completed against the speaker reported social education and income variables. As previously described the median income in the study community was approximately $68,000 in 2009 with primary employment in the area in manufacturing and retail service. The income values that were coded (< 25K per year; 25-50K per year; >50K per year) for analysis represent well below median, below median and near or above the median. The distribution of speakers into the three categories, based on speaker report, was 16 speakers in the Hi_income category, 16 speakers in the Mid_income category, and 32 speakers in the Lo_income category. For education the values were coded NC for no college, C for some college and CG for college graduate. The distribution of speakers into the categories was 21 NC, 25 C and 18 CG. The results of the Stage 1 linear regression indicate a significant positive relationship between female gender to TL of /aɪ/ vowel and a significant negative relationship between some college with TL of /aɪ/ vowel. Using these results in a predictive manner, they point toward female community members being more likely to have longer /aɪ/ vowel trajectories and persons with either no college or college graduates having longer /aɪ/ vowel trajectories. Speakers who are male with some college would be expected to have shorter trajectories of /aɪ/ vowel.

Reversal of /e/ and /ɛ/

Labov et al., (2006) calculated the reversal of /e/ and /ɛ/ by summing the difference between the F2 value of /ɛ/ minus the value of /e/ at some time with the difference in F1/e/ - F1 /ɛ/ values at the same temporal location. When the result is positive the relative positions of /e/ and /ɛ/ have changed. For the current data set 31of 64 speakers produced the vowels with a positive difference at t2 of duration (35% point). This manner of production is consistent with the reversal of /e/ and /ɛ/. Figure 22 below presents the mean values for the calculated difference of /e/ and /ɛ/. Only the older and younger EA females do not show a negative value on this measure. This may indicate all speaker groups except older and younger EA females are participating in Stage II of the SVS. An alternative explanation is that the community participation in the SVS is regressing and the EA females are leading this change.

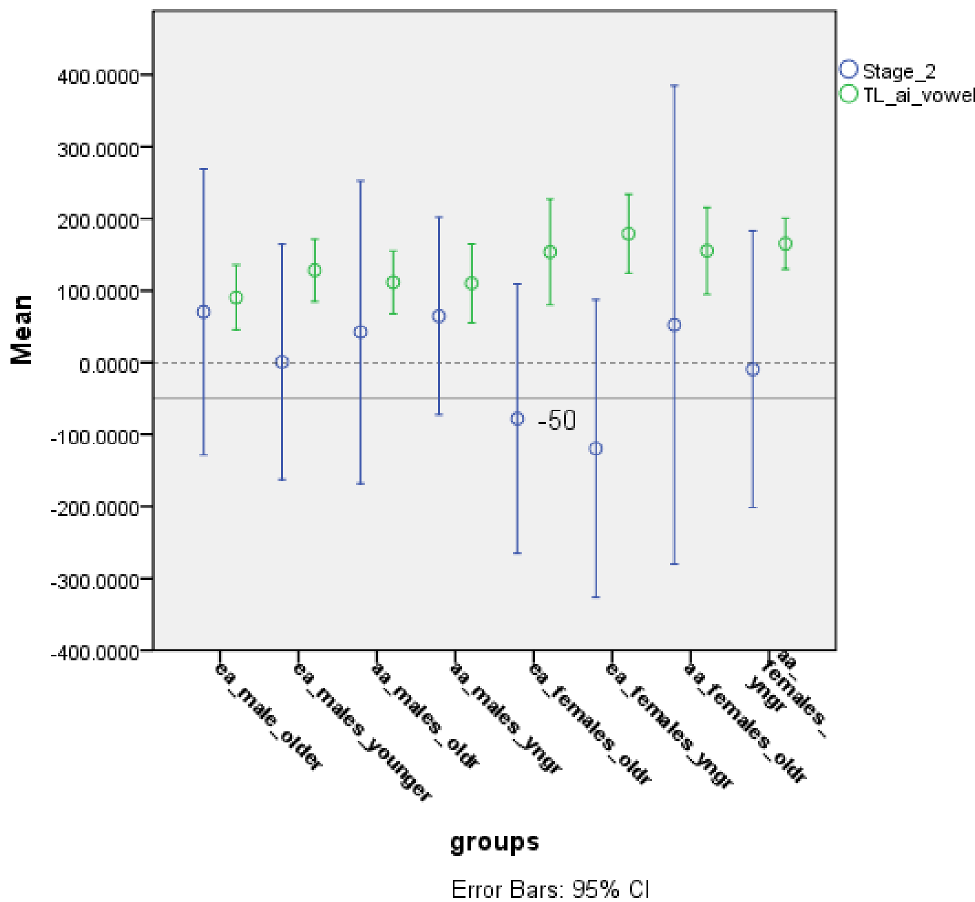

Figure 23 Correlation of social factors with elements of the SVS
-- dashed line indicates 0 Hz; solid line indicates (-50 Hz) --

In calculating group participation in the SVS a method similar to Labov et al. (2006) was used. That group used percent of /aɪ/ glide deletion Stage 1 of the SVS. For this paper the regression analysis includes the trajectory length of /aɪ/ vowel as a predictor variable. This value was included even though /aɪ/ vowel is diphthongal in this community because the production of /aɪ/ in the vowel space in this community does allow space for the /e/, /ɛ/ reversal.

A regression analysis predicting Stage 2 from the listed categorical variables and /aɪ/ vowel trajectory length was completed using the enter method. A significant model emerged (F 8,55 =2.234 p=0.38, η^2 = 0.135). Significant values are shown in Table 13 below.

Predictor Variable	Beta	p
Mid_Income	NS	NS
Lo_Income	NS	NS
AA	NS	NS
Female	NS	NS
Ed_C	NS	NS
Ed_CG	NS	NS
Oldr	NS	NS
TL of /aɪ/	-1.459	p =.009

Table 13 Stage 2 Participation

The results of the Stage 2 linear regression indicate the only variable in the model significantly related to participation in Stage 2 of the SVS is the trajectory length of /aɪ/ vowel. This value was negatively correlated with the /e/, /ɛ/ reversal. No other predictor variables were found to have a significant influence on the values associated with Stage 2 of the SVS. As /aɪ/ vowel is diphthongal in this community this negative relationship to Stage 2 is not unexpected. This finding is consistent with Labov et al., (2006) results of monophthongal /aɪ/ production and participation in the SVS. No other socio-linguistic factors were found to be significant.

Chapter 7: Discussion

Similarities and Differences in AAE and WVE

The purpose of this dissertation was twofold, first to evaluate similarities and differences in the vowel productions of AA and EA speakers in a small town in western North Carolina for similarity and second to assess community participation in the SVS. In order to compare vowel production by group membership speakers were asked to self-identify themselves by gender, and ethnicity. A categorical value for age group was defined by separating speakers into a pre- and a post school integration cohort. This category was created to evaluate the hypothesis that school integration had an impact on the vowels produced in the post-integration group; as it is hypothesized that these speakers would have spent a larger proportion of their daily lives in a mixed ethnic environment. It is hypothesized that this daily interaction between the younger group of speakers would result in similarities in their vowel productions not seen in the older group of speakers hypothesized to have spent the majority of their school years (ages 6-18) in an ethnically segregated environment.

A set of variables were defined for comparison by group membership. These were vowel duration, vowel space area (normalized), vowel trajectory length (TL), and vowel spectral rate of change (SROC). There were six main alternatives for speaker performance on the vowel production tasks. 1)Differences by age group only; 2) differences by gender only; 3)differences by ethnicity only; 4)differences by age and by gender; 5) differences by age and ethnicity; 6) differences by gender and ethnicity; 7) differences by age, and gender, and ethnicity. The results provide minimal support for alternative 6) differences by gender and ethnicity with some support for alternative 5) differences by age and ethnicity and alternative 7) differences by age and gender and ethnicity.

For the measures duration, normalized vowel space area, TL, SROC significant differences were found between group means. For duration AA and female speakers had the greatest mean values. For vowel space area EA and younger speakers had the greatest areas with an interaction effect for gender and age with younger male and female speakers demonstrating greater normalized vowel space areas than the older group. For TL EA and female speakers produced greater values. For SROC female and EA speakers produced greater values. The value duration is used to calculate both TL and SROC. The finding that female speakers have greater values across both TL and SROC is not surprising. It is interesting however that EA speakers have greater TL and SROC values as AA speakers had greater duration values. The TL is a measure of the magnitude of change. The greater duration of AA vowel means alongside the greater value of TL for EA speakers suggests that while AA speakers produce longer vowels the amount of change across the vowel's duration is greater for EA speakers. The additional finding that the mean SROC (spectral rate of change) the amount of change from the 20% point to the

80% point over the vowel's duration, for EA speakers is greater than for AA speakers further indicates that EA speakers make more changes in F1 and F2 more quickly over the course of the vowels production. These features point toward more dynamic movement in the EA speakers in this task. Looking specifically at Chamber's Principle 2.3 Simple phonological rules progress faster than complex ones the data show that there is an effect of dialect contact in the speech of the AA speakers in the community. Both TL and SROC are values derived from duration. AA speaker have greater duration values but EA speakers have greater TL and SROC values. It is possible that AA speakers are moving toward EA speakers in the onset and off set of vowels. These finding suggest the AA speakers are matching, or rather exceeding EA speakers in total vowel duration however the magnitude and rate of change, a temporal phenomenon, may be a sub phonemic event that is difficult to acquire. An examination of the descriptive plots Figure 7 and 8, show that in particular the younger AA speakers appear to be moving toward the production manner of the EA speakers, particularly for the vowel *head* for both male and female speakers and for *hide* for males.

Specific information on mean differences for the six vowels associated with the SVS revealed that *head* and *hide* have substantial variability in production. For *head* AA is greater than EA duration; for TL there are main effects revealing EA, older, and female speakers have greater values and there are interaction effects of ethnicity and sex with EA and AA females producing greater values. The variance accounted for , partial eta squared, indicates approximately 17% of the variance is ethnically accounted for, 8% age group, 13% gender and 7% ethnicity x sex interaction. While the findings of mean difference are significant, the effect size is small. For SROC of *head* the gender variance accounted for(female greater than male) is 16% while the ethnicity (EA > AA) is 40%. The spectral rate of change measures how quickly the changes in F1 and F2 occur. Ethnicity has a strong effect on SROC. While AA and EA speakers may have similar starting and ending points for the production of this vowel, the rate with which the formant changes occur appears to be strongly related to ethnic group membership.

For the vowels *hide,* AA and older speakers show greater values. There is no significant difference in TL by group membership. The SROC for *hide* reveals greater values for females and EA speakers. For spectral rate of change the variance accounted for by gender is approximately 11% but ethnicity accounts for only 7% of the variance. The measures completed with this vowel indicate AA and EA speakers on this task in this sample continue to show a significant, measurable difference in production values for SROC, but the variance accounted for is small.

These results of the data collected for vowel duration, normalized vowel space area, TL and SROC provide baseline data for EA and AA speakers from a rural community near the Inland South. These data provide additional evidence on the complex nature of AA and EA speech relationships in the rural South. The community under study is in the western piedmont, or foothills of the Appalachian mountains of NC. The community has maintained a relatively consistent social and economic stratification over the last hundred years. An examination of vowel dynamics in other speech tasks may provide relevant data on the manner in which groups of speakers manipulate SROC to index socio-linguistic meaning.

The community under study was and remains a rural but relatively prosperous town with agricultural and service industries providing employment in the community. This economic base led to relatively equal economic relationships among AA and EA members. In addition the development of a unified school district in the late 1960's resulted in a generation of children growing up in homes with parents of similar educational and economic backgrounds. Due to these community specific qualities, Statesville was an ideal setting to evaluate the relationship between AAVE and WVE. Previous data on AA speakers in North Carolina has been gathered from the eastern region, including the Pamlico Sound and Coastal Plain, and from the far western region. African American speakers sampled in these areas were members of isolated communities (Wolfram, Hazen, and Tamburro 1997; Mallinson and Wolfram 2002) or urban communities of the NC eastern coastal plain (Thomas, 1989).

Participation in the SVS

The variables defined for assessing community participation in the SVS were monophthongization of /aɪ/ vowel, trajectory length of /aɪ/ vowel, and the relative reversal of /e/ and /ɛ/ (Stage 2). A comparison of the TL of /aɪ/ compared to /i/ and /e/ indicated that /aɪ/ vowel was produced as a diphthong before final /d/ in this community.

However the manner of production of /aɪ/ vowel was more consistent with a phonological realization of the token as /aæ/. This manner of production would allow space in the F1 x F2 plane for the /e/, /ɛ/ reversal to occur.

A linear regression using the dependent variable TL of /aɪ/ vowel against the categorical predictor variables along with additional variables accounting for income and educational level revealed the variables female gender and some college were relevant to the mean values of TL for /aɪ/. Since the value for /aɪ/ is more diphthongal than monophthongal and the duration value is used in the calculation of trajectory length it is not surprising that female gender would be correlated with the longer TL for /aɪ/. The interesting parameter of association with this variable was some college (C). Speakers with some college as opposed to those with no college and those who are college graduates may have a greater awareness of the expectation for standard speakers to produce /aɪ/ as a diphthong. This implicit knowledge may have influenced this group to produce the vowel in a manner more consistent with the standard expectation.

The expected reversal of /e/ and /ɛ/ was demonstrated by 31 of the 64 speakers in this sample. The linear regression of the difference value (Stage 2) indicated the value most significantly correlated with Stage 2 was TL of /aɪ/. Since a one unit change in Stage 2 was associated with a (-1.459) unit change in /aɪ/ trajectory length the relationship between the dependent variable and the predictor variable is negative. Even though in this community of speakers /aɪ/ is produced as a diphthong before final /d/ the data support earlier findings that shorter trajectory lengths of /aɪ/ (monophthongal production or removal from the front upgliding class); Stage 1 of the SVS; is correlated with participation in Stage 2 .

Based on the presented data this community appears to 1) be a participant in the SVS and 2) be receding in that participation. The presented data further indicate that both EA and AA speakers are participants in the SVS in this community. There was no exclusion of AA speakers in the regression analysis of TL for /aɪ/. or Stage 2. Further, the analysis of /aɪ/. trajectory length did not exclude AA speakers. What was not found in the data was a clear indication that the post integration speakers (those attending integrated schools) were more similar to each other (EA/AA) in their vowel productions than the pre integration speakers. When ethnic group membership was found to be a main effect and AA productions were greater than EA productions the variability accounted for by ethnic group membership (partial eta squared) was consistently more than 40%, and there were no interaction effects between ethnicity and any other variables. Conversely when ethnic group membership was found to be a main effect and EA productions were greater than AA productions, the variability accounted for was typically less than 25% and there were often interaction effects although they did not always include ethnicity. Taken as a whole the results of the data analysis point to a complex relationship between African American English and White Vernacular English as spoken in this community. There is indirect support for the hypothesis that the vowels produced by the post integration speakers are more similar than those produced by the pre integration group. This support is found in the lack of consistent differentiation of vowel productions by gender and ethnicity in the variables evaluated. A stronger argument could be made that AAE and WVE in this community may have historically been and continue to be quite similar. This valuation of the current data set does not support the divergence hypothesis which states AAE and WVE were historically more similar and are currently becoming less similar..

If AAE and WVE were moving away from each other as the divergence hypothesis suggests, then the data gathered in this community should indicate a consistent pattern of difference by age group, gender and ethnicity. One of the primary components of the divergence hypothesis was the segregation of ethnic groups into distinct neighborhoods, peer groups or enclaves. This separation was defined both by race and socio-economic status. In the community under study this type of segregation while once prevalent has substantially decreased in the last 40 years. People living in Statesville live in a relatively diverse community. The relative percentage of African Americans to Whites has remained relatively consistent for many years. These factors may be indicative of the similarities observed in vowel productions in the community.

The data obtained in this sample provide limited evidence of community participation in Stage I and Stage II of the SVS. However both AA and EA speakers appear to be participating in this transition . Unlike Labov et al., (2006) this study used age and gender matched members of the same community to assess participation in the SVS. Labov et. al's (2006) results found living in the Inland South to be the most effective predictor of

SVS participation. This community of AA and EA speakers live in a geographic region just outside the Inland South. In this community rather than finding EA speakers participating in the SVS to the exclusion of AA speakers the data indicate that both groups are or have participated in aspects of this regional sound change event.

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APPENDIX A

SOUTHERN WHITE VERNACULAR ENGLISH (SWVE)

Front vowels /i/ /I/ /e/ /ɛ/ /æ/

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
FLEECE	ï̞i ~ ɪi	ï̞i ~ ɪ̞i	NO	RSW	common diphthong	Thomas 2008
FEEL	ï̟i	i~iə~ ï̟i	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
FILL	ɪ~ iə	ɪ~ iə ~ ɪ̈	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
MIRROR/NEARER	ɪ ~ _i	_i	NO	RSW	scarce published evidence – young white Southerners in general appear to merge these	Thomas 2008

KIT	i~iə ~ ̈i	ɪ ~ iə	stress [tensing and raising in heavily stressed syllables; remains /I/ under weak stress]	RSW	part of the SVS noted in Labov 1991	Thomas 2008
happY	ɪ ~i	i	NO	RSW	/I/production highly recessive	Thomas 2008
HORSES	ɪ ~ï	ɪ ~ ɪ̈	NO	RSW	affected by co-articulation of neighboring segments	Thomas 2008
PIN/PEN	ɪ ~ iə	ɪ ~ iə	merger of /I/&/E/ before nasals **RECEDING IN UR-SW**	RSW *SWVE* **UR-SW**	began late 19th century spread during the 20th century; recessive in some areas 2nd education **EXPANDING IN RSW**	Thomas 2008 *BAILEY 2001* **TILLERY BAILEY 2008**
KIT	i~iə ~ ̈i	ɪ ~ iə	stress [tensing and raising in heavily stressed syllables; remains /I/ under weak stress]	RSW	part of the SVS noted in Labov 1991	Thomas 2008

continued

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
DRESS	e~eə~ eəi	e~ eə	variation related to the SVS; under heavy stress before /d/ middle aged and older speakers show triphthong; before nasals production consistent with PIN/PEN and LENGTH	RSW	/ɛ/ or /e/ if participating in the SVS	Thomas 2008
FELL	e~ ei	e	merger before /l/ *SWVE*	RSW	merger occurs less often than FEEL/FILL [i/I]	Thomas 2008 *BAILEY 2001*
FAIL	ei~æ_ ~ ei	ei ~ e	merger before /l/ *SWVE*	RSW	merger occurs less often than FEEL[i/I]	Thomas 2008 *BAILEY 2001*

continued

STRUT	ɜ > ʌ	ɜ	Age variant	RSW	Λ in former plantation areas among middle-aged and older speakers- recessive- [Ɛ_ Ə] also found	Thomas 2008
FACE	ei ~ æ_i	ei ~ æ_i	geographic variation throughout the South	RSW	[æ_i~ɜi] Southern Appalachian, Ozarks, Texas, Piney Woods, NC coastal plain	Thomas 2008
commA	ə	ə	NO	RSW	----------	Thomas 2008
MARRY	æ	e̹	AGE variant before /r/	RSW **UR-SW**	typically merged by younger speakers: MARY/MERRY precedes merger with MARRY	Thomas 2008 **TILLERY BAILEY 2008**
MERRY	e	e̹	AGE variant before /r/	RSW **UR-SW**	MARY/MERRY precedes merger with MARRY	Thomas 2008 **TILLERY BAILEY 2008**

continued

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
MARY	ei ~ ɛ	ȩ	AGE variant before /r/	RSW **UR-SW**	MARY/MERRY precedes merger with MARRY	Thomas 2008 **TILLERY BAILEY 2008**
TRAP	æ~ æ_ɛ æ_	æ	conditioned + AGE variant	RSW	[æ_ɛæ_] before/d/ & /n/. Speakers born between WWI and WWII may raise to [ɛ]	Thomas 2008
BATH	æ_ɛ	æ	AGE	RSW	White Southerners born prior to WWII distinguish BATH and TRAP	Thomas 2008
DANCE	æ_ɛ	eə	AGE + Geography younger Southerners do not distinguish BATH and TRAP	RSW	Variant by region [æ_ɛ] w or w/o up glide AND [ɑː]	Thomas 2008
HAND	æ~ æ_ɛ æ	eə	AGE	RSW	young white Southerners raise [æ] before nasals; older Southerners use the listed tripthong	Thomas 2008

continued

The BATH and DANCE class is indistinct for most young Southerners. For those born prior to WWII the [æ_ɛ] production is the most common realization although [æ_e] and [aæ] may also occur. For speakers who use these forms pairs such as *pass* and *pace* are differentiated by the height of the glide. The BATH class has a mid vowel height while the FACE class is produced with a high glide. Up gliding BATH and DANCE vowel productions are widespread, but are not used in the Chesapeake Bay area, the Pamlico Sound, the Low Country of South Carolina and southern Louisiana. In words such as *aunt, rather,* and previously *pasture* a non rhotic pronunciation of the vowel of START, or the vowel of LOT was used. This production is most prevalent in eastern Virginia.

continued

Back Vowels /u/ /ʊ/ /o/ /ɔ/ /ɑ/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
GOOSE	ʉ̞u̞~y̞ʉ̞	ʉ̞u̞ ~ y̞ʉ̞ ~ ʉ̞y̞~ y̞y	STRESS	RSW SWVE	fronting more common in the eastern half of the South	Thomas 2008, Bailey 2001
POOL	ʉ ~ u	ʊ̠~u̞	AGE + merger	RSW *SWVE*	younger Southerners rarely show POOL fronting	Thomas 2008, *Bailey 2001*
PULL	ʊ	ʊ̠~u̞	AGE + merger	RSW *SWVE*	POOL and PULL commonly merged by younger speakers throughout the South	Thomas 2008, *Bailey 2001*
FOOT	ʊ̈~ʏ	ʊ̈~ʏ	NO	RSW	common throughout the South in all ages and social levels	Thomas 2008
LOT **LOT**	ɑ	ɑ **ɑ (merged w/ THOUGHT)**	INNOVATION **SINCE 1970**	RSW **UR-SW**	stable vowel: being merged with THOUGHT in some areas	Thomas 2008 **TILLERY BAILEY 2008**

continued

PALM	ɑ > æ	ɑ > ɒo	INNOVA TION	RSW	being merged with LOT in some areas; previously merged with LOT and START in some areas	Thomas 2008
TOMORRO W	ɑ~ɒ	ɑ~ɒ	CONDITI ONED	RSW	[ɑ~ɒ] where /r/ is followed by a vowel in an open syllable [o] where /r/ is followed by a vowel in a closed syllable. This trend more common in Texas and Virginia than the Carolinas	Thomas 2008
ORANGE	ɑ~ɒ	ɑ~ɒ ~o	CONDITI ONED	RSW	see TOMORROW	Thomas 2008

continued

Diphthongs /ai/ / æ/ /æɔ/ /oi/ /ɔo/ /ɔu/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
PRICE	ai ~aːæ~a~ ɑːe ai	ai~aːæ~ aː **full diphthong**	before vcls consonants *BEFORE VOICED OBS AND FINALLY* **all environments**	RSW *SWVE* **UR-SW**	monophthong –glide weakened before voiceless consonants, before liquids: geographically and socially restricted by class, more so in urban than rural areas. Began in 19th century	Thomas 2008, *Bailey 2001* **Tillery Bailey 2008**
PRIZE	aːɛ~ aːæ~a	aːɛ ~ aːæ~aː **full diphthong**	see PRICE **all environments**	RSW **UR-SW**	see PRICE	Thomas 2008 **Tillery Bailey 2008**

continued

MOUTH, LOUD	æɔ~æɒ ~æ̠ɛɒ> aɒ˙æɑ	æɔ~æɒ> aɒ	STRESS + GEOGRAPHY +AGE	RSW	Tidewater & Piedmont [æɔ~æɒ] before voiced consonants and word finally: before vcls consonants [ɜʉ~ɜy]; fronting is variable	Thomas 2008
CHOICE	oi~ɔoi>oː ɛ~oːe ɔi	oi	CONDITION +AGE +GEOGRAPHY *GLIDE REDUCTION BEFORE /L/*	RSW *SWVE*	[ɔoi][ɒoɨö] : [oːɛ][oːə] former Plantation areas. Both processes more common in speakers born before 1960. before /l/ glide weakening is common in all Southern groups	Thomas 2008 *BAILEY 2001*
CLOTH	ɔo~ɑɒ	ɑɒ	always merged with THOUGHT	RSW	see THOUGHT	Thomas 2008

continued

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
THOUGHT **THOUGHT**	ɔo~ɑɒ **ɔ~ɔo**	ɑɒ **ɑ(merged w/LOT**	Regional Variation **SINCE 1970**	RSW **UR-SW**	[ɑɒ] most common form; see LOT	Thomas 2008 **TILLERY BAILEY 2008**
GOAT	ɔ̟u~ɒ̟u	ɜʏ~ɜu~æ̠u	Innovation	RSW	fronting began in northeastern NC during 19th century, now found throughout the South among young whites.	Thomas 2008
GOING	ɔ̟u~ɒ̟u	ɔ̟u~ɒ̟u	condition	RSW	fronting blocked before nasals	Thomas 2008
GOAL	ɔ̟u~ɒ̟u	ɔ̟u~ɒ̟u	condition + AGE	RSW	seldom fronted before /l/ esp. by younger speakers	Thomas 2008

continued

R influenced vowels / ɚ / /iɚ / /æɚ / /ɑɚ / /ɔɚ/ /oɚ/ uɚ/ /aæɚ/ /æɔɚ/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
NURSE	ɚ>ɐɚ>ɜ ɪ	ɚ> ɐɚ	AGE	RSW	more rhoticity in younger speakers	Thomas 2008
NEAR	i̱ɚ ~iə	i̱ɚ	NO	RSW	-----	Thomas 2008
SQUARE	æɚ~æə ~ɛiɚ~ɛiə ~e̞ɚ	e̞ɚ	AGE	RSW	[æɚ] [æə] for rural middle-aged and older speakers	Thomas 2008
START	ɒɚ~ɒː	ɒɚ~ >ɑɚ	AGE	RSW	rounded nucleus common since 19th century	Thomas 2008
NORTH	ɔɚ~ɔə~ ɔoɚ~ɔo ə~ɔo	oɚ	AGE	RSW	few Southerners born after WWII distinguish NORTH and FORCE	Thomas 2008
FORCE	oɚ~oə~o uɚ~ouə ~ou	oɚ	AGE	RSW	younger white rural Southerners rarely show upgliding in FORCE	Thomas 2008

continued

AFRICAN AMERICAN ENGLISH

Front vowels /i/ /I/ /e/ /ɛ/ /æ/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
FLEECE	deaf→ *e.g.*[dif]				has not disappeared in AA speech as quickly as in EA speech	LAGS 29%AA 13% EA
FEEL	i̟i	i~iɘ~ i̟i	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
FILL	ɪ~ iɘ	ɪ~ iɘ ~ ɪ̈	Merger before /l/	RSW *SWVE*	merger of /i/ & /I/ by many young Southerners	Thomas 2008 *BAILEY 2001*
Vowels before /l/			merger before /l/	Widespread throughout the US		Thomas (2008)
Field eg. [i→I] *sale eg.* [e→ ɛ] *school eg.* [u→ɨ]			merger before /l/	EA speakers in Texas	EA more likely than AA speakers to show laxing of vowels (laxing is correlated with merger of the corresponding lax vowels)	Bernstein (1993)
heel/hill [i/I] *pool/pull* [u/ʊ]			merger before /l/	AA more likely to show merger than EA	Throughout the US	Labov et. al. (2006)

continued

APPENDIX A continued

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
DRESS/KIT			tense and raise	SWVE/AAE		
FACE/DRESS reversal				SWVE/AAE	occurring in AAE	Fridland (2003); Fridland and Bartlett (2006); Andres and Votta (2006)
FACE	*can't→ e.g.*[kejnt]	*can't→e.g*[kejnt]	general Southern variant	AAVE & SWVE		Thomas (2008)
FACE	[fe:s]		Monophthongal productions; more strongly correlated with areas having high concentrations of AA speakers and not correlated with Ulster Scots settlements	EA and AA born in the mid-late 19th century	Primarily found in speakers born before World War I; persisted longer in some regions—southern Louisiana (Thomas 2008)	Dorrill 1986 a, b using LAMSAS data; Thomas and Bailey (1998) using acoustic analysis of ex-slave recordings
FACE		[ɛi]	Lowering ; Extreme lowering	AAE SWVE	common in AAE; rare in AAE	

continued

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
MARY	ei ~ ɛ	ẹ	AGE variant before /r/	RSW **UR-SW**	MARY/MERRY precedes merger with MARRY	Thomas 2008 **TILLERY BAILEY 2008**
TRAP	jaundice→*e.g.*[jændɪs]				has not disappeared in AA speech as quickly as in EA speech	LAGS 32%AA 13% EA
BATH	æ_ɛ	æ	AGE	RSW	White Southerners born prior to WWII distinguish BATH and TRAP	Thomas 2008
DANCE	æ_ɛ	eə	AGE + Geography younger Southerners do not distinguish BATH and TRAP	RSW	Variant by region [æ_ɛ] w or w/o up glide AND [ɑː]	Thomas 2008
HAND	æ~ æ_ɛ æ	eə	AGE	RSW	young white Southerners raise [æ] before nasals; older Southerners use the listed tripthong	Thomas 2008

continued

Back Vowels /u/ /ʊ/ /o/ /ɔ/ /ɑ/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
GOOSE/GOAT			both nucleus and glide fronted	SWVE east of Texas	Occurring in WVE throughout the US including outside the South	Thomas (2001);Labov et. al. (2006)
				AAVE	Less common in AAE	Thomas (1986) Wilmington, NC-eastern NC
GOOSE	u→ʉ			SWVE/AAVE		LAGS
POOL	*pool/pull* [u/ʊ]			merger before /l/	AA more likely to show merger than EA	Throughout the US
PULL	*pool/pull* [u/ʊ]			merger before /l/	AA more likely to show merger than EA	Throughout the US

continued

FOOT	*sister* → [ˈsʊstə]	*sister*→ [ˈsʊstə]	Began as retraction of the KIT vowel when the following syllable contains schwa e.g. mister → [ˈmʊstə]; ribbon → [ˈrʊbən] etc.,	someAAVE	once widespread in Southern speech	Sledd 1966 reported in Thomas (2008)
	whip→ *e.g.*[ˈʍʊp]			some AAVE	more common in AAVE	Foley (1972) LAGS 19%AA 6% EA
LOT	*aunt*→[ɑnt]	*aunt*→[ɑnt]	More common in Southern AAE; also in some SWVE	AAVE & SWVE	Continues to be more common in AAE ; also found in AAE in northwestern Indiana (Gordon 2000)	LAGS Data 74% AA 9% EA reported in Thomas (2008)
LOT/THOUGHT		thought→[θɒɔʔt] lot→[ɫ ɒʔt]	vowel merger			
		walk, lost e.g.[ɑ]	unrounded vowel	SWVE/AAVE	widespread in SWVE Texas; less common AAVE Texas	Bernstein (1993); see also Thomas (1989/1993); Labov et.al. (2006)

continued

Diphthongs /ai/ /æ/ /æɔ/ /oi/ /ɔo/ /ɔu/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
PRICE			glide weakening before vcls consonants			Reported in Thomas (2008) from data presented in McNair (2005); see also Kurath and McDavid (1961); Pedersen et.al. (1986-1992); Thomas (2001); Labov et.al. (2006)
PRIZE/PRY			lowering and glide weakening before vcd consonant	typifies southern EA in areas where plantation culture once dominated esp. among higher social classes; also typifies AAVE	ongoing; well documented in AAE(LAGS)	Reported in Thomas (2008) from data presented in McNair (2005); see also Kurath and McDavid (1961); Pedersen et.al. (1986-1992); Thomas (2001); Labov et.al. (2006)

continued

PRICE/PRIZE /PRY	right→ e.g. [raːt] night→ e.g. [naːt]		Lowering and glide weakening in all contexts	most common in SWVE areas where the plantation culture never dominated e.g. Appalachia, Ozarks, Piney Woods, from southern GA to northern FL,southern MS, Texas, southern OK; also in SWVE in other areas among lower social levels.	AAE glide weakening before vcls consonants less common LAGS data EA 8% AA25%	Reported in Thomas (2008) from data presented in McNair (2005); see also Kurath and McDavid (1961); Pedersen et.al. (1986-1992); Thomas (2001); Labov et.al. (2006); Bernstein (1993)
CHOICE	[oɛ]; boil→eg.[ɑ~oʊ] to sound like ball or bowl	[oɛ]; boil→eg.[ɑ~oʊ] to sound like ball or bowl	Lowering without glide weakening; Monophthongization before /l/ common	AAVE;SWVE		Thomas (2008)

continued

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
THOUGHT		[θɒɔʔt]	upgliding of the vowel; monophthongization and ingliding	SWVE; inconsistent in AAE Common in AAE	*sociolinguistic and geographic status undetermined	Pedersen et. al. (1986-1992) Thomas (2001)
GOAT	[goːt]		Monophthongal productions; more strongly correlated with areas having high concentrations of AA speakers and not correlated with Ulster Scots settlements	EA and AA born in the mid-late 19th century	Primarily found in speakers born before World War I; persisted longer in some regions—southern Louisiana (Thomas 2008)	Dorrill (1986 a, b) using LAMSAS data; Thomas and Bailey (1998) using acoustic analysis of ex
GOAT			fronting	SWVE/AAVE	minority feature in SWVE/AAE	LAGS

continued

APPENDIX A continued

R influenced vowels / ɚ / /iɚ / /æɚ / /ɑɚ / /ɔɚ/ /oɚ/ uɚ/ /aæɚ/ /æɔɚ/

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
NURSE			near merger with SQUARE/NEAR	AAE	ongoing in Memphis	Hinton and Pollock (2000); Pollock (2001)
SQUARE/ NEAR		bear→[bɚ] hear→[hɚ] chair→[tʃɛ ɚə]	centralization; some speakers show schwa offglides	AAE	ongoing in Memphis	Hinton and Pollock (2000); Pollock (2001)
START		[stɒ:ʔt~stɒɹ ʔt]	backing and rounding	SWVE; inconsistent in AAE		Thomas (2008)

continued

WORD CLASS	OLDER	YOUNGER	CONDITIONED	GROUP	STATUS	SOURCE
MOUTH	[a>ʊ~ɑ<ʊ] [əʊ~əu]		before vcls consonants in VA, GA. low country of SC	Non fronted forms of MOUTH continue in AAE		LAMSAS data as reported in Thomas (2008)
MOUTH	e.g. cow→[æo]			EA	LAGS 41% EA 18% AA	Similar findings of fronting of MOUTH vowel in southern EA speakers by Bernstein 1993: Thomas 2001; Labov et. al. 2006 as reported in Thomas 2008
MOUTH	e.g. plow		glide weakening or monophthongization	Younger AA	LAGS 15% EA 25% AA	EA speakers with this feature concentrated in areas with few AA speakers e.g. eastern and middle Tennessee; also Hyde County N.C. Wolfram and Thomas (2002)
MOUTH		[aɐ]	glide weakening or monophthongization	Younger AA		Hyde County N.C. Wolfram and Thomas (2002)

continued

MOUTH	vowel more likely to be fronted by southern EA than AA speakers (Thomas 2008)					

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
Initial vowels	enough →’nough ahead→ ’head become →’come expect →’spect		Deletion of initial unstressed vowel		Decreasing in AAE	Reported in Thomas(2008) from data presented in Vaughn-Cooke (1986)

continued

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
Southern Shift				AAE participate in the different components of the shift to varying degrees		Labov (1991, 1994); Labov et. al. (2006)
DRESS/KIT			tense and raise	SWVE/AAE		
FACE/FLEECE			non-peripheral and lower	SWVE/AAE		
FLEECE/KIT reversal				SWVE/AAE	limited in SWVE; rare in AAE	
FACE/DRESS reversal				SWVE/AAE	occurring in AAE	Fridland (2003); Fridland and Bartlett (2006); Andres and Votta (2006)
FACE		[ɛi]	Lowering ; Extreme lowering	AAE SWVE	common in AAE; rare in AAE	
PRICE			Monophthongizes to [aː]; or has the nucleus backed	see PRICE/PRIZE/PRY above	Typical of Southern Speech	
GOOSE			fronted	AAE	AAE speakers slow to participate; longstanding feature in SWVE	Kurath and McDavid (1961) as reported in Thomas (2008)

continued

GOAT			fronted	AAE	AAE speakers slow to participate; longstanding feature only in eastern NC SWVE; has recently spread throughout the South	Kurath and McDavid (1961) as reported in Thomas (2008)

WORD CLASS	**OLDER**	**YOUNGER**	**CONDITIONED**	**GROUP**	**STATUS**	**SOURCE**
AAE Shift				AAE	proposed by Thomas and Bailey 1998; Thomas (2001)	Thomas (2008)
LOT			fronted	AAE	proposed	Thomas (2008) reports this patter is the mirror image of the Canadian Shift first identified by Clarke, Elms and Youssef (1995)—the same 4 vowels move in the opposite direction
TRAP	no raising in NC AAE speakers	raising in NC	raised	AAE	proposed	
DRESS			raised	AAE	proposed	
KIT			slight raising	AAE	proposed	

continued

APPENDIX B
Vowel Measurements

Average vowel duration (ms), Trajectory Length (Hz) and formant frequencies (Hz) for the first three formants for the vowel tokens produced by EA and AA speakers. AA African American; EA ,European American; DUR, duration, N per cell is 24, F1, F2, and F3 were sampled at 35% (t2) of the vowels duration; TL was calculated over the duration of the vowel.

MALE		heed	hid	hayed	head	had	hod	whod
EA	DUR	267	235	277	269	286	280	268
older	TL	61	125	126	109	113	104	80
	F1	295	341	373	348	576	747	338
	F2	2196	2013	1888	1906	1903	1297	1538
	F3	2893	2721	2471	2470	2524	2482	2333
AA	DUR	328	310	361	338	366	364	361
older	TL	59	79	116	97	96	91	83
	F1	292	293	562	544	512	694	311
	F2	2005	1922	2424	2327	1838	1281	1152
	F3	2593	2530	3086	3024	2361	2315	2280
EA	DUR	244	215	258	227	260	265	282
young	TL	41	94	111	81	57	101	55
	F1	291	389	427	393	674	734	351
	F2	2241	1855	2066	2096	1816	1130	1365
	F3	2965	2605	2540	2556	2645	2587	2239
AA	DUR	334	303	356	322	354	360	354
young	TL	51	72	124	66	59	83	70
	F1	278	314	632	663	563	712	334
	F2	2339	2244	2518	2429	1905	1214	939
	F3	2849	2718	3181	3114	2482	2362	2384

continued

MALE		hood	hoed	hawe d	heard	hide	hoyd	howe d
EA	DUR	242	283	298	301	309	282	301
older	TL	72	107	118	66	91	244	172
	F1	419	482	691	474	809	444	746
	F2	1384	1453	1172	1372	1492	938	1574
	F3	2389	2364	2407	2042	2443	2445	2416
AA	DUR	315	338	377	371	392	355	395
older	TL	85	98	124	83	112	173	163
	F1	331	443	653	398	756	428	746
	F2	1253	1080	1198	1423	1535	881	1449
	F3	2310	2389	2273	1900	2396	2328	2302
EA	DUR	221	275	293	273	276	270	308
young	TL	64	98	106	76	128	250	202
	F1	433	507	667	507	790	444	760
	F2	1331	1409	1291	1407	1332	1027	1526
	F3	2386	2440	2543	2071	2509	2468	2478
AA	DUR	331	357	398	353	378	362	398
young	TL	93	97	101	60	110	279	194
	F1	375	458	624	438	755	428	716
	F2	1262	930	999	1459	1467	767	1570
	F3	2454	2410	2308	1777	2382	2449	2329

continued

FEMALE		heed	hid	hayed	head	had	hod	whod
EA	DUR	296	242	315	275	302	314	277
older	TL	66	162	171	139	118	141	85
	F1	358	417	562	467	761	913	407
	F2	2790	2574	2424	2418	2376	1362	1839
	F3	3451	3182	3086	2988	3057	2917	2775
AA	DUR	374	336	399	338	382	402	349
older	TL	68	116	153	103	106	88	85
	F1	366	384	482	576	723	921	379
	F2	2697	2534	2380	1903	2253	1334	1200
	F3	3212	3097	2929	2524	2866	2819	2715
EA	DUR	284	242	304	262	296	297	298
young	TL	69	147	148	120	96	138	69
	F1	342	476	632	541	867	932	424
	F2	2896	2511	2518	2487	2208	1333	1931
	F3	3471	3216	3181	3018	2911	2881	2795
AA	DUR	348	327	373	329	382	376	331
young	TL	62	130	134	104	78	111	65
	F1	376	420	553	674	728	900	399
	F2	2831	2656	2507	1816	2281	1345	1220
	F3	3223	3117	2981	2645	2968	2778	2877

continued

APPENDIX B continued

FEMALE		hood	hoed	hawed	heard	hide	hoyd	howed
EA	DUR	259	325	347	318	325	303	360
older	TL	101	137	135	72	154	445	257
	F1	474	622	622	580	1022	478	893
	F2	1551	1698	1698	1546	1689	1038	1910
	F3	2734	2754	2754	2018	2941	2758	2794
AA	DUR	343	406	417	404	429	366	421
older	TL	103	120	157	87	155	223	205
	F1	437	507	507	477	1000	494	974
	F2	1431	1191	1191	1644	1648	1016	1622
	F3	2649	2595	2595	2191	2639	2637	2597
EA	DUR	260	306	319	294	305	297	328
young	TL	113	110	148	74	179	391	248
	F1	526	637	637	636	1042	471	975
	F2	1645	1718	1718	1603	1621	1018	1807
	F3	2879	2811	2811	2112	2851	2842	2809
AA	DUR	333	380	375	361	388	381	415
young	TL	107	102	96	74	165	390	211
	F1	442	515	515	560	981	475	902
	F2	1509	1103	1103	1532	1574	856	1663
	F3	2928	2881	2881	1874	2803	2935	2713

APPENDIX C

VOWEL DURATION

Within-Subjects Factors

Measure:MEASURE_1

vowel_name	Dependent Variable
1	heed
2	hid
3	hayed
4	head
5	had
6	hod
7	whod
8	hood
9	hoed
10	hawed
11	heard
12	hide
13	hoyd
14	howed

Between-Subjects Factors

		Value Label	N
AGE	1	oldr	32
	2	yngr	32
ETHNICITY	1	ea	32
	2	aa	32
GENDER	1	male	32
	2	female	32

APPENDIX C continued

Estimates

Dependent Variable:Vow_dur

vowel	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
heed	309.411	4.705	300.186	318.637
hid	276.135	4.705	266.910	285.361
hayed	330.609	4.705	321.383	339.835
head	294.953	4.705	285.727	304.179
had	328.349	4.705	319.123	337.575
hod	332.292	4.705	323.066	341.518
whod	315.052	4.705	305.826	324.278
hood	288.120	4.705	278.894	297.346
hoed	333.750	4.705	324.524	342.976
hawed	352.974	4.705	343.748	362.200
heard	334.208	4.705	324.982	343.434
hide	350.120	4.705	340.894	359.346
hoyd	327.031	4.705	317.805	336.257
howed	365.812	4.705	356.587	375.038

continued

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
vowel_name	Sphericity Assumed	532586.055	13	40968.158	60.218	.000	.518
	Greenhouse-Geisser	532586.055	4.565	116679.174	60.218	.000	.518
	Huynh-Feldt	532586.055	5.641	94419.038	60.218	.000	.518
	Lower-bound	532586.055	1.000	532586.055	60.218	.000	.518
vowel_name * AGE	Sphericity Assumed	17157.605	13	1319.816	1.940	.023	.033
	Greenhouse-Geisser	17157.605	4.565	3758.895	1.940	.095	.033
	Huynh-Feldt	17157.605	5.641	3041.771	1.940	.079	.033
	Lower-bound	17157.605	1.000	17157.605	1.940	.169	.033
vowel_name * ETHNICITY	Sphericity Assumed	9783.034	13	752.541	1.106	.350	.019
	Greenhouse-Geisser	9783.034	4.565	2143.271	1.106	.356	.019
	Huynh-Feldt	9783.034	5.641	1734.376	1.106	.358	.019
	Lower-bound	9783.034	1.000	9783.034	1.106	.297	.019
vowel_name * GENDER	Sphericity Assumed	23167.964	13	1782.151	2.620	.001	.045
	Greenhouse-Geisser	23167.964	4.565	5075.647	2.620	.029	.045
	Huynh-Feldt	23167.964	5.641	4107.312	2.620	.019	.045
	Lower-bound	23167.964	1.000	23167.964	2.620	.111	.045

continued

APPENDIX C continued

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	
vowel_name * AGE * ETHNICITY	Sphericity Assumed	7424.144	13	571.088	.839	.618	.015
	Greenhouse-Geisser	7424.144	4.565	1626.484	.839	.514	.015
	Huynh-Feldt	7424.144	5.641	1316.183	.839	.534	.015
	Lower-bound	7424.144	1.000	7424.144	.839	.363	.015
vowel_name * AGE * GENDER	Sphericity Assumed	15009.340	13	1154.565	1.697	.057	.029
	Greenhouse-Geisser	15009.340	4.565	3288.253	1.697	.142	.029
	Huynh-Feldt	15009.340	5.641	2660.917	1.697	.126	.029
	Lower-bound	15009.340	1.000	15009.340	1.697	.198	.029
vowel_name * ETHNICITY * GENDER	Sphericity Assumed	7372.212	13	567.093	.834	.624	.015
	Greenhouse-Geisser	7372.212	4.565	1615.107	.834	.518	.015
	Huynh-Feldt	7372.212	5.641	1306.976	.834	.539	.015
	Lower-bound	7372.212	1.000	7372.212	.834	.365	.015
vowel_name * AGE * ETHNICITY * GENDER	Sphericity Assumed	5469.076	13	420.698	.618	.840	.011
	Greenhouse-Geisser	5469.076	4.565	1198.167	.618	.671	.011
	Huynh-Feldt	5469.076	5.641	969.580	.618	.706	.011
	Lower-bound	5469.076	1.000	5469.076	.618	.435	.011
Error(vowel_name)	Sphericity Assumed	495280.088	728	680.330			
	Greenhouse-Geisser	495280.088	255.614	1937.610			
	Huynh-Feldt	495280.088	315.877	1567.951			
	Lower-bound	495280.088	56.000	8844.287			

Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	9.418E7	1	9.418E7	5097.788	.000	.989
AGE	32753.504	1	32753.504	1.773	.188	.031
ETHNICITY	1432062.812	1	1432062.812	77.514	.000	.581
GENDER	123565.859	1	123565.859	6.688	.012	.107
AGE * ETHNICITY	1013.116	1	1013.116	.055	.816	.001
AGE * GENDER	2686.692	1	2686.692	.145	.704	.003
ETHNICITY * GENDER	4524.397	1	4524.397	.245	.623	.004
AGE * ETHNICITY * GENDER	7398.872	1	7398.872	.400	.529	.007
Error	1034595.165	56	18474.914			

1. Grand Mean

Measure:MEASURE_1

Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
324.211	4.541	315.115	333.308

continued

Univariate Tests

Measure:MEASURE_1

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	2339.536	1	2339.536	1.773	.188	.031
Error	73899.655	56	1319.637			

The F tests the effect of AGE. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Estimates

AGE

Measure:MEASURE_1

AGE	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
oldr	330.257	6.422	317.393	343.122
yngr	318.165	6.422	305.301	331.029

continued

Estimates

ETHNICITY Measure:MEASURE_1

ETHNICITY	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
ea	284.233	6.422	271.368	297.097
aa	364.190	6.422	351.326	377.054

Pairwise Comparisons

Measure:MEASURE_1

(I) ETHNICITY	(J) ETHNICITY	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
ea	aa	-79.957*	9.082	.000	-98.150	-61.764
aa	ea	79.957*	9.082	.000	61.764	98.150

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure:MEASURE_1

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	102290.201	1	102290.201	77.514	.000	.581
Error	73899.655	56	1319.637			

The F tests the effect of ETHNICITY. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

continued

Estimates

GENDER Measure:MEASURE_1

GENDER	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
male	312.468	6.422	299.604	325.332
female	335.955	6.422	323.090	348.819

Pairwise Comparisons

Measure:MEASURE_1

(I) GENDER	(J) GENDER	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
male	female	-23.487*	9.082	.012	-41.680	-5.294
female	male	23.487*	9.082	.012	5.294	41.680

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure:MEASURE_1

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	8826.133	1	8826.133	6.688	.012	.107
Error	73899.655	56	1319.637			

The F tests the effect of GENDER. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

continued

APPENDIX C continued

GENDER * vowel_name

Measure:MEASURE_1

GENDER	vowel_name	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
male	1	293.239	7.379	278.458	308.021
	2	265.646	7.047	251.528	279.763
	3	313.208	7.834	297.515	328.901
	4	288.958	8.201	272.531	305.386
	5	316.364	7.656	301.027	331.701
	6	317.333	6.610	304.092	330.574
	7	316.489	9.524	297.410	335.568
	8	277.396	7.649	262.074	292.718
	9	313.385	8.715	295.928	330.843
	10	341.635	7.364	326.883	356.387
	11	324.302	7.935	308.407	340.197
	12	338.499	8.609	321.253	355.746
	13	317.448	6.942	303.541	331.354
	14	350.646	7.351	335.920	365.372
female	1[a]	325.583	7.379	310.802	340.365
	2	286.625	7.047	272.507	300.743
	3	348.011	7.834	332.318	363.704
	4	300.949	8.201	284.521	317.377
	5	340.333	7.656	324.996	355.669
	6	347.250	6.610	334.010	360.491
	7	313.895	9.524	294.816	332.974
	8	298.844	7.649	283.522	314.167
	9	354.115	8.715	336.658	371.572
	10	364.313	7.364	349.561	379.065
	11	344.115	7.935	328.220	360.010
	12	361.739	8.609	344.493	378.986
	13	336.614	6.942	322.707	350.521
	14	380.979	7.351	366.253	395.706

GENDER * vowel_name

Measure:MEASURE_1

GENDER	vowel_name	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
male	1	293.239	7.379	278.458	308.021
	2	265.646	7.047	251.528	279.763
	3	313.208	7.834	297.515	328.901
	4	288.958	8.201	272.531	305.386
	5	316.364	7.656	301.027	331.701
	6	317.333	6.610	304.092	330.574
	7	316.489	9.524	297.410	335.568
	8	277.396	7.649	262.074	292.718
	9	313.385	8.715	295.928	330.843
	10	341.635	7.364	326.883	356.387
	11	324.302	7.935	308.407	340.197
	12	338.499	8.609	321.253	355.746
	13	317.448	6.942	303.541	331.354
	14	350.646	7.351	335.920	365.372
female	1[a]	325.583	7.379	310.802	340.365
	2	286.625	7.047	272.507	300.743
	3	348.011	7.834	332.318	363.704
	4	300.949	8.201	284.521	317.377
	5	340.333	7.656	324.996	355.669
	6	347.250	6.610	334.010	360.491
	7	313.895	9.524	294.816	332.974
	8	298.844	7.649	283.522	314.167
	9	354.115	8.715	336.658	371.572
	10	364.313	7.364	349.561	379.065
	11	344.115	7.935	328.220	360.010
	12	361.739	8.609	344.493	378.986
	13	336.614	6.942	322.707	350.521
	14	380.979	7.351	366.253	395.706

a.1 heed, 2 hid 3,hayed, 4 head, 5 had, 6 hod, 7 whod, 8 hood, 9 hoed, 10 hawed, 11 heard,12 hide, 13 hoyed, 14 howed

Tests of Between-Subjects Effects

Dependent Variable: **heed**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	108143.943[a]	7	15449.135	8.867	.000	.526
Intercept	6127060.584	1	6127060.584	3516.692	.000	.984
GENDER	16737.891	1	16737.891	9.607	.003	.146
ETHNICITY	85873.907	1	85873.907	49.288	.000	.468
AGE	2920.322	1	2920.322	1.676	.201	.029
GENDER * ETHNICITY	54.428	1	54.428	.031	.860	.001
GENDER * AGE	439.322	1	439.322	.252	.618	.004
ETHNICITY * AGE	236.468	1	236.468	.136	.714	.002
GENDER * ETHNICITY * AGE	1881.608	1	1881.608	1.080	.303	.019
Error	97567.647	56	1742.279			
Total	6332772.174	64				
Corrected Total	205711.590	63				

a. R Squared = .526 (Adjusted R Squared = .466)

continued

Tests of Between-Subjects Effects

Dependent Variable:**hid**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	125713.417[a]	7	17959.060	11.300	.000	.585
Intercept	4880051.015	1	4880051.015	3070.595	.000	.982
GENDER	7041.937	1	7041.937	4.431	.040	.073
ETHNICITY	116223.890	1	116223.890	73.130	.000	.566
AGE	1399.976	1	1399.976	.881	.352	.015
GENDER * ETHNICITY	227.369	1	227.369	.143	.707	.003
GENDER * AGE	339.158	1	339.158	.213	.646	.004
ETHNICITY * AGE	15.337	1	15.337	.010	.922	.000
GENDER * ETHNICITY * AGE	465.750	1	465.750	.293	.590	.005
Error	88999.972	56	1589.285			
Total	5094764.403	64				
Corrected Total	214713.388	63				

a. R Squared = .585 (Adjusted R Squared = .534)

continued

Tests of Between-Subjects Effects

Dependent Variable:hid

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	125713.417[a]	7	17959.060	11.300	.000	.585
Intercept	4880051.015	1	4880051.015	3070.595	.000	.982
GENDER	7041.937	1	7041.937	4.431	.040	.073
ETHNICITY	116223.890	1	116223.890	73.130	.000	.566
AGE	1399.976	1	1399.976	.881	.352	.015
GENDER * ETHNICITY	227.369	1	227.369	.143	.707	.003
GENDER * AGE	339.158	1	339.158	.213	.646	.004
ETHNICITY * AGE	15.337	1	15.337	.010	.922	.000
GENDER * ETHNICITY * AGE	465.750	1	465.750	.293	.590	.005
Error	88999.972	56	1589.285			
Total	5094764.403	64				
Corrected Total	214713.388	63				

a. R Squared = .585 (Adjusted R Squared = .534)

continued

Tests of Between-Subjects Effects

Dependent Variable: **hayed**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	137138.836[a]	7	19591.262	9.977	.000	.555
Intercept	6995370.378	1	6995370.378	3562.311	.000	.985
GENDER	19379.772	1	19379.772	9.869	.003	.150
ETHNICITY	112031.621	1	112031.621	57.051	.000	.505
AGE	3828.980	1	3828.980	1.950	.168	.034
GENDER * ETHNICITY	887.668	1	887.668	.452	.504	.008
GENDER * AGE	174.471	1	174.471	.089	.767	.002
ETHNICITY * AGE	2.920	1	2.920	.001	.969	.000
GENDER * ETHNICITY * AGE	833.405	1	833.405	.424	.517	.008
Error	109968.145	56	1963.717			
Total	7242477.358	64				
Corrected Total	247106.980	63				

a. R Squared = .555 (Adjusted R Squared = .499)

continued

Tests of Between-Subjects Effects

Dependent Variable: **head**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	99042.101[a]	7	14148.872	6.575	.000	.451
Intercept	5567847.838	1	5567847.838	2587.271	.000	.979
GENDER	2300.282	1	2300.282	1.069	.306	.019
ETHNICITY	86654.433	1	86654.433	40.267	.000	.418
AGE	6433.444	1	6433.444	2.989	.089	.051
GENDER * ETHNICITY	1141.849	1	1141.849	.531	.469	.009
GENDER * AGE	1176.061	1	1176.061	.546	.463	.010
ETHNICITY * AGE	882.610	1	882.610	.410	.525	.007
GENDER * ETHNICITY * AGE	453.424	1	453.424	.211	.648	.004
Error	120512.879	56	2152.016			
Total	5787402.818	64				
Corrected Total	219554.980	63				

a. R Squared = .451 (Adjusted R Squared = .382)

continued

Tests of Between-Subjects Effects

Dependent Variable: **had**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	127842.734[a]	7	18263.248	9.737	.000	.549
Intercept	6899999.436	1	6899999.436	3678.706	.000	.985
GENDER	9192.016	1	9192.016	4.901	.031	.080
ETHNICITY	114951.512	1	114951.512	61.286	.000	.523
AGE	2081.641	1	2081.641	1.110	.297	.019
GENDER * ETHNICITY	62.016	1	62.016	.033	.856	.001
GENDER * AGE	1074.856	1	1074.856	.573	.452	.010
ETHNICITY * AGE	411.887	1	411.887	.220	.641	.004
GENDER * ETHNICITY * AGE	68.807	1	68.807	.037	.849	.001
Error	105036.926	56	1875.659			
Total	7132879.096	64				
Corrected Total	232879.660	63				

a. R Squared = .549 (Adjusted R Squared = .493)

continued

APPENDIX C continued

Tests of Between-Subjects Effects

Dependent Variable:**hide**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	159362.019[a]	7	22766.003	9.598	.000	.545
Intercept	7845348.912	1	7845348.912	3307.670	.000	.983
GENDER	8641.562	1	8641.562	3.643	.061	.061
ETHNICITY	137364.744	1	137364.744	57.914	.000	.508
AGE	11547.652	1	11547.652	4.869	.031	.080
GENDER * ETHNICITY	.209	1	.209	.000	.993	.000
GENDER * AGE	181.172	1	181.172	.076	.783	.001
ETHNICITY * AGE	3.195	1	3.195	.001	.971	.000
GENDER * ETHNICITY * AGE	1623.486	1	1623.486	.684	.412	.012
Error	132824.463	56	2371.865			
Total	8137535.394	64				
Corrected Total	292186.482	63				

a. R Squared = .545 (Adjusted R Squared = .489)

APPENDIX D
Normalized Vowel Space Area

APPENDIX D

Normalized Vowel Space Area

Tests of Between-Subjects Effects

Dependent Variable:5pt AREA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	18.130[a]	7	2.590	6.517	.000	.449	45.617	.999
Intercept	1345.788	1	1345.788	3386.078	.000	.984	3386.078	1.000
gender	.494	1	.494	1.243	.270	.022	1.243	.195
ethnicity	5.132	1	5.132	12.912	.001	.187	12.912	.942
age	8.578	1	8.578	21.582	.000	.278	21.582	.995
gender * ethnicity	.339	1	.339	.854	.359	.015	.854	.149
gender * age	3.292	1	3.292	8.284	.006	.129	8.284	.807
ethnicity * age	.277	1	.277	.698	.407	.012	.698	.130
gender * ethnicity * age	.018	1	.018	.045	.833	.001	.045	.055
Error	22.257	56	.397					
Total	1386.175	64						
Corrected Total	40.387	63						

a. R Squared = .449 (Adjusted R Squared = .380)

b. Computed using alpha = .05

continued

6. gender * age

Dependent Variable:5pt AREA

gender	age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
male	oldr	3.905	.158	3.589	4.221
	yngr	5.091	.158	4.775	5.406
female	oldr	4.534	.158	4.218	4.850
	yngr	4.813	.158	4.497	5.128

ANOVA

Gender and Age

5pt AREA

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		12.364	3	4.121	8.824	.000
	Linear Term	Contrast	.982	1	.982	2.102	.152
		Deviation	11.382	2	5.691	12.185	.000
Within Groups			28.023	60	.467		
Total			40.387	63			

continued

Post Hoc Tests

Bonferroni	older_male	younger_male	-1.1858178*	.2416233	.000	-1.845100	-.526536
		older_female	-.6293636	.2416233	.069	-1.288645	.029918
		younger_female	-.9079223*	.2416233	.002	-1.567204	-.248641
	younger_male	older_male	1.1858178*	.2416233	.000	.526536	1.845100
		older_female	.5564542	.2416233	.149	-.102828	1.215736
		younger_female	.2778955	.2416233	1.000	-.381386	.937177
	older_female	older_male	.6293636	.2416233	.069	-.029918	1.288645
		younger_male	-.5564542	.2416233	.149	-1.215736	.102828
		younger_female	-.2785587	.2416233	1.000	-.937840	.380723
	younger_female	older_male	.9079223*	.2416233	.002	.248641	1.567204
		younger_male	-.2778955	.2416233	1.000	-.937177	.381386
		older_female	.2785587	.2416233	1.000	-.380723	.937840

*. The mean difference is significant at the 0.05 level.

APPENDIX E

Trajectory Length

Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	4369192.534	1	4369192.534	1631.278	.000	.967
gender	98180.839	1	98180.839	36.657	.000	.396
eth	14180.631	1	14180.631	5.294	.025	.086
Age group	11864.485	1	11864.485	4.430	.040	.073
gender * eth	1677.727	1	1677.727	.626	.432	.011
gender * Age group	2107.922	1	2107.922	.787	.379	.014
eth * Age group	554.041	1	554.041	.207	.651	.004
gender * eth * Age group	27.259	1	27.259	.010	.920	.000
Error	149989.599	56	2678.386			

continued

Trajectory Length
Pairwise Comparisons

Measure:MEASURE_1

(I) TL	(J) TL	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
heed	hid	-55.796*	3.842	.000	-67.578	-44.014
	hayed	-75.845*	3.994	.000	-88.092	-63.598
	head	-42.909*	3.755	.000	-54.424	-31.394
	had	-30.820*	4.769	.000	-45.445	-16.196
	hide	-77.198*	8.353	.000	-102.810	-51.586
hid	heed	55.796*	3.842	.000	44.014	67.578
	hayed	-20.049*	4.578	.001	-34.086	-6.013
	head	12.887*	3.195	.003	3.088	22.685
	had	24.975*	4.633	.000	10.770	39.181
	hide	-21.402	8.576	.233	-47.700	4.895
hayed	heed	75.845*	3.994	.000	63.598	88.092
	hid	20.049*	4.578	.001	6.013	34.086
	head	32.936*	4.919	.000	17.854	48.018
	had	45.025*	5.239	.000	28.960	61.089
	hide	-1.353	8.394	1.000	-27.092	24.386
head	heed	42.909*	3.755	.000	31.394	54.424
	hid	-12.887*	3.195	.003	-22.685	-3.088
	hayed	-32.936*	4.919	.000	-48.018	-17.854
	had	12.089*	3.754	.032	.578	23.599
	hide	-34.289*	9.052	.006	-62.044	-6.533
had	heed	30.820*	4.769	.000	16.196	45.445
	hid	-24.975*	4.633	.000	-39.181	-10.770
	hayed	-45.025*	5.239	.000	-61.089	-28.960
	head	-12.089*	3.754	.032	-23.599	-.578
	hide	-46.378*	9.586	.000	-75.771	-16.984

continued

hide	heed	77.198*	8.353	.000	51.586	102.810
	hid	21.402	8.576	.233	-4.895	47.700
	hayed	1.353	8.394	1.000	-24.386	27.092
	head	34.289*	9.052	.006	6.533	62.044
	had	46.378*	9.586	.000	16.984	75.771

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

APPENDIX F

SROC
Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	130.748	1	130.748	1768.072	.000	.969
gender	1.655	1	1.655	22.381	.000	.286
eth	4.496	1	4.496	60.796	.000	.521
age_grp	.096	1	.096	1.298	.260	.023
gender * eth	.046	1	.046	.624	.433	.011
gender * age_grp	.038	1	.038	.517	.475	.009
eth * age_grp	.000	1	.000	.006	.939	.000
gender * eth * age_grp	7.526E-5	1	7.526E-5	.001	.975	.000
Error	4.141	56	.074			

continued

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
SROC_6	Sphericity Assumed	7.893	5	1.579	43.741	.000	.439
	Greenhouse-Geisser	7.893	2.644	2.985	43.741	.000	.439
	Huynh-Feldt	7.893	3.134	2.518	43.741	.000	.439
	Lower-bound	7.893	1.000	7.893	43.741	.000	.439
SROC_6 * gender	Sphericity Assumed	.505	5	.101	2.798	.017	.048
	Greenhouse-Geisser	.505	2.644	.191	2.798	.049	.048
	Huynh-Feldt	.505	3.134	.161	2.798	.039	.048
	Lower-bound	.505	1.000	.505	2.798	.100	.048
SROC_6 * eth	Sphericity Assumed	1.221	5	.244	6.767	.000	.108
	Greenhouse-Geisser	1.221	2.644	.462	6.767	.000	.108
	Huynh-Feldt	1.221	3.134	.390	6.767	.000	.108
	Lower-bound	1.221	1.000	1.221	6.767	.012	.108
SROC_6 * age_grp	Sphericity Assumed	.808	5	.162	4.477	.001	.074
	Greenhouse-Geisser	.808	2.644	.306	4.477	.007	.074
	Huynh-Feldt	.808	3.134	.258	4.477	.004	.074
	Lower-bound	.808	1.000	.808	4.477	.039	.074

continued

SROC_6 * gender * eth	Sphericity Assumed	.006	5	.001	.034	.999	.001
	Greenhouse-Geisser	.006	2.644	.002	.034	.987	.001
	Huynh-Feldt	.006	3.134	.002	.034	.993	.001
	Lower-bound	.006	1.000	.006	.034	.855	.001
SROC_6 * gender * age_grp	Sphericity Assumed	.119	5	.024	.662	.653	.012
	Greenhouse-Geisser	.119	2.644	.045	.662	.558	.012
	Huynh-Feldt	.119	3.134	.038	.662	.583	.012
	Lower-bound	.119	1.000	.119	.662	.419	.012
SROC_6 * eth * age_grp	Sphericity Assumed	.220	5	.044	1.221	.299	.021
	Greenhouse-Geisser	.220	2.644	.083	1.221	.303	.021
	Huynh-Feldt	.220	3.134	.070	1.221	.304	.021
	Lower-bound	.220	1.000	.220	1.221	.274	.021
SROC_6 * gender * eth * age_grp	Sphericity Assumed	.076	5	.015	.421	.834	.007
	Greenhouse-Geisser	.076	2.644	.029	.421	.713	.007
	Huynh-Feldt	.076	3.134	.024	.421	.747	.007
	Lower-bound	.076	1.000	.076	.421	.519	.007
Error(SROC_6)	Sphericity Assumed	10.106	280	.036			
	Greenhouse-Geisser	10.106	148.076	.068			
	Huynh-Feldt	10.106	175.517	.058			
	Lower-bound	10.106	56.000	.180			

continued

APPENDIX G

PARTICIPATION IN THE SVS

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
monophthong	Pillai's Trace	.873	189.522[a]	2.000	55.000	.000	.873
	Wilks' Lambda	.127	189.522[a]	2.000	55.000	.000	.873
	Hotelling's Trace	6.892	189.522[a]	2.000	55.000	.000	.873
	Roy's Largest Root	6.892	189.522[a]	2.000	55.000	.000	.873
monophthong * gender	Pillai's Trace	.143	4.606[a]	2.000	55.000	.014	.143
	Wilks' Lambda	.857	4.606[a]	2.000	55.000	.014	.143
	Hotelling's Trace	.167	4.606[a]	2.000	55.000	.014	.143
	Roy's Largest Root	.167	4.606[a]	2.000	55.000	.014	.143
monophthong * eth	Pillai's Trace	.019	.529[a]	2.000	55.000	.592	.019
	Wilks' Lambda	.981	.529[a]	2.000	55.000	.592	.019
	Hotelling's Trace	.019	.529[a]	2.000	55.000	.592	.019
	Roy's Largest Root	.019	.529[a]	2.000	55.000	.592	.019
monophthong * age_grp	Pillai's Trace	.055	1.605[a]	2.000	55.000	.210	.055
	Wilks' Lambda	.945	1.605[a]	2.000	55.000	.210	.055
	Hotelling's Trace	.058	1.605[a]	2.000	55.000	.210	.055
	Roy's Largest Root	.058	1.605[a]	2.000	55.000	.210	.055

continued

APPENDIX G continued

monophthong * gender * eth	Pillai's Trace	.009	.241[a]	2.000	55.000	.787	.009
	Wilks' Lambda	.991	.241[a]	2.000	55.000	.787	.009
	Hotelling's Trace	.009	.241[a]	2.000	55.000	.787	.009
	Roy's Largest Root	.009	.241[a]	2.000	55.000	.787	.009
monophthong * gender * age_grp	Pillai's Trace	.053	1.547[a]	2.000	55.000	.222	.053
	Wilks' Lambda	.947	1.547[a]	2.000	55.000	.222	.053
	Hotelling's Trace	.056	1.547[a]	2.000	55.000	.222	.053
	Roy's Largest Root	.056	1.547[a]	2.000	55.000	.222	.053
monophthong * eth * age_grp	Pillai's Trace	.030	.837[a]	2.000	55.000	.439	.030
	Wilks' Lambda	.970	.837[a]	2.000	55.000	.439	.030
	Hotelling's Trace	.030	.837[a]	2.000	55.000	.439	.030
	Roy's Largest Root	.030	.837[a]	2.000	55.000	.439	.030
monophthong * gender * eth * age_grp	Pillai's Trace	.008	.223[a]	2.000	55.000	.801	.008
	Wilks' Lambda	.992	.223[a]	2.000	55.000	.801	.008
	Hotelling's Trace	.008	.223[a]	2.000	55.000	.801	.008
	Roy's Largest Root	.008	.223[a]	2.000	55.000	.801	.008

a. Exact statistic

b. Design: Intercept + gender + eth + age_grp + gender * eth + gender * age_grp + eth * age_grp + gender * eth * age_grp

Within Subjects Design: monophthong

continued

Repeated Measures ANOVA heed/hayed/hide
Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	2348095.541	1	2348095.541	947.343	.000	.944
gender	52212.617	1	52212.617	21.065	.000	.273
eth	414.893	1	414.893	.167	.684	.003
age_grp	17.606	1	17.606	.007	.933	.000
gender * eth	1308.863	1	1308.863	.528	.470	.009
gender * age_grp	35.021	1	35.021	.014	.906	.000
eth * age_grp	203.034	1	203.034	.082	.776	.001
gender * eth * age_grp	87.831	1	87.831	.035	.851	.001
Error	138802.188	56	2478.610			

Pairwise Comparisons

Measure:MEASURE_1

(I) monophthong	(J) monophthong	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
heed	hayed	-75.845*	3.994	.000	-85.702	-65.988
	hide	-77.198*	8.353	.000	-97.813	-56.583
hayed	heed	75.845*	3.994	.000	65.988	85.702
	hide	-1.353	8.394	1.000	-22.070	19.363
hide	heed	77.198*	8.353	.000	56.583	97.813
	hayed	1.353	8.394	1.000	-19.363	22.070

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

continued

Estimates

Measure:MEASURE_1

gender	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
male	94.097	5.081	83.918	104.276
female	127.078	5.081	116.900	137.257

Pairwise Comparisons

Measure:MEASURE_1

(I) gender	(J) gender	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	95% Confidence Interval for Difference[a] Upper Bound
male	female	-32.981*	7.186	.000	-47.376	-18.586
female	male	32.981*	7.186	.000	18.586	47.376

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

continued

REGRESSION ANALYSIS SOCIAL VARIABLES TO TL OF /aɪ/

Descriptive Statistics

	Mean	Std. Deviation	N
TL_ai_vowel	136.771563	66.1464513	64
Hi_Income	.25	.436	64
Mid_Income	.25	.436	64
Lo_Income	.50	.504	64
EA	.50	.504	64
AA	.50	.504	64
MALE	.50	.504	64
FEMALE	.50	.504	64
Ed_NC	.33	.473	64
Ed_C	.39	.492	64
Ed_CG	.28	.453	64
YNGR	.50	.504	64
OLDR	.50	.504	64

continued

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.579[a]	.336	.253	57.1826792	.336	4.043	7	56	.001	2.252

a. Predictors: (Constant), OLDR, FEMALE, AA, Ed_C, Hi_Income, Mid_Income, Ed_CG

b. Dependent Variable: TL_ai_vowel

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92535.147	7	13219.307	4.043	.001[a]
	Residual	183112.093	56	3269.859		
	Total	275647.240	63			

a. Predictors: (Constant), OLDR, FEMALE, AA, Ed_C, Hi_Income, Mid_Income, Ed_CG

b. Dependent Variable: TL_ai_vowel

continued

APPENDIX G continued

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	127.466	21.576		5.908	.000	84.243	170.688					
	Hi_Income	6.988	19.790	.046	.353	.725	-32.656	46.631	.052	.047	.038	.696	1.437
	Mid_Income	-14.273	20.748	-.094	-.688	.494	-55.837	27.290	-.052	-.092	-.075	.633	1.580
	AA	-6.079	16.834	-.046	-.361	.719	-39.803	27.644	-.017	-.048	-.039	.721	1.387
	FEMALE	58.170	14.460	.443	4.023	.000	29.203	87.136	.406	.473	.438	.977	1.023
	Ed_C	-37.408	17.816	-.278	-2.100	.040	-73.098	-1.719	-.302	-.270	-.229	.676	1.479
	Ed_CG	22.823	20.220	.156	1.129	.264	-17.682	63.328	.318	.149	.123	.618	1.618
	OLDR	-13.448	15.468	-.102	-.869	.388	-44.434	17.539	-.136	-.115	-.095	.854	1.171

a. Dependent Variable: TL_ai_vowel

continued

APPENDIX G continued

REGRESSION ANALYSIS STAGE 2 SOCIAL VARIABLES TL LENGTH OF /aɪ/

Descriptive Statistics

	Mean	Std. Deviation	N
Stage_2	2.974219	246.3422302	64
Hi_Income	.25	.436	64
Mid_Income	.25	.436	64
Lo_Income	.50	.504	64
EA	.50	.504	64
AA	.50	.504	64
MALE	.50	.504	64
FEMALE	.50	.504	64
Ed_NC	.33	.473	64
Ed_C	.39	.492	64
Ed_CG	.28	.453	64
YNGR	.50	.504	64
OLDR	.50	.504	64
TL_ai_vowel	136.771563	66.1464513	64

continued

APPENDIX G continued

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	67.474	120.796		.559	.579	-174.606	309.553					
	Mid_Income	-57.262	82.847	-.101	-.691	.492	-223.292	108.768	-.188	-.093	-.081	.637	1.570
	Lo_Income	118.830	79.358	.243	1.497	.140	-40.208	277.868	.239	.198	.175	.521	1.921
	AA	8.856	67.511	.018	.131	.896	-126.440	144.151	.142	.018	.015	.719	1.390
	FEMALE	-8.013	65.760	-.016	-.122	.903	-139.799	123.774	-.170	-.016	-.014	.758	1.319
	Ed_C	66.173	74.121	.132	.893	.376	-82.368	214.714	.133	.120	.105	.627	1.595
	Ed_CG	112.466	81.909	.207	1.373	.175	-51.684	276.615	-.076	.182	.161	.604	1.654
	OLDR	63.970	62.377	.131	1.026	.310	-61.036	188.976	.077	.137	.120	.843	1.187
	TL_ai_vowel	-1.459	.535	-.392	-2.725	.009	-2.531	-.386	-.385	-.345	-.319	.664	1.505

a. Dependent Variable: Stage_2

continued

APPENDIX G continued

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	937490.064	8	117186.258	2.234	.038[a]
	Residual	2885633.082	55	52466.056		
	Total	3823123.146	63			

a. Predictors: (Constant), TL_ai_vowel, Lo_Income, OLDR, Ed_C, FEMALE, AA, Mid_Income, Ed_CG

b. Dependent Variable: Stage_2

APPENDIX H
Subject Recruitment

Needed:

Adults (18-70+ years) and Children (ages 8-12) to participate in a Speech Pronunciation Study

Looking for adults and children, born and raised in the Statesville Area
(Statesville, Troutman, Hiddenite, Olin, Harmony,Cleveland, and surrounding communities)

You will be recorded speaking.
Total time one hour.
You will be paid $15.00 for participation.

continued

We are researching how people from different regions of North Carolina speak. We are interested in recording, adults and children of different ages and backgrounds to compare how speech sounds change across the generations. We are interested in recording regular people without special training in speaking.

Interested
please call or e-mail Yolanda Holt
holt.174@osu.edu
phone 1-888-540-0614

APPENDIX I

Stimulus Words

HEED

HID

HAYED

HEAD

HAD

HOD

WHOD

HOOD

HOED

HAWED

HEARD

HIDE

HOYED

HOWED

APPENDIX J
Survey Questions

BACKGROUND SURVEY – Adult Subjects

This is a brief survey to obtain some information about your background so that we can better understand the nature of speech variation across different dialects and ages. Please note that you will be identified only by the subject number on this survey, and not by name.

Subject Number: _____ Gender: M___ F____ Date of Testing:_______ Height:_________

1. Date of birth:____
2. Place of birth (city/town and state):____
3. Current place of residence (city/town and state):___________________________________
4. How long have you lived in North Carolina?_______________________________________
5. Where did you spend your first 6 years of life?_____________________________________
6. Have you ever had any speech-language or hearing problems?__________________________

   If so, did you have therapy (and for how long?)___________________________________

7. Please check your highest competed education level:

   Elementary School (what grade?): ____
   High School (what grade?): ____
   College (1-2 years): ____
   College (3-4 years): ____
   College (more than 4 years): ____

OPTIONAL QUESTIONS—We would like you to answer the following questions and your answers will remain confidential. However, you do not have to answer them.

8. Annual Income (check one):
   Less then $30,000/year ____
   Between $30,000 and $45,000/year ____
   Over $45,000/year ____

9. Ethnic Origin (check one):
   African-American: ____
   Asian-American: ____
   Hispanic-American: ____
   Native American: ____
   Caucasian-American: ____
   Other: ____

APPENDIX K
Subjects

Subject Number	Ethnicity	Gender
4001	AA	female
4002	AA	female
4003	AA	male
4004	AA	male
4005	AA	male
4006	AA	female
4007	AA	female
4008	AA	male
4009	AA	male
4010	AA	female
4011	AA	male
4012	AA	female
4013	AA	female
4014	AA	female
4017	AA	female
4018	AA	male
4020	AA	male
4021	AA	female
4022	AA	female
4024	AA	male
4025	AA	female
4026	AA	female
4028	AA	male
4029	AA	male
4030	AA	male
4031	AA	male
4032	AA	male
4033	EA	male
4035	EA	male
4037	EA	male
4038	EA	male

continued

4039	EA	male
4042	AA	female
4043	AA	female
4044	AA	female
4045	EA	female
4046	AA	male
4047	AA	male
4048	AA	female
4049	AA	female
4050	EA	female
4051	AA	male
4052	AA	male
4053	EA	female
4054	AA	male
4055	AA	male
4056	AA	female
4057	EA	male
4058	EA	female
4059	EA	female
4060	AA	male
4061	EA	female
4062	EA	female
4063	EA	female
4066	EA	female
4067	EA	female
4068	EA	female
4069	EA	male
4070	EA	female
4071	EA	female
4072	EA	female
4073	EA	male
4074	EA	male
4075	EA	male
4076	EA	male
4077	EA	female
4080	EA	female
4081	EA	female

continued

Appendix K continued

4082	EA	male
4083	EA	female
4084	EA	female
4085	EA	male
4086	EA	male
4087	EA	male
4088	EA	female
4089	EA	female
4090	EA	female
4091	EA	male
4092	EA	male