12-14-2009

An acoustic phonetic analysis of African American English: A comparative study of two dialects

Catherine A. Adams

An Acoustic Phonetic Analysis of African American English:

A Comparative Study of Two Dialects

by

Catherine A. Adams

Thesis

Submitted to the Department of English Language and Literature

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

Master of Arts

in

English with a concentration in Linguistics

Thesis Committee:

Beverley Goodman, PhD, Chair

Edward Garrett, PhD

December 15, 2009

Ypsilanti, MI

TABLE OF CONTENTS

Acknowledgments....ii

Abstract....iii

Chapter 1: Introduction to the Thesis....1
1.0 Introduction....1
1.1 Statement of the Problem....2
1.2 Purpose of the Study....3
1.3 Significance of the Study....4
1.4 Limitations of the Study....5
1.5 Overview of the Thesis....6

Chapter 2: Literature Review....7
2.0 Introduction....7
2.1 Phonetic Literature....8
2.1.1 Introduction....8
2.1.2 *An Acoustic Analysis of Vowel Variation in New World English*. ErikThomas. (2001)....9
2.1.3 "The three dialects of English." William Labov. (1991)....11
2.2 Phonological Literature....14
2.2.1 Introduction....14
2.2.2 *African American Vernacular English*. John Rickford. (1999)....14
2.2.3 "Some aspects of African-American Vernacular English phonology". Guy Bailey & Erik Thomas. (1998)....16
2.3 Perceptual Literature....18
2.3.1 Introduction....18
2.3.2 Use of Black English and racial discrimination in urban housing markets". Douglas Massey & Garvey Lundy. (2001)....18
2.3.3 Testing listeners reactions to phonological markers of ethnic identity. David Graff, William Labov & Wendell Harris. (1986)....20
2.4 Chapter Summary....21

Chapter 3: Research Design and Methodology....23
3.0 Research Goals....23
3.1 Hypothesis....24
3.2 Experimental Design....25
3.2.1 Target data and collection tools....25
3.2.2 Participant demographics....28

3.3 Methodology....28
3.3.1 Defining the acoustic phonetic variables....29
3.3.2 Vowel duration....30
3.3.3 Vowel quality....33
3.4 Challenges to Analysis....35
3.5 Chapter Summary....36

Chapter 4: Results....37
4.0 Introduction....37
4.1 Vowel Duration....37
4.1.1 Northern Cities Shift vowel duration....38
4.1.2 African American English vowel duration....39
4.1.3 Interdialect comparison of vowel duration....41
4.1.4 Effects of consonant voicing on vowel length....43
4.1.5 Summary of duration results....49
4.2 Vowel Quality....49
4.2.1 Northern Cities Shift vowel quality....50
4.2.2 African American English vowel quality....52
4.2.3 Interdialect comparison of vowel quality:
Interaction of raised [æ] and front tense/lax vowels....53
4.2.4 Summary of quality results....56
4.3 Chapter Summary....56

Chapter 5: Conclusions....57
5.0 Introduction....57
5.1 Summary of Results....58
5.1.1 Summary of vowel duration....58
5.1.2 Summary of vowel quality....59
5.2 Implications of the Results....60
5.2.1 The relationship between [æ] and front tense/lax vowels....61
5.2.2 Vowel lengthening and consonant voicing....62
5.3 Chapter Summary....64
5.4 Directions for Future Research.... 65

References....66

Bibliography....68

Appendix A: Approval letter from the College of Arts and Sciences Human Subjects Review Committee....75
Appendix B: Preliminary study....76
Appendix C: Word list, test items....79
Appendix D: Demographic questionnaire....83
Appendix E: Vowel duration measurements....84

LIST OF TABLES

Table		Page
1	Average vowel duration of speakers of Northern Cities Shift (NCS)	39
2	Average vowel duration of speakers of African American English (AAE)	40
3	Comparison of vowel duration in AAE and NCS	42
4	Front tense/lax vowel lengths in AAE and NCS	45
5	Average vowel quality of NCS speakers by gender	84
6	Average vowel quality of AAE speakers by gender	84

LIST OF FIGURES

Figure		Page
1	Illustration of vowel duration, waveform of the word “bead”	31
2	Illustration of glottalization: spectrogram of the word “butt”	32
3	Illustration of F2 variability: [a] and [i]	34
4	Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS males	47
5	Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS females	48
6	Northern Cities Shift vowel chart	51
7	African American English vowel chart	52
8	Front tense/lax vowel quality in NCS	54
9	Front tense/lax vowel quality in AAE	55

LIST OF TABLES

Table		Page
1	Average vowel duration of speakers of Northern Cities Shift (NCS)	39
2	Average vowel duration of speakers of African American English (AAE)	40
3	Comparison of vowel duration in AAE and NCS	42
4	Front tense/lax vowel lengths in AAE and NCS	45
5	Average vowel quality of NCS speakers by gender	84
6	Average vowel quality of AAE speakers by gender	84

LIST OF FIGURES

Figure		Page
1	Illustration of vowel duration, waveform of the word “bead”	31
2	Illustration of glottalization: spectrogram of the word “butt”	32
3	Illustration of F2 variability: [a] and [i]	34
4	Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS males	47
5	Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS females	48
6	Northern Cities Shift vowel chart	51
7	African American English vowel chart	52
8	Front tense/lax vowel quality in NCS	54
9	Front tense/lax vowel quality in AAE	55

ACKNOWLEDGEMENTS

Many people assisted and supported me as I wrote this thesis, and I would like to acknowledge them here.

I would first like to thank my committee, Beverely Goodman and Edward Garrett. I thank Beverley for her vision and her generous support. In creating The Linguistics Lab at EMU, Beverley provided a work space for the data collection and analysis of this thesis. I also thank Beverley for her analytical insight and her skills as a writer. She has supported me professionally and personally through every step of this thesis. Her guidance has been invaluable to my development as a linguist. I thank Edward for having the courage to teach a course devoted to African American English for the first time at EMU. His class brings serious linguistic attention to a subject that is often misunderstood and, in doing so, demonstrates how academic research may act as a positive force in our community. I would also like to thank Edward for his creative thinking, honest criticism, and for lending me a sweet computer to use during the course of my thesis.

I also give very special thanks to Karen Dykstra and her Fall 2008 LING 201 students who volunteered as subjects in my experiment. I thank them all for their patience and humor during the recording sessions.

Finally, I would like to thank Kevin for his positive impact on my work and, more importantly, in my life.

Thank you all, so very much!

ABSTRACT

In this thesis, I contribute acoustic phonetic data and analysis to the study of African American English (AAE). For this research, I collected speech samples of self-identified AAE speakers and speakers of a dominant coexisting dialect, the Northern Cities Shift (NCS). I analyze these samples to determine if vowel quality and vowel duration are consistently and predictably varied between the two dialects. Labov's Chain Shift Principles are used as the context for the results.

In my analysis, I find that both vowel quality and duration are different between AAE and NCS in ways previously undocumented in the linguistic literature. The quality analysis relies on evidence from the vowel [æ]. I find that AAE shares a distinct quality feature of NCS, raised [æ], despite the fact that this feature is said not to be present in AAE. This vowel functions as the pivot point for the chain shift in the NCS data but does not cause a vowel shift in AAE data analyzed in this thesis. In the analysis of vowel length, I rely on data from the front tense/lax vowel pairs, [i ; ɪ] and [e ; ɛ] in both dialects. I find that vowel length is consistently longer in AAE than in NCS. Additionally, I find that in NCS, the tense/lax pairs maintain a difference in length in which the tense vowels are longer than the lax vowels. In AAE, I find that the tense vowels are shorter than the lax vowels. I conclude that the length differences found in these data sets indicate that Labov's feature [+/- peripheral] is not a feature of the AAE front tense/lax vowel pairs, [i ; ɪ] and [e ; ɛ] and that this prevents a vowel shift in AAE that should occur in response to the presence of the raised [æ].

Chapter 1: Introduction to the Thesis

1.0 Introduction

That African American speech is different from all other varieties of American English is an idea widely accepted by the general public. The distinct properties of African American English (AAE) have received a great deal of scholarly attention, and this body of research continues to grow as linguists examine how components of the grammar formulate this distinct dialect.

Thus far, the syntactic, morphological, and sociolinguistic variables of AAE have received more formal linguistic attention than the phonological and phonetic elements of the dialect. Previous phonological analyses of AAE have characterized consonant and prosodic variation, but little attention has been given to vowel variation. Of the phonetic investigations that have addressed vowel variation, most have concentrated on data from Southern varieties of AAE. While this research contributes valuable insight to our understanding of AAE, more phonetic analysis on regional variations needs be done to better answer the question as to exactly why this dialect sounds different from other varieties of American English.

In this thesis, I contribute acoustic phonetic data and linguistic analysis to the study of African American English. I compare AAE as spoken in the Detroit metropolitan area with Modern American English as spoken in this region to determine if the vowel quality and duration are consistently and predictably varied between the two dialects. The results of this investigation contribute to our understanding of AAE and, ultimately, to our understanding of variations within Modern American English.

1.1 Statement of the Problem

Perceptual studies suggest a distinction can be detected between speakers of AAE and of other varieties of American English over the telephone – a situation in which information about the speaker can only be transmitted through the speech signal (Graff, Labov & Harris, 1986; Massey & Lundy, 2001). Linguistic evidence is required to verify any perceptual judgement based exclusively on a telephone conversation. Previous linguistic investigations have controlled for morphosyntactic and discourse elements, but a difference between speech samples can still be detected by listeners when these variables are controlled. If paralinguistic stimuli and syntactic (etc.) elements are controlled, a quantifiable phonetic variable may be contributing to the perceivable distinction of AAE.

To date, there are few investigations on the sound system of AAE. Both the existing descriptive and theoretical analyses of AAE are primarily concerned with morphosyntactic variation, historical development, or sociolinguistic variables. Phonological and phonetic analyses of AAE are available, but these studies often favor discussions of prosodic features or consonantal variables and present limited amounts of vowel data, a source of significant information on speech variation. Additionally, existing studies primarily rely on speech data from older speakers living or born in Southern regions of the US and may not reflect either Northern dialect variations or modern pronunciations (Rickford, 1999; Thomas, 2007). This contribution of phonetic vowel analysis from Northern AAE speakers furthers our understanding of this unique variety of American English.

1.2 Purpose of the Study

The primary aim of this thesis is to examine African American English (AAE) and a perceptually distinct coexisting contemporary American dialect to determine if the acoustic vowel features are consistently and predictably varied. This examination is achieved through the description and close phonetic analysis of vowels occurring in speakers of two dialects found in the Detroit metropolitan area, AAE and the Northern Cities Shift (NCS). These dialects coexist, but AAE is claimed to not exhibit the distinctive features of the dominant dialect, NCS (Labov, 1991).

Vowel quality and duration are the primary targets of the data collection and the focus of the phonetic analysis. Existing studies that characterize distinctive features of either dialect are used as reference points to establish norms within the collected data. The analyses of each dialect are compared to determine the extent of variation. The comparison provides context for each sample set and determines if the perceived distinction between AAE and NCS correlates with an acoustic phonetic feature found in the speech signal.

This thesis contributes empirical evidence to the body of literature characterizing AAE as a variety of American English. The data collection concentrates on a geographic area and demographic population currently underrepresented in the phonetic, phonological, and perceptual literature on AAE. The analysis of this data provides a broader base for theoretical constructions and substantiates existing perceptual studies of AAE. Through this data collection and analysis, this thesis furthers our understanding of the AAE linguistic system and provides an empirical basis to substantiate the claim that AAE sounds different from other varieties of English.

1.3 Significance of the Study

This thesis analyzes a subject underrepresented in linguistic literature, African American English (AAE) vowel variation and its relation to a dominant Northern dialect. This thesis contributes new information on the sound system of AAE through the collection and analysis of data samples from the primary dialects spoken in Detroit metropolitan area, AAE and Northern Cities Shift (NCS). This analysis may prove additionally significant by providing quantifiable evidence and objective results that can offer insight to social distress caused by linguistic discrimination.

The phonological and phonetic systems of AAE have received less formal linguistic attention than the syntactic elements, sociolinguistic variables, or the historical development of the dialect. Phonological sketches of AAE primarily generalize consonant and prosodic variables but pay little attention to vowel tendencies and characteristics. While the acoustic structure of consonants is often more complicated than that of vowels, consonant variation is more predictable (Ladefoged, 2000). Vowels, however, are characterized by radical variations that often account for the sound differences between dialects. These variations contribute unique, quantifiable elements to the speech signal that cannot be inferred or predicted by other components of the grammar. To date, the phonetic analyses that address vowels concentrate on historical data from speakers in the South. The phonological understanding of permitted variation within Modern American English is informed by phonetic evidence and is incomplete without a characterization of vowels in AAE as spoken in Northern regions.

This thesis contributes a close acoustic phonetic analysis and comparison of AAE vowels and a coexisting dialect, Northern Cities Shift (NCS). The analysis contributes new

data to the field, expanding our knowledge base of the AAE linguistic system and, by extension, Modern American English. While the primary goal of this thesis is linguistic in nature, it must be noted that analyses of AAE speech patterns may foster a better understanding of AAE within our greater social and political systems.

1.4 Limitations of the Study

African American speech and language is of interest to many fields and often attracts interdisciplinary attention. This analysis is, however, concerned only with formal linguistic aspects of African American English (AAE). Within the broad field of linguistics, this thesis is limited to an acoustic phonetic analysis of the primary vowel features of duration and quality. Additional phonetic and phonological phenomena are considered in this thesis when relevant to, or interacting with, vowel features found in the data set. Other linguistic elements (morphosyntactic, semantic, etc.) are excluded from this study.

To provide motivation for the experimentation and preparation for the data analysis, this thesis includes a review of some phonetic, phonological, and perceptual literature pertaining to the sound systems of AAE. The literature review additionally includes information positing the principles governing NCS. The data set analyzed in this study is limited to the speech samples of eight residents of the Detroit metropolitan area. These samples were collected in 2008 specifically for this thesis. The experimental design controlled the data collection and restricted the analysis to vowel features and any

immediately related phenomena. The conclusions of this thesis pertain directly to the experiment and subsequent results and the logical implication of these results.

1.5 Overview of the Thesis

In this thesis, I first provide general context for the phonetic investigation of African American English (AAE). Chapter 2 presents a review of the phonetic, phonological, and perceptual literature on AAE, with particular attention given to previous work on vowel systems. I additionally include a review of a phonological explanation of the Northern Cities Shift (NCS) as a point of comparison for the AAE data analysis. In Chapter 3, I state my research hypothesis and outline the methodology used to collect and analyze speech samples of the coexisting varieties of American English spoken in the Detroit metropolitan area, AAE and NCS. The results of the acoustic analysis are presented in Chapter 4, and a discussion of these results is found in Chapter 5.

In these two final chapters, I conclude that vowel duration plays a different role in the two coexisting dialects but that supposedly distinct features of vowel quality may be shared across dialect boundaries. I demonstrate that the traditional durational distinction between tense and lax vowels found in most varieties of American English (including NCS) is not present in the front vowels in AAE. I also discuss the interaction between vowel duration and the voicing of a following consonant. I then discuss the finding that AAE shares a distinct regional NCS feature of vowel quality that, according to the literature, should not be found in AAE speech. Finally, I discuss the implications for the vowel system as based on this analysis of vowel duration and vowel quality.

Chapter 2: Literature Review

2.0 Introduction

A large body of linguistic research on African American English (AAE) has been developed, but the majority of these investigations focus on the morphosyntactic and sociolinguistic features. In comparison, the number of studies on the AAE sound system is limited. As a result, our current understanding of how the phonetic and phonological components of the grammar function to produce AAE as a unique dialect of American English is also limited.

In this literature review, I focus on six articles that directly address the sound system of AAE. These articles include acoustic phonetic analyses, phonological generalizations, and perceptual studies. The acoustic phonetic analyses provide detailed information of AAE from specific regions. These studies do not present a broad cross-sampling of data. The phonological analyses that have been proposed capture the general sound patterns of AAE independently from other varieties of American English. The phonological features listed in these proposals address consonant behaviors and give less attention to vowel variation. The perceptual studies suggest that a distinction can be detected between speakers of AAE and speakers of other varieties of American English over the telephone. The results from these perceptual studies invites a contribution of quantifiable phonetic data as in this thesis.

Through surveying the linguistic literature that addresses the sound system of AAE, it is clear that listeners generally agree that AAE is perceptually distinct from other varieties of American English, but technical phonological feature listings have only partially explained the dialect variation. Additionally, it is clear that both the perceptual and phonological claims

are backed by a small sampling of phonetic evidence. In this thesis, I contribute new phonetic data and analysis to address the general question of why, exactly, AAE sounds unique among varieties of American English. The existing phonetic, phonological, and perceptual literature provides the foundation for the exploration of this question.

This chapter is divided into four parts. In section 2.1, I address two phonetic analyses of American English that are relevant to the current study. I review phonological generalizations of AAE in section 2.2, and in section 2.3 I review two perceptual studies concerned with AAE. Section 2.4 summarizes all three areas of this literature review.

2.1 Phonetic Literature

2.1.1 Introduction

Acoustic phonetic analysis allows linguists to empirically evaluate speech to determine what sounds are present in the speech signal. Acoustic information provides information about the phonetic component of human language. Through acoustic phonetic investigation, we can determine the regularity and predictability of sound patterns that form the basis of phonological generalizations. Within the linguistic literature on African American English (AAE), acoustic phonetic analyses have received the least attention. In this thesis, I review two phonetic analyses that address AAE.

In section 2.1.2, I review *An Acoustic Analysis of Vowel Variation in New World English* by Erik Thomas. In this book, Thomas presents a thorough acoustic phonetic analysis of data from regional dialects across the US, but data from a Northern variety of African American English (AAE) is severely limited. In section 2.2.2, I review "The three

dialects of English" by William Labov. In "The three dialects," Labov identifies the principles governing the variation between three divergent regional varieties of American English and explains these differences as systematic vowel shifts. Although Labov excludes an analysis of AAE, he provides context for the coexisting dialect of the Detroit metropolitan area investigated in this thesis, the Northern Cities Shift.

2.1.2 An Acoustic Analysis of Vowel Variation in New World English. Erik Thomas (2001).

In *An Acoustic Analysis of Vowel Variation in New World English,* Erik Thomas presents an in-depth analysis of vowel variation from dialects across the continental US. A large cross-section of the American population is represented in this study, including male and female speakers spanning several generations from varying ethnic backgrounds. In this study, vowel plots are provided for each speaker; descriptions of both phonetic tendencies and anomalies are discussed at length. The chapter divisions in *New World English* are primarily based on regional divisions, but a specific chapter is devoted to African American English (AAE) regardless of speaker geographic origin. Most of the data were collected in the latter part of the 20th century, but analyses of speech samples from recordings of people born as early as 1876 are included in the book. In addition to his linguistic data and analysis, Thomas provides information on the possible historical social conditions that may have contributed to dialect divergence, including factors that may have led to the development and cohesion of AAE. *New World English* is unparalleled in the phonetic literature of American dialects, but it is unfortunately limited in the sampling of AAE data.

The chapter devoted to African American speech presents a large amount of acoustic data, but it is not comprehensive. The analysis of AAE in *New World English* includes data samples from three Caribbean Anglophone creoles and thirty-three speakers from Ohio, North Carolina, and Texas. Only one speaker from a Northern state is represented in this study, a female (b. 1970) from Columbus, OH.

In *New World English,* Thomas claims that AAE speakers show a surprising degree of linguistic uniformity throughout the country. This supposed uniformity of AAE is suggested to be linked to the Great Migration, a mass movement of African Americans from rural areas to industrial cities in reaction to the 1915 boll weevil infestation. This mass relocation concentrated African American culture in urban centers, resulting in less regular contact with white populations, particularly in the North. This radical social change impacted the linguistic systems as well: AAE vowels were no longer affected by sound changes in white vernaculars as when the populations had more regular contact as in the South (165-167). Although this is a plausible sociological explanation of considering AAE a cohesive dialect, it cannot be verified without linguistic data from speakers living in cities farther north than Columbus, OH. Data samples and analyses from AAE as spoken in a Northern region would help to verify or refute existing claims about the national cohesion of the dialect.

There is regular and intimate interaction between the arguably hegemonic American culture and an African American subculture. With close contact between two communities that use mutually intelligible speech, it seems unlikely that the linguistic features of one dialect will change without affecting the coexistent system. It is reasonable to suggest that contemporary AAE speakers will share some features with a dominant regional “standard”

dialect and will not, therefore, be uniform across the country. In *New World English,* Thomas does note that a previous study found that AAE speech in South Atlantic states does display features typical of the local white vernaculars. He also notes that a previous study in Detroit found that AAE seem to be showing some accommodation to the white vernacular, noting AAE speakers show [o] fronting where this phone is usually backed in Southern speakers. With the exception of these notes, *New World English* does not draw any further parallel between the phonetic features of a regionally standard or dominant dialects and the coexisting AAE variation.

In *An Acoustic Analysis of Vowel Variation in New World English,* Thomas presents a thorough analysis of data from regionally distinct dialects. Although this work is unparalleled in the phonetic literature, the scope and sampling of AAE data are limited. There are little data on contemporary AAE speakers from a Northern region, without which, knowledge of this supposedly cohesive dialect is incomplete. The work does, however, offer context for understanding variations within sound systems of American English and provides a strong foundation for the phonetic investigation of this thesis.

2.1.3 "The three dialects of English." William Labov (1991).

In "The three dialects of English," Labov explains variation between three divergent regional dialects of American English as series of predictable shifts or mergers within vowel subsystems. The dialects addressed in this article are the Northern Cities Shift (NCS), the Southern Shift (SS), and the Low-Back Merger (LBM). Although African American English (AAE) is omitted from this analysis, Labov notes in this article that AAE may be considered

a relatively uniform dialect across the country, independent from features of the other major dialects. This thesis is concerned with the vowel system of AAE and the relationship of this system to that of the dominant coexisting system, NCS. For this reason, “The three dialects” is of interest to this thesis. The review of this article focuses on characteristics of NCS and of the general principles of systematic vowel chain shifts. Although “The three dialects” is not directly concerned with AAE, the explanation of the dominant regional vowel system in the Great Lakes region, NCS, provides context for my analysis of the AAE vowel system in the Detroit metropolitan area.

The NCS dialect is characterized by a unique vowel space created by a chain shift. In a chain shift, the vowel system reacts to at least one critical stimuli by permitting other vowels to react in turn by shifting along a predictable acoustic path. The path of each vowel is determined by the feature [+/- peripheral], or the relative distance of a phoneme to the edge or to the center of the vowel space.

The minimal stimuli, or catalyst, for the systematic shift is referred to as the pivot point. In the case of NCS, [æ] is tensed, raised, and lengthened. This functions as the pivot point, causing the surrounding vowels to move to maintain distinctive features and phonemic status. In a merging dialect like LBM, by contrast, two phonemes collapse into one; the merge neutralizes features and vowels lose distinctions. Chain shifts and mergers can be understood as systematic, predictable sound shifts of subsystems within the vowel space that cause the features and/or status of individual phonemes to change.

Eight principles govern the shifts of these three major American dialects; six of these principles govern chain shifts, including the dominant coexistent dialect NCS. These six

principles are as follows[1]:

I. Peripheral vowels rise
II. Non-peripheral nuclei fall
III. Back vowels move to the front
IV. Low vowels become non-peripheral
V. High nuclei become non-peripheral before upglides
VI. Peripherality is defined relative to the vowel system

The speech samples analyzed for this thesis were collected from four AAE speakers and four NCS speakers from the Detroit Metropolitan area. According to "Three Dialects," the speech samples from AAE speakers from this region will not share NCS features. Labov excludes any discussion of AAE from this article, only suggesting it must be considered a fourth dialect. He notes that large black populations of in all the major cities of the North and West show do not show a phonetic connection with the three dialects of English as described in this article (38).

"The three dialects of English" identifies the principles governing the variation between three divergent regional varieties of American English and explains these differences as systematic vowel shifts. "The three dialects" excludes an analysis of African American English (AAE), claiming AAE to be an independent dialect that does not share characteristics with regional dialects. "The Three Dialects of English" provides context for an acoustic vowel analysis of the coexisting dialects of the Detroit metropolitan area, AAE and NCS.

1. For reference, the numbers here are those used by Labov.

2.2 Phonology Literature

2.2.1 Introduction

Phonological analysis is informed by phonetic phenomenon, which can vary radically across regions and change with every new generation. Although recent phonological generalizations have laid the foundation for ensuing investigations of African American English (AAE) sound patterns, the identified features are limited. The most salient features identified concentrate on consonant features, including final consonant deletion or cluster reduction, consonant devoicing, and liquid reduction. These features are not, however, claimed to belong uniquely to AAE. Additionally, little information on vowels is provided in these phonological generalizations despite the fact that the dominant American English dialects are determined by vowel variation (Labov, 1991). The phonological literature on AAE provides a foundation for pursuing the phonetic analysis of this thesis.

The recent phonological summaries of AAE by John Rickford (1999) and Guy Bailey & Erik Thomas (2001) are addressed individually in sections 2.2.2 and 2.2.3. These articles are relevant to the phonetic investigation of this thesis as they address contemporary speech patterns in AAE. This review concentrates on phonological vowel features.

2.2.2 African American Vernacular English. John Rickford (1999).

African American Vernacular English concisely summarizes and lists eighteen distinctive phonological features of AAE. Two items in this list describe prosodic features, and three describe vowel features. The remaining thirteen identified features describe consonants and can be further generalized into one of three categories: consonant deletion,

consonant or consonant-cluster reduction, and consonant devoicing. These features are considered tendencies rather than rules; their appearance and distribution is not regularized as speakers are not required to produce these forms.

The three phonological vowel features of AAE Rickford identifies are features 14, 15, and 16[2]:

14. Monophthongal pronunciations of *ay* and *oy*, as in *ah* for *I* and *boah* for *boy*
15. Neutralization/merger of [ɪ] and [ɛ] before nasals, as in [pɪn] for [pɛn]
16. Realization of "ing" as "ang" and "ink" as "ank" in some words, as in *thang* for *thing*, *sang* for *sing*, and *drank* for *drink*

The number of vowels and vowel behaviors captured in this list are extremely limited and are not claimed to be exclusive to AAE. This limited feature listing may not, then, be used as evidence of properties of AAE that can uniquely characterize the dialect.

African American Vernacular English lists eighteen general phonological features that define AAE, and only three of these features addresses vowel tendencies. The appearance of these features is not claimed to be exclusive to, or regular within, AAE. Although these features concentrate on consonants and are not definitive characteristics of AAE, they provide a phonological context for the current investigation. The phonetic analysis of vowels presented in this thesis contributes evidence to the limited description of the sound system of AAE to help identify any unique properties of the dialect.

2. The feature numbers used here correspond to Rickford's numbering for reference.

2.2.3 "Some aspects of African-American Vernacular English phonology." Guy Bailey & Erik Thomas (1998).

"Some aspects of African-American Vernacular English phonology" compiles a list of twenty-five frequently cited features of African American English (AAE) phonology. "Some aspects of AAVE" provides additional information on which features uniquely belong to AAE and which features may be shared across dialect boundaries. As in Rickford, few features listed by Bailey & Thomas address vowel characteristics. Eight features address consonants, three address prosodic or segment features, and six features address both consonants and segments. Only four features in this article characterize vowels of AAE. These features are said to be shared with Southern white speech and cannot, therefore, be used to characterize AAE as a unique dialect. Despite the limitations of the listing in "Some aspects of AAVE," these phonologic features provide context for the research in this thesis.

Bailey & Thomas' list of vowel features are as follows (note features 14, 15 also found in Rickford)[3]:

14. Glide reduction of /ai/ to [aɪ à a] before voiced obstruent and finally
15. Glide reduction of /ɔɪ/ [ɔɪ à ɔe] before /l/
16. Merger of /ɛ/ and /ɪ/ before nasals
17. Merger of tense and lax front vowels before /l/

These features address a small subset of vowels and behaviors and can be further generalized into two characterizations: glide reduction (features 14 and 15) and the mergers of the Southern Chain Shift[4] (features 16 and 17).

Although this thesis is primarily concerned with AAE vowels, this article identifies

3. The feature numbers used here correspond to Bailey & Thomas' numbering for reference.
4. Labov (1991)

six consonant features that concern environments used in the data collection for this thesis. These features are the only phonological elements in the literature claimed to singularly belong to AAE and are as follows[5]:

20. Reduction of final nasal to vowel nasality
21. Final consonant deletion (especially affects nasals)
22. Final stop devoicing (without shortening of preceding segment)
23. Co-articulated glottal stop with devoiced final stop
24. Loss of /j/ after consonants
25. Substitution of /k/ for /t/ in /str/ clusters

Feature numbers 21 – 23 are of particular note because these phonetic environments were relied upon to gather test data in this thesis. Their predicted impact on proceeding vowels are under secondary observation in the analysis of this thesis. For more information on the experimental design, please refer to Chapter 3.

"Some aspects of African-American Vernacular English phonology" identifies twenty-five phonological features of AAE and includes information regarding cross-dialect feature sharing. While accounting for these variations contributes to the phonological understanding of AAE, this listing is limited to a small subset of vowels and their behaviors. Only four features in "Some aspects of AAVE" are concerned with vowel behaviors, all of which are said to be shared with Southern white speech. In addition to the vowel features, this article includes six consonant features likely unique to AAE, three of which are of concern to the data collection and analysis of this thesis. "Some aspects of African-American Vernacular English phonology" defines the phonological boundaries for the phonetic testing environment of this thesis but is limited in scope. The vowel features discussed in this article are not unique elements of AAE and are not of concern to the current investigation.

5. The feature numbers used here correspond to Bailey & Thomas' numbering for reference.

2.3 Perceptual Literature

2.3.1 Introduction

Speculation that African American English (AAE) is a unique dialect that "sounds" different from other American dialects is widespread and often supported only by anecdotes. Perceptual experiments can help verify the unique identification of AAE by controlling paralinguistic variables, such as age, gender, and race, to reduce listeners' prejudice towards a given speaker. When listeners perceive a difference between dialects while presented with only audio stimuli, as in a perceptual study, it is reasonable to conclude that a difference in the speech itself must exist. Results of recent perceptual experiments on AAE inspire this phonetic investigation of the dialect.

In this section, I review two perceptual tests in which listeners do distinguish AAE from another variety of contemporary American English. Section 2.3.2 addresses a study by Douglas Massey & Garvey Lundy, and section 2.3.3 addresses a study by David Graff, William Labov & Wendell Harris.

2.3.2 "Use of Black English and racial discrimination in urban housing markets." Douglas Massey & Garvey Lundy (2001).

"Use of Black English and racial discrimination in urban housing markets" was not motivated for pure linguistic research. The experiment was designed as an inexpensive and effective method for social scientists to measure incidence of racial discrimination in the urban Philadelphia housing market. Results of the experiment indicate that some Americans can hear a difference between speakers of dialects primarily associated with a single race,

providing enough perceptual evidence to investigate phonetic cues for an empirical basis for these perceptions. The conclusions suggest that some Americans can infer race from speech patterns alone.

For the experiment reported in "Use of Black English," perceptual tests were conducted using scripted telephone conversations that controlled for paralinguistic variables such as age, gender, income level, and race. Three speech patterns that supposedly reveal the race and social status of the subjects were tested: Black Vernacular English (BEV), Black Accented English (BAE), and White Middle-Class English (WME). BEV and BAE are distinguished by the inclusion of "black" sounding syntactic features.[6] BEV employs both syntactic and phonologic features of AAE, while BAE combines the syntactic features of "standard" American English and the phonological features of AAE. Massey & Lundy do not specifically identify the BEV phonological features, but presumably they are the same as those identified by Rickford (1999) and Bailey & Thomas (1998), e.g. final consonant devoicing/deletion, consonant cluster reduction.

Based on their telephone experiments testing each of these speech patters (BEV, BAE, WME), Massey & Lundy conclude there is scalar phone-based discrimination in the Philadelphia housing market. Black speakers generally experienced less access[7] than whites, females less than males. Within black dialects, BEV speakers (or "lower class black" speakers) had less access than BAE speakers ("middle class black" speakers).

The results of the experiment reported in "Use of Black English and racial discrimination in urban housing markets" suggest variables perceived only through the

6. See Green (2001).
7. Access to housing was based on rate of returned calls and on appointments made with landlords.

speech signal are likely to be a liability to potential renters in this market. While age and gender are likely factors in discrimination, this perceptual study supports the impressions that African American English (AAE) "sounds" distinct. Interestingly, this study contradicts the idea that AAE is a phonetically consistent singular dialect across the country and supports the idea that subtypes of AAE can distinguished.

2.3.3 "Testing listeners reactions to phonological markers of ethnic identity." David Graff, William Labov & Wendell Harris (1986).

"Testing listeners reactions to phonological markers of ethnic identity" reports on a phonetic analysis and perceptual experiment targeting only the relative fronting of vowels / aw / as in the word *saw* and / ow / as in *sow* (authors' transcriptions) from speakers in Philadelphia. The subjects participating in this study are identified as African American English (AAE) speakers or as non-AAE speakers, speakers of the local Philadelphia vernacular. Although neither group is claimed to use the standard American English dialect, the authors report that some phonetic features of vowels from AAE speakers appear more similar to standard pronunciation patterns than the features of non-AAE speakers.

In this data, authors found that the position of / ow / was similar in both AAE and non-AAE speaker groups and could not be used to indicate dialect. The / ow / was fronted in both groups, and the vowel nucleus was lax (non-peripheral). The position of / aw /, however, was different between the speaker groups. The nucleus of / aw / was tense (phonetically peripheral) in the SAE speaking community and lax (non-peripheral) among AAE speakers. Strangely, listeners participating in the perceptual experiment judged fronted

/ ow / to be “more white” sounding even though it is present in both dialects, but when presented with a fronted / aw /, the same judgment was not made. It has been suggested that when listeners are presented with a fronted / ow / in a test environment, the fronting feature is isolated as an indication of white speech. Listeners have generalized the [+ front] feature as indicator of a single dialect despite its presence in both dialects presumably because it occurs more frequently in that dialect.

The results of “Testing listeners reactions to phonological markers of ethnic identity” illustrate how a local vernacular can exhibit fewer standard features than a minority dialect. It additionally draws attention to the fact that perception may not always coincide with phonetic production. This article concludes that a phonetic vowel feature can make both an empirical and a perceptual distinction between AAE and another variety of American English, inspiring the analysis of this thesis.

2.4 Chapter Summary

In this chapter, I addressed phonetic analyses, phonological generalizations, and perceptual studies of African American English. In *An Acoustic Analysis of Vowel Variation in New World English,* Erik Thomas presents a thorough acoustic phonetic analysis of data from regional distinct dialects, but data from Northern variety of African American English (AAE) are limited. William Labov's “The three dialects of English” identifies the principles governing the variation between three divergent regional varieties of American English and explains these differences as systematic vowel shifts. Although Labov excludes an analysis of AAE, his analysis provides context for the coexisting dialect of the Detroit metropolitan

area investigated in this thesis, the Northern Cities Shift. Both John Rickford's *African American English* and Bailey & Thomas' "Some aspects of African American Vernacular English phonology" provide phonological features of AAE but concentrate on the properties of consonants. The perceptual literature on AAE, including the work of Douglas Massey & Garvey Lundy and David Graff, William Labov & Wendell Harris, substantiate the anecdotal view that AAE is a unique dialect that "sounds" different from other American dialects, provoking further linguistic investigation.

The syntactic and sociolinguistic variables of AAE have been extensively addressed in other literature, and the phonetic and phonological research has concentrated on consonant variation, creating a situation ripe for an acoustic phonetic investigation of the vowels of AAE such as in this thesis.

Chapter 3: Research Design and Methodology

3.0 Research Goals

The primary goal of this thesis is to examine speech samples of two perceptibly distinct dialects spoken in the Detroit metropolitan area. The speech varieties, African American English (AAE) and Northern Cities Shift (NCS), are examined to determine if acoustic vowel features vary predictably between dialects. These two dialects are claimed to coexist without sharing distinct features; speakers of AAE are claimed not to exhibit any distinctive characteristics of NCS (Labov, 1991). For this research, speech data from both dialects are elicited and analyzed. Although the research includes data collection, inventory and description, the close acoustic phonetic analysis is the focus of this thesis. This thesis contributes phonetic data and analysis of AAE speech to ultimately determine if vowel features may be included in the list of defining characteristics of AAE. Focused phonetic analyses, such as the one presented here, are underrepresented in the general literature.

In this chapter, I describe the data collection and research methods used to achieve these goals. In section 3.1, I state my hypothesis. In section 3.2, I describe the experimental design, including targeted phonetic features, elicitation techniques, recording materials, and participant demographics. The methodology of the experiment is discussed in section 3.3. This section defines the phonetic variables under investigation and provides illustrations on how these variables were analyzed. Section 3.4 concludes this chapter with a note on the challenges to the acoustic phonetic analysis of vowels.

3.1 Hypothesis

As illustrated in Chapter 2, existing phonological and phonetic work on African American English (AAE) is primarily concerned with consonant variation. Many of these variations are claimed to be optional or to be shared with other varieties of American English (Bailey & Thomas, 1998; Rickford 1999). If AAE is a cohesive dialect that can be identified even when other variables are controlled (i.e. syntactic, socioeconomic, etc.), and the consonant features are neither predictable nor distinct, then other phonetic or phonological variables must help distinguish AAE from other American dialects. To date, the vowel system of AAE is often defined against a dominant dialect and not by features that may be independently present. For example, AAE speakers in the Great Lakes region (Michigan, Ohio, Wisconsin) are claimed not to participate in the dominant regional vowel shift, the Northern Cities Shift (NCS). There is not, however, an alternative prediction regarding the behavior of AAE vowels as spoken in this region. This thesis presents the findings of an empirical analysis of AAE vowels to determine if unique phonetic features are present in the dialect.

For this thesis, I collect and analyze speech data from four self-identified AAE speakers and four speakers of NCS living in the Detroit metropolitan area. Under investigation are the principle acoustic features, vowel duration and vowel quality. This analysis demonstrates that there are phonetic features that systematically differ between the coexisting speech communities, AAE and NCS.[8] This analysis broadens our knowledge of vowel variation within AAE and, ultimately, expands the notion of acceptable vowel variation within contemporary American English.

8. Excluded from this are the quality predictions made in Labov (1991).

3.2 Experimental Design

To investigate the acoustic features of vowels of African American English (AAE) and Northern Cities Shift (NCS), I recorded and analyzed an original data set of contemporary speech samples from volunteer subjects living within a fifty mile radius of the city of the Detroit. I recorded the subjects reading from a list of common English words. This list was created for this experiment to target common vowels, controlling the phonetic environment for known influences on vowels. The recordings were contribute to the AAVE Speech Project at Eastern Michigan University and can be downloaded at altiplano.emich.edu.

In this section, I describe the experimental design. In section 3.2.1, I describe the word list and other materials used to collect the data, and in section 3.2.2, I provide information on participant demographics.

3.2.1 Target data and collection tools

Fourteen distinct vowels were identified in preliminary recordings of AAE and NCS speech samples.[9] Ten of these vowels were selected for analysis: [i , ɪ , e , ɛ , æ , ʌ , a , o , u , ɔ]. These vowels were selected because of their regularity of occurrence and clarity in the recordings. In this thesis, I only report results of these ten vowels from the test data.

To collect vowel samples, I created a list of 198 common monosyllabic English words selected for the uniformity of their phonetic environments (consonant-vowel-consonant or

9. See Appendix B for information on the preliminary study

CVC).[10] I constructed the word list to target minimal pairs with alternating voice/voiceless final stop Cs, [p , b , t , d , k , g] to control for the known influence of a C on a preceding V. For example, *dip, dib, bit, bid, Bic*, and *big* were among the set of test words for the vowel [ɪ]. Due to the limitations of the lexicon, however, some near pairs or unpaired words were included in the word list where there are lexical gaps.

The word list includes three different carrier frames read with every target word, as follows:

Frame 1: Read X again
Frame 2: Read X slowly
Frame 3: Read X

If a subject were reading the word list using frame 1, for example, she would read aloud from the list inserting a word into the first frame *Read X again* (where *X* is an item from the word list):

Read bot again
Read hit again
Read bought again
Read league again
(...continuing through completion of the list)

These frames are constructed to capture the range of phonetic influence on the target words by providing three distinct environments in which all targets will appear. Frame 1 (*Read X again*) provides an environment where the target word (*X*) is composed of CVC and followed by a word initial V (in the word *again*): a $CV_1C\#/\_V_2$ environment, where V_1 is the test item. Frame 2 provides a $C_1VC_2\#/\_C_3$ environment, where C_3 is the voiceless alveolar fricative [s]. Frame 3 provides a CVC# environment, where the target word is also phrase

10. See Appendix C for the complete list of test items.

final. The surrounding environments provided in the three frames are predicted to affect the target vowels differently. For example, the duration of a word in phrase final position is usually shorter than when that same word appears in another phrase position. In this thesis, I report only the result from frame 2 because of the relatively neutral phonetic environment provided by [s] following the target word. This environment is predicted to have the least influence on the test V of the preceding target segment ($C_1VC_2\#/\_C_3$ where $C_3$is [s]). Data from frame 1 and frame 3 were analyzed for reference, but this information is not included in the results presented here.

For the recording sessions, the word list was randomized once and given to subjects to review immediately before each session. When subjects were comfortable with the test items, they were instructed to read into a microphone at a comfortable, conversational rate. Subjects were asked to read the complete list first using frame 1, then repeat the list using frame 2, and a third time using frame 3. The completion of these three frames constituted one reading of the list. Subjects were asked to repeat this process for the second reading. Both readings were recorded, but only the second readings were selected for analysis; the first reading was omitted to account for the known tendency of subjects to over-articulate when alert or anxious and to speak more naturally when bored or tired.

All recordings were made in a quiet room using a Shure vocal microphone (PG58) and a Marantz digital recorder (PMD671). The sound files were analyzed using the speech analysis software Praat for Mac OS X (Boersma & Weenink 2008).

3.2.2 Participant demographics

Eight native speakers of American English, four male and four female ages 22-33, were volunteer participants in this study.[11] All speakers are residents of Michigan and live within a fifty-mile radius of the city of Detroit.

All subjects completed a brief demographic questionnaire before participating in this study.[12] Of the eight speakers' recordings that were selected for analysis, two male and two female participants identified themselves exclusively as “Midwest/Northern American English” speakers. Two males and two females identified as “African American/Black English” speakers. In the analysis, the first group is identified as the set of Northern City Shift (NCS) speakers, and the second group is identified as the set of African American English (AAE) speakers. It should be noted that of the four AAE speakers, one male and two females identified as both AAE and Midwest/Northern American English speakers while only one male identified exclusively as an AAE speaker.

3.3 Methodology

Speech sounds consist of small variations in air pressure that occur very rapidly. These variations are produced as air is pushed through and manipulated by the body's speech organs. The variations are characterized in articulatory phonetics by the behavior of the speech organs at the time of production; acoustic phonetics characterizes the physical patterns of the air itself. As language sounds can be identified by specific production methods, so too can they be identified by acoustic patterns.

11. This study was conducted in compliance with the Eastern Michigan University Human Subjects Research Committee. See Appendix A for the approval letter.
12. See Appendix D for the demographic questionnaire template.

In this section, I first provide background information on acoustic phonetic variables, including how they are produced and why they are valuable to linguistic research. In subsections 3.3.1 and 3.3.2, I provide illustrations on how these variables were analyzed for this thesis.

3.3.1 Defining acoustic phonetic variables

A vowel can be broadly defined as a sound that is produced with an open vocal tract, preventing the obstruction of air pressure past the glottis.[13] The acoustic character of a vowel is shaped by minimal articulatory obstruction by the position of the tongue in the mouth and by the shape of the lips. Because there is no other physical obstruction during production, vowels are acoustically characterized by vibrations, or resonance, of the human vocal tract. The vibrations move at physical frequencies that can be deconstructed to two components: regular repeating wave cycles, known as a waveform, and harmonic overtone structures, or a formant pattern. Both the waveform and the formant pattern can be quantitatively measured using a spectrogram. A spectrogram is the visual output of a software program that represents the waveform and formant pattern using sonic or acoustic input. These measurements help identify differences in speech sounds that may otherwise be consciously undetected or misidentified by listeners. The acoustic information of waveforms and formant patterns provide information about the phonetic component of human language.

Speech samples from volunteer participants were recorded as .wav files and analyzed using Praat 5.1.2 (Boersma & Weenink, 2008). The primary acoustic phonetic variables

13. This is a phonological simplification, as glides and approximates such as [w] and [j] are produced in a similar manner and can also function as syllable nuclei.

under investigation are vowel duration and vowel quality, detected and measured using the spectrogram. Other phonetic variables, such as consonant deletion, glottal co-articulation, and/or replacement are considered in the analysis because of their potential influence on vowels, but these variables are not the primary focus of this thesis. In the following section, I provide a description of how vowel duration and vowel quality are defined and analyzed for this experimental procedure. Section 3.4.1 is devoted to duration and section 3.4.2 to quality.

3.3.2 Vowel duration

Vowel duration, or length, is measured in milliseconds (ms) and can vary substantially. Factors affecting vowel duration include vowel height, syllable stress, word familiarity, place of articulation of proceeding consonant and the voicing of a following consonant. Consonant voicing, in particular, is known to affect the length of a preceding vowel. This variable was controlled for in the experiment by selecting phonetically similar targets in constructing the word list. The list is primarily composed of monosyllabic minimal pairs with [+ / - voice] stop consonants following each target vowel, as in *bet/bed, bit/bid, bat/bad* (phonetically, [bɪt/bɪd ; bɛt/bɛd ; bæt/bæd]) to account for the known influence.

Although duration alone is not sufficient for the accurate perception of individual vowels, previous work indicates that vowel length helps listeners distinguish spectrally similar vowels, such as [æ] from [e] (as in the words *bat* and *bait*) and to place vowels in larger categories, such as tense vs. lax (Kent & Read, 1992).

The waveform and the formant structure displayed through a spectrogram can both be analyzed to determine the boundary between a vowel and a consonant, but the regularity of a

waveform is the more reliable indication of vowel duration. Figure 1 illustrates how waveform cycles are used to determine length:

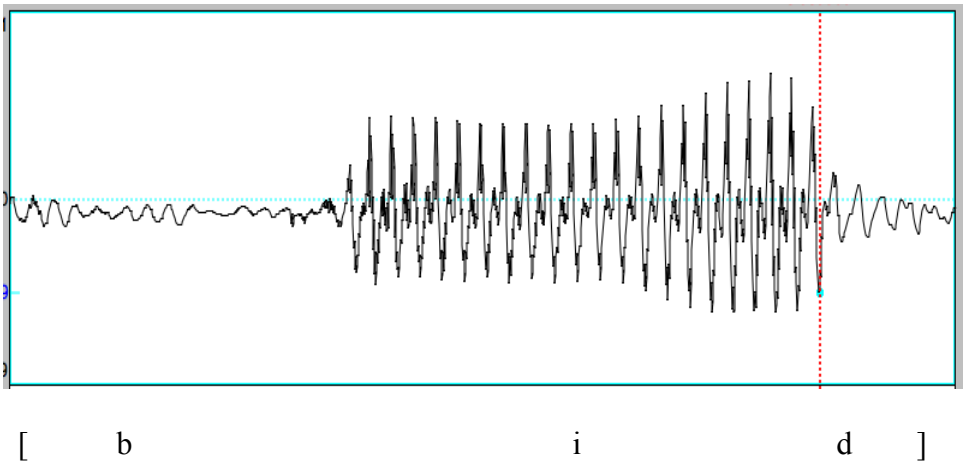


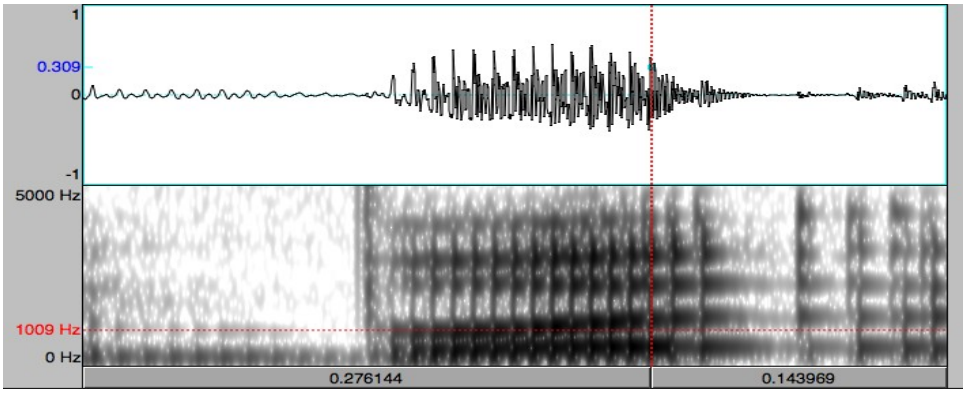
Figure 1. Illustration of vowel duration: Waveform of the word "bead"

Figure 1 shows the waveform and the phonetic transcription of the word *bead.* The phonetic letters are aligned with their appearance in the wave from. The vowel can easily be distinguished by the regular periodic wave structure. The cursor shows where I would judge the [i] to end and the following consonant [d] to begin.

For this thesis, I relied primarily on the waveform to determine vowel duration. In cases where an interruption or cessation was found in the regularity of a vowel waveform, I relied upon the formant structure for duration analysis. For example, an ambiguous transition is often found in the waveform when features are shared across adjacent phoneme boundaries (e.g. voicing of a sonorant consonant following a vowel). Cessation of the waveform can indicate a degree of glottalization, or the full glottal replacement, of a stop consonant. For these types of occurrences in the speech signal, I consulted both the waveform and format

structure to determine vowel length.

The ubiquity of glottalization was the primary challenge in determining vowel duration in this data set. Nearly half of the speakers in this study displayed glottalization on (or full glottal replacement of) word final stop consonants. The frequency and exact environments of these occurrences were noted when found in the data. The effect of glottalization is considered in the analysis. Figure 2 illustrates a typical appearance of glottalization in this data:



[b u ʔ]

Figure 2. Illustration of glottalization: Spectrogram of the word "butt"

Figure 2 shows the complete spectrogram (waveform on top and formants on bottom) and the phonetic transcription of the word *butt.* The phonetic letters are aligned with their appearance in the spectrogram. Although the nucleus of the vowel can still be determined, the glottalization of the final consonant creates turbulence in the waveform, making it difficult to judge where, exactly, the resonance of the vowel ceases. The striations that appear above [ʔ] are indicators of glottalization. Turbulence created by the glottal can blur the waveform, and the striations found in the formants can help determine where the vowel may

end and a glottalized consonant begins. The cursor shows where I would judge the [i] to end and the following consonant [ʔ] to begin.

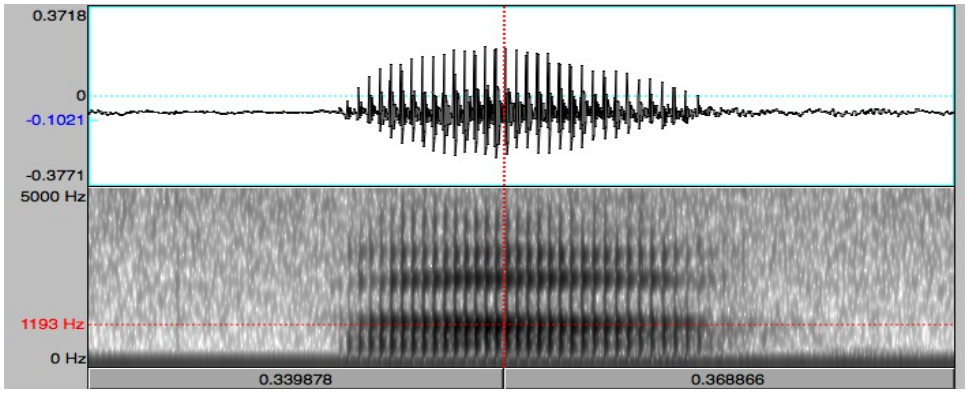
3.3.3 Vowel quality

Vowel quality determined by analyzing the formant structure visible in the spectrogram. Three formants detected in speech carry the majority of meaningful acoustic information. Although no human body is identical and must, therefore, resonate at different frequencies, each biological gender produces sounds in expected formant frequency ranges (children also have expected ranges based on age). These ranges are based on biologically determined resonant chamber size, e.g. the body cavities and relative size of the speech organs. These formants are referred to as F1, F2 and F3, with the lowest frequency being defined as F1.

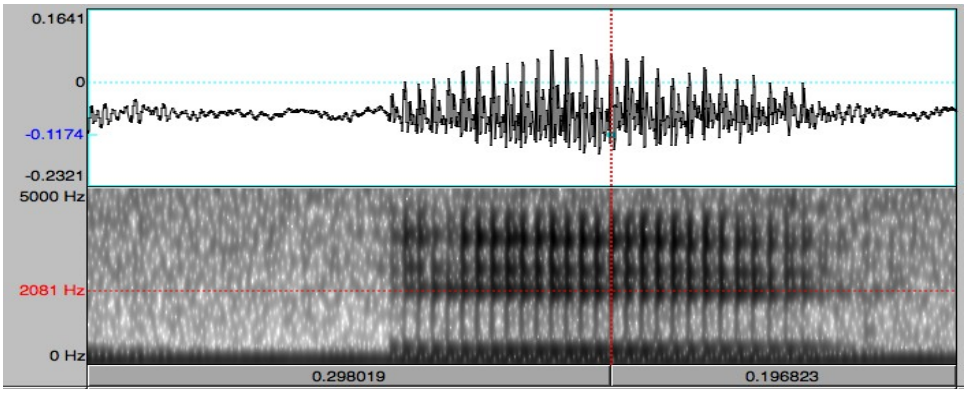
Unique characteristics of individual vowels are visible as changes in the formant patterns. Analyzing the changing position of the formants can indicate where the speech organs are and what they are doing, and from this determine what vowel is being produced in a given sample. The resonating frequency of a vowel is referred to as vowel quality, a composite measurement of F1, F2, and F3. All measurements are presented using the Hertz (Hz) frequency scale.

F1/F2/F3 measurements were taken for all vowels in speech samples from participants. The measurements were taken from the steady state of the vowel. The steady state is the peak of vowel production, the strongest and most consistent resonant moment. Previous research indicates that F1 corresponds with tongue height and F2 with tongue

advancement, and the acoustic quality of vowels corresponds to these variables. For example, it is expected that the F2 of the high close vowel [i] as in the word *feet* will be resonating at a higher frequency than that of the low mid vowel [a] as in the word *father.* Figure 3 displays a spectrogram for each of these vowels.



[a]



[i]

Figure 3. Illustration of F2 variability: Spectrogram of [a] and [i]

In the spectrogram of [a], we see the F2 measurement at a frequency of 1193 Hz. It is considered low, as it is close to F1. In the spectrogram of [i], we see the opposite to be

true. F2 measures at a frequency of 2081 Hz, nearly 1000 Hz. higher than in [a]. Here, F2 is considered high, as it is close to F3. Both of these measurements are taken at vowel nuclei.

A minimum of two measurements at the highest and lowest points of F1 and F2 are taken for ambiguous samples and for diphthongs. Complex vowels are not, however, the primary focus of this thesis and these measurements are omitted from the results. As in the analysis of vowel length, the ubiquity of glottalization in this data set is evident. Although this feature does greatly affect vowel quality, the degree of glottalization and the occurring environment were noted for future research.

3.4 Challenges to Analysis

Although there are duration and quality tendencies of individual vowels, languages permit a great deal of flexibility and variability in a single sound. This flexibility presents difficulties for acoustic analysis. In this data set, an additional difficulty is posed by the ubiquity of glottalization. In this data, glottalization is primarily found on word final stop consonants and often includes a degree of consonant deletion, glottal replacement, or co-articulation. This poses a particular challenge to determining vowel duration, as this feature can blur the boundary between consonant and vowel. The inherent acoustic fluidity of vowels poses an additional challenge to the vowel quality analysis of this thesis. This fluidity raises questions regarding the delineation of vowels themselves: are vowels defined by physical properties or by listener perceptions? If a speaker can produce acoustically distinct samples of [e] and [æ] but a listener cannot distinguish [bed] from [bæd], are these different vowels, internal variations of one vowel, or both? When faced with phonetic data, it is

necessary to delineate vowel lines despite these difficulties before proceeding with an analysis. This fluidity of vowel production is the source of both the difficulties and the rewards of the phonetic research presented in this thesis. Through it, I present a new data set and my phonetic judgments based on my analysis and comparison of the observable properties of the data set.

3.5 Chapter Summary

In this chapter, I stated my research goals and hypothesis. I described the data collection and research methods used to achieve these goals. I presented information on the experimental design, including targeted phonetic features, elicitation techniques, recording materials, and participant demographics. I also defined the phonetic variables under investigation and provided illustrations on how these variables were analyzed. I concluded with a note on the challenges to the acoustic phonetic analysis of vowels.

Chapter 4: Results

4.0 Introduction

In this chapter, I present the results of the analysis of speech samples from eight volunteer subjects, four African American English (AAE) speakers and four Northern Cities Shift (NCS) speakers, to empirically determine if acoustic phonetic vowel features are consistently and predictably varied between the speaker groups. Vowel duration and vowel quality are the primary targets of the data collection and the focus of the phonetic analysis, but secondary information on the consonants following target vowels is included in this thesis.

The results of this experiment are organized into two sections, one for each primary phonetic feature under investigation. In section 4.1, I present the results of my analysis of vowel duration from each dialect. This section includes a comparison of results from each dialect and a discussion of how consonant voicing affects the length of the proceeding target vowels. In section 4.2, I presents results from my analysis of vowel quality. This section includes an analysis of the role of the NCS pivot point in each dialect and the subsequent effect on the front tense/lax vowels. A summary of results is presented at the end of this chapter.

4.1 Vowel Duration

Vowel duration, or length, can vary substantially. Vowel height, syllable stress, word familiarity, place of articulation of preceding consonant and the voicing of a following consonant are some factors that can affect vowel length. Although the accurate perception of

vowels is not based exclusively on length, it distinguishes between similar vowels (such as [æ] from [e]) and places vowels into larger categories (such as tense vs. lax). Vowel length is a principle phonetic cue, but it has not been specifically addressed within AAE studies. I have selected vowel duration as the first phonetic variable to investigate in this thesis. One goal of this study is to determine why AAE sounds different from other varieties of American English. For this thesis, I measured speech data from spectrograms produced using Praat 5.1.2 speech analysis software to determine vowel length.

4.1.1 Northern Cities Shift vowel duration

In this section, I present the average length of the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] from two male and two female participants in this study who typify the Northern Cities Shift (NCS) dialect. All vowel lengths are presented in milliseconds (ms). Table 1 presents measurements from vowels produced by both the male and the female speakers.

Table 1

Average vowel duration in milliseconds of speakers of Northern Cities Shift (NCS)

NCS Vowel Duration		
Vowel	**NCS Male**	**NCS Female**
i	141	137
ɪ	120	121
e	167	164
ɛ	133	147
æ	197	177
ʌ	131	139
a	208	190
u	174	132
o	177	154
ɔ	192	189

The results from this data set do not deviate from the expectations for American English vowel duration. There is little difference found between the genders. The central vowels display the widest range of possibilities. The [æ , a] are the longest vowels in the entire set, with [a] being longer than [æ]. Karet, [ʌ], is the shortest vowel. As expected, there is a length distinction between front tense/lax vowel pairs [i , ɪ] and [e , ɛ]: the lax vowels [ɪ , ɛ] are shorter than their tense counterparts [i , e]. These vowel lengths and relationships are typical features of American English.

4.1.2 African American English vowel duration

In this section, I present the average length of the same vowels addressed in section above, [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ], but from two male and two female African American

English (AAE) speakers that participated in this study. Table 2 presents measurements from vowels produced by both the male and the female speakers. All vowel lengths are presented in milliseconds (ms).

Table 2

Average vowel duration in milliseconds of speakers of African American English (AAE)

AAE Vowel Duration		
Vowel	**AAE Male**	**AAE Female**
i	204	165
ɪ	221	166
e	231	206
ɛ	240	202
æ	260	242
ʌ	242	176
a	256	230
u	223	162
o	246	184
ɔ	250	218

Unlike the NCS speakers, the AAE speakers display unexpected tendencies in vowel duration. In both male and female speakers, there is a general lengthening trend from high to low. High vowels are shorter than low vowels regardless of internal relationship within the vowel sets. The high vowels [i , u] are the shortest vowels in these data, and the low vowels [æ , a] are the longest. Both the set of front vowels [i , ɪ , e , ɛ] and the set of back vowels [u , o , ɔ] lengthen as they lower.

Although vowel length in male and female AAE speakers is generally parallel, the genders exhibit a regular difference between the length of the tense/lax vowels in the front sets [i , ɪ] and [e , ɛ]. It is predicted that in American English, the higher tense vowel of each pair [i , e] will be longer than the lower lax vowel of each pair [ɪ , ɛ]. Both the male and female AAE speakers deviate from this expectation, but in different ways. In the male AAE speakers, the lax vowels [ɪ , ɛ] are longer than their tense counterparts [i , e]. There is, however, only a negligible difference between the lengths of the tense/lax vowels produced in the female AAE speakers.

The AAE data analyzed for this thesis display a general lengthening tendency within the system as the vowels move from high to low. These results deviate from the predictions for vowel length in American English.

4.1.3 Inter-dialect comparison of vowel duration

To determine if vowel duration contributed to the distinct sound of African American English, I analyzed data from two coexisting dialects in the Detroit metropolitan area, African American English (AAE) and Northern Cities Shift (NCS). I found that the length of the vowels in the NCS data was consistent with the predictions for contemporary American English, but data from the AAE speakers were not. In this section, I compare the duration of vowels from the AAE and NCS samples to better illustrate where the differences occur. In this section, the results that were separated by genders in sections 4.1.1 and 4.1.2 are averaged together. AAE durations are of both male and female AAE speakers; NCS durations are of both male and female participates who typify the Northern Cities Shift.

Table 3 presents average measurements of the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] from each dialect. The final column in this table ("+ / - ms") is the average difference between a given sample produced by an AAE speaker and the same vowel when produced by an NCS speaker. For example, [i] will be an average of 46 ms. longer when produced in AAE than when produced in NCS. All vowel lengths are presented in milliseconds (ms).

Table 3

Comparison of average vowel duration in AAE and NCS

Comparison of Vowel Duration in AAE and NCS			
Vowel	**NCS**	**AAE**	**+ / - ms**
i	139	185	+ 46
ɪ	121	194	+ 73
e	166	218	+ 52
ɛ	141	221	+ 80
æ	187	252	+ 65
ʌ	135	209	+ 74
a	199	244	+ 45
u	153	193	+ 40
o	165	215	+ 50
ɔ	191	231	+ 40

In comparing the vowel durations of AAE and NCS, a striking difference becomes immediately apparent: all AAE vowels are longer than their NCS counterparts by a minimum of 40 ms. Another clear difference in vowel length is found in the front tense/lax pairs, [i , ɪ] and [e , ɛ]. In English, it has been found that the lax vowels [ɪ , ɛ] will be shorter than their tense counterparts [i , e] (Goodman, Jones & Sibadini, 1998). This relationship is seen in

the NCS front tense/lax pairs, but interestingly the AAE data do not follow the pattern.

In NCS, the tense vowels [i , e] are longer than the lax vowels [ɪ , ɛ] by an average of 20 ms. In AAE, the tense vowels are shorter than the lax vowels by an average of 6 ms. In AAE, vowel length appears to correlate more strongly with vowel height. The higher the vowel in AAE, the shorter it will be regardless of its inclusion in a tense/lax pair. The "tense" vowels [i] and [e] are higher, and therefore shorter, than their "lax" counterparts [ɪ] and [ɛ]. This length pattern is different from NCS, which maintains the predicted tense/lax length distinction.

4.1.4 Effects of consonant voicing on vowel length

This comparison of African American English and Northern Cities Shift vowel duration illustrates differences between dialects, but another factor involved with vowel length was also analyzed in this study. The voicing of a consonant is known to have an affect on the length of a preceding vowel. The environment of all targeted vowels analyzed in this study were tightly controlled to account for this variable. Words included in the test list were monosyllabic consonant-vowel-consonant, or CVC, with the final C being a stop consonant. Minimal pairs of words with [+ / - voice] on the final C were selected as ideal candidates, as in the words *bat/bad.* The effect of C voicing on vowel length in AAE and in NCS is addressed here.

In this section, I discuss how vowel length in this data is affected by the voicing of a following consonant. I find that the vowels in both speakers who typify the Northern Cities Shift (NCS) and in the African American English (AAE) speakers are lengthened when

followed by a voiced consonant but that the degree of lengthening is different. The results in this section focus on the difference between the front tense/lax vowel pairs [i , ɪ] and [e , ɛ].

In both dialects, word final stops are reduced but the reduction appears more progressive in AAE than in NCS. In AAE, [+ voice] consonants are deleted, while [- voice] final consonants are subject to either full glottal replacement or co-articulation. By contrast, [+ voice] final consonants are devoiced in NCS but not fully deleted, and [- voice] are often glottalized. Both dialects exhibit glottalization in the same environment, but what is devoiced in NCS is deleted in AAE. Although the degree of final stop consonant reduction is different between the dialects, the variation appears to be allophonic. The reduction of word final stops, where [+/- voice] of that stop is the critical variable of the minimal pair, should result in a homophonous word pair. In this situation, for example*, bud* and *butt* should appear to be phonetically identical and be perceived identically.

Although the dialects exhibit similar tendencies in word final stop neutralization, the duration of the preceding vowel is dissimilar. This difference is exemplified in the front tense/lax vowels sets. Table 4 compares the differences of the front tense vowel [i] and the lax counter part [ɪ] in NCS and AAE before voiced and voiceless stop consonants (written as _ / [+ voice] and _ / [- voice]). The final column in this table ("+ / - ms") is the average amount of time difference of a vowel occurring before a voiceless consonant than from its appearance before a voiceless consonant. For example, [i] will be an average of 85 ms. longer in AAE produced before a voiced consonant than when produced before a voiceless consonant. This figure also compares dialect differences in the length of [i] and

[ɪ] in each environment. The final row in each table (“ + / - ms.”) shows the durational difference between AAE and NCS vowels in the same environment. All vowel lengths are presented in milliseconds (ms.).

Table 4

Front tense/lax vowel lengths in AAE and NCS

Front Tense Vowels Length			
[i]	**_ / [- voice]**	**_ / [+ voice]**	**+ / - ms**
AAE	161	246	+ 85
NCS	122	159	+ 37
+ / - ms	- 39	- 88	

Front Lax Vowel Length			
[ɪ]	**_ / [- voice]**	**_ / [+ voice]**	**+ / - ms**
AAE	148	294	+ 146
NCS	85	155	+ 70
+ / - ms	- 63	- 137	

The AAE vowels are consistently longer than the NCS counterparts, as expected, and vowels proceeding a voiced consonant are longer than those proceeding a voiceless consonant in both dialects. Unexpectedly, however, the lengthening affect of a [+ voice] consonant in AAE has approximately twice as great an effect than in NCS. This is particularly interesting when considering the consonant reduction found in the data. Word final stop reduction appears in both dialects, but the reduction appears to be greater in AAE than in NCS. Where AAE deletes a [+ voice] stop consonant, NCS devoices the consonant,

and where AAE replaces a [- voice] stop consonant with a glottal stop, NCS may glottalize the consonant somewhat. Interestingly, consonant reduction correlates with the voicing of a stop consonant, and the vowel length, in turn, appears to correlates with the degree of reduction.

In taking a closer look at the data, an interesting picture emerges from these correlations. In AAE, vowels are longer before [+ voice] stop consonant than when occurring before a [- voice] stop consonant. Note, however, that the realization of a [+ voice] consonant in this data set is total deletion. In the data, AAE vowels occur within limited time ranges that appear to be based on the voicing of the following consonant. In males, vowels that occur before the [+ voice] stops [b , d , g] and vowels that occur before the [- voice] stops [p , t , k] will appear between distinct time frames. By contrast, the average length of a vowel in the speech of NCS males is more loosely delineated. Vowels that occur before [+ voice] stops and before [- voice] stops overlap in time frames. This is illustrated Figure 4:

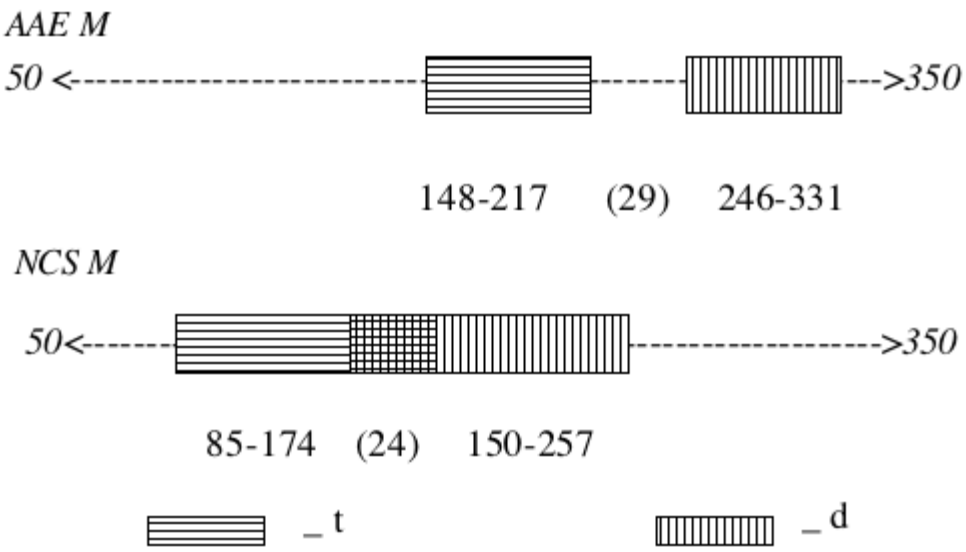


Figure 4. Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS males

Figure 4 shows the time frames in which vowels occur in the male AAE and NCS. In AAE, when a vowel occurs before [- voice] stop consonant (represented by "_t") the vowel falls between 148 ms and 217 ms. Vowels occurring before [+ voice] stop consonants (represented by "_d") fall between 246 ms and 331 ms. There is a gap of 29 ms in which no vowels occur. In NCS, vowels before [- voice] consonants occur between 85 ms and 174 ms. Before [+ voice] consonants, vowels occur between the times of 150 ms and 257 ms. In the NCS males, there is a 24 ms. period in which vowel lengths overlap. No distinction of the environment can be made based on vowel length, as it can be in the AAE data. A similar phenomenon, though less distinct, occurs in the female data (Figure 5):

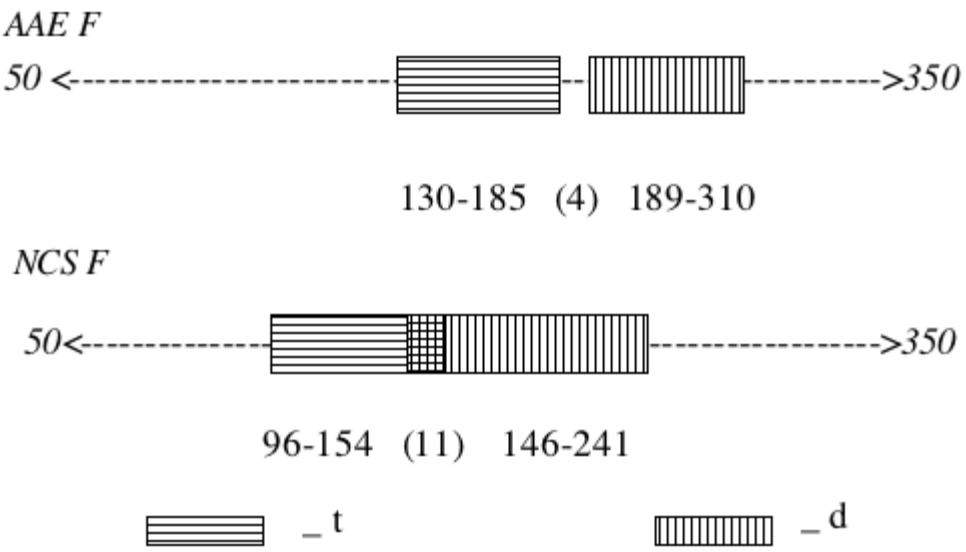


Figure 5. Average length in milliseconds of vowels occurring before stop consonants in AAE and NCS females

In the AAE data, vowels occurring before [- voice] consonants fall between 130 ms. and 185 ms. Vowels occurring before [+ voice] consonants range between 189 ms and 310 ms. The gap between the two sets is only 4ms. In NCS females, vowels before [- voice] consonants occur between 96 ms and 154 ms. Before [+ voice] consonants, vowels occur between 146 ms and 241 ms. This data is parallel to the male set of data but less pronounced. In AAE females, there is a gap of 4 ms between the vowels that occur between [- voice] and [+ voice] consonants. There is an overlap of 11ms in the NCS data. The voicing of the following consonant can be inferred from the length of the preceding vowel in AAE but not in NCS.

4.1.5 Summary of duration results

In this section, I presented results of an acoustic phonetic analysis of vowel duration in two coexisting dialects of the Detroit metropolitan area, Northern Cities Shift (NCS) and African American English (AAE). I found regular differences in the vowel lengths of the two speakers sets. Length in the NCS vowel system is within the expected norm for contemporary American English; length in the AAE vowel system deviates from this norm. A listed summary of the most notable differences is as follows:

1) AAE vowels are consistently longer than NCS counterparts
2) The tense/lax length distinction is present in NCS but not in AAE. In NCS, tense vowels are longer by an average of 20 ms than the lax counterparts. In AAE, this relationship between the vowels is reversed: lax vowels are longer than tense vowels by an average of 6 ms.
3) In both NCS and AAE, consonant voicing affects the length of a preceding vowel (predicted). This produces distinct vowel lengths in AAE based on the voicing of the following consonant, but does not produce distinct vowel lengths in NCS. This implies that when the consonant is fully deleted, that consonant can be identified based on vowel length in AAE. The same is not true in NCS.

4.2 Vowel Quality

Individual vowel quality is determined by the physical patterns that are produced when air is pushed through and manipulated by the body's speech organs. Because vowels are produced with little obstruction, the acoustic structure of a vowel is characterized by the vibrations, or resonance, of the human vocal tract. The acoustic structure of a vowel is referred to as quality. Vowel quality is analyzed through the formant structure visible in the spectrogram, which represent the major resonating frequencies. Three formants detected in speech carry the majority of meaningful acoustic information of vowel quality. These

formants are referred to as F1, F2, and F3 (F1 being the lowest composite frequency).

The unique physical characteristics of individual vowels are visible as changes in formant patterns. Analyzing the changing position of the formants can indicate where the speech organs are and what they are doing, and from this, we can determine what vowel is being produced in a given sample. Vowel quality is a principle acoustic cue that often distinguishes one dialect from another. It is the second phonetic variable I investigate in this thesis to help determine why African American English sounds different from other varieties of American English.

4.2.1 Northern Cities Shift vowel quality

In this section, I present the quality measurements of the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] from two male and two female speakers of the Northern Cities Shift (NCS) dialect. The vowel chart (Figure 6) is based on measurements[14] from vowels produced by both the male and the female speakers; the males' vowels are presented in a black font, females' in grey. The horizontal axis represents F2 measurements and corresponds with tongue advancement or retraction in articulatory phonetics. The vertical axis represents F1 measurements and corresponds with tongue height. All measurements are presented in Hertz (Hz).

14. This chart is based on measurements included in the table in Appendix E.

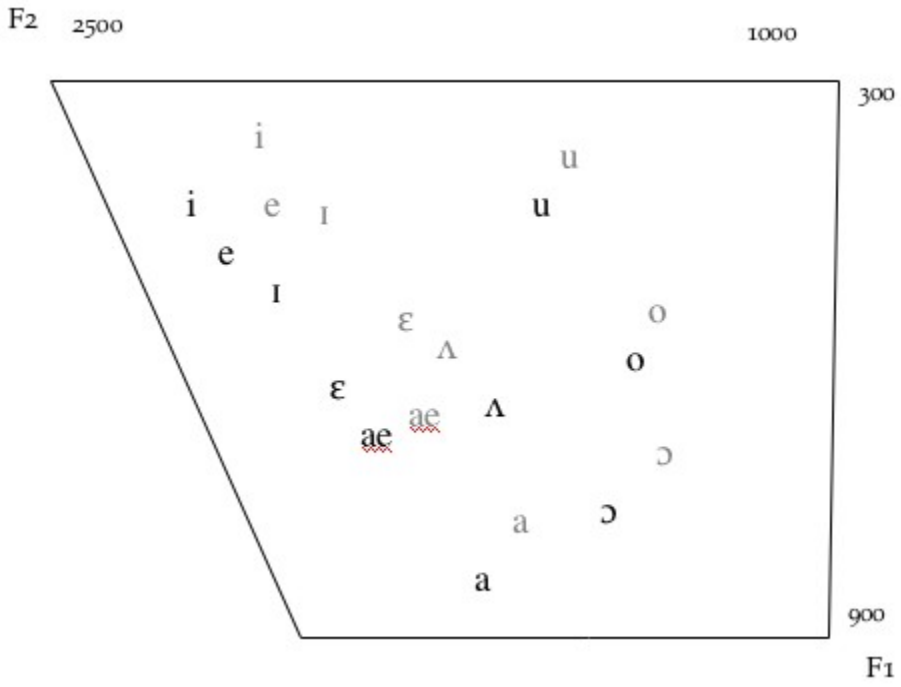


Figure 6. Northern Cities Shift vowel chart (males in black font; females in grey font)

The relationships of vowels within this space illustrate general tendencies of the NCS dialect as predicted by the Chain Shift Principles (Labov, 1991). These principles predict that in NCS, [æ] specifically is tensed and raised. In order to maintain vowel distinction within the system, it has been proposed that other sounds shift to accommodate the first vowel change (Labov, 1991). Specifically, peripheral (tense) vowels rise and non-peripheral (lax) vowels fall in reaction to the catalyst, evident here in the front tense/lax vowel pairs [i , ɪ] and [e , ɛ]. The tense vowels [i] and [e] raised as the lax vowels [ɪ , ɛ] fell, creating a distance within each pair when compared with non-NCS speakers, such as speakers of the Southern Shift, the Low Back Merger, and African American English (Labov, 1991). Back

vowels [u , o , ɔ , a] in both males and females are fronted. These data are consistent with the predictions on vowel quality for this dialect.

4.2.2 African American vowel quality

In this section, I present the quality measurements of the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] from the two male and two female speakers of African American English (AAE). The vowel chart (Figure 7) is based on measurements[15] from vowels produced by both the male and the female speakers; male vowels are presented in a black font, female vowels in grey. The horizontal axis represents F2 measurements, and the vertical axis represents F1 measurements. All measurements are presented in Hertz (Hz).

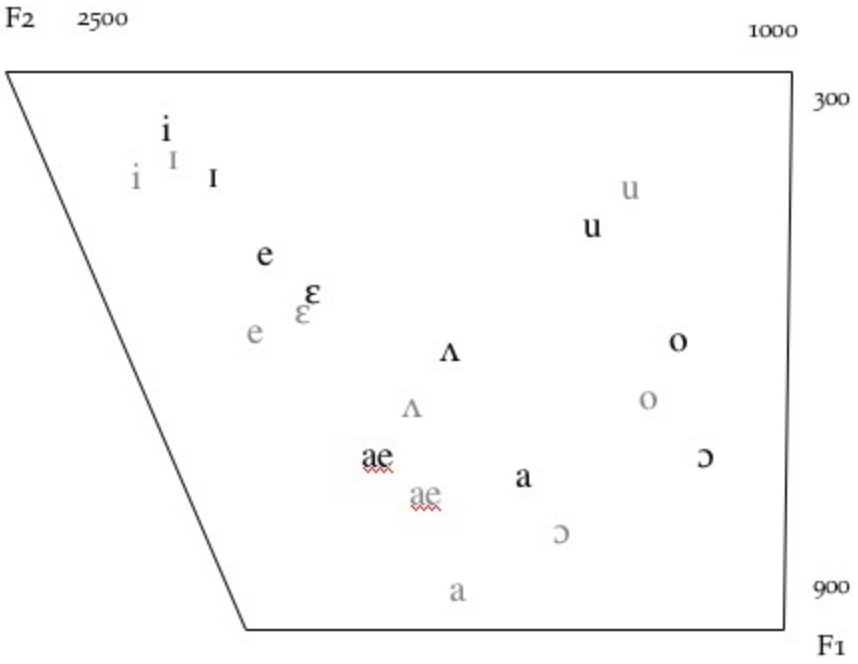


Figure 7. African American English vowel chart (males in black font; females in grey font)

15. This chart is based on measurements included in Appendix E.

The vowel space of in both the AAE males and females, shown in Figure 7, is different from the Northern Cities Shift (NCS) vowels displayed in Figure 6. The peripheral/non-peripheral nuclei of the front tense/lax vowel pairs [i , ɪ] and [e , ɛ] have not shifted, and the back vowels [u , o , ɔ , a] have remained back. This result is not unexpected, as AAE is claimed to be a separate dialect from the other major American dialects characterized by their unique vowel spaces. Interestingly, however, the NCS pivot point [æ] is raised in these data. This is judged by its proximity to [ʌ] and distance to [a], a relationship that is also evident in the NCS data. Despite the fact that [æ] has been raised, it does not appear to function as a catalyst for vowel shifting. The prediction that AAE does not participate in the NCS is borne out by this investigation. However, previous studies have not discussed the raising of [æ], the NCS pivot point, as exhibited by the AAE speakers in this study. Although the [æ] is raised in AAE, it does not appear to trigger the shifter of the other vowels, as predicted as the NCS pivot point.

4.2.3 Inter-dialect comparison of vowel quality: Interaction of the raised [æ] and the front tense/lax vowels

In the analysis of vowel quality, I found that African American English (AAE) speakers from the Detroit metropolitan area shared a feature of the Northern Cities Shift (NCS), a raised [æ]. This finding has not been noted previously in the literature. It is, however, a critical feature of the NCS. The raised [æ] functions as the pivot point, or the catalyst, that starts the vowel shift in NCS. To accommodate the pivot point and maintain phonemic distinction, the nuclei of peripheral (tense) vowels are expected to rise while non-

peripheral (lax) vowels lower. There is no evidence of this shifting in the AAE data despite the presence of the pivot point. In this section, I use the front tense/lax vowel pairs [i , ɪ] and [e , ɛ] to illustrate the rising/falling in NCS and how this feature is absent in AAE.

Figure 8 highlights the relationship of the front tense/lax vowel pairs [i , ɪ] and [e , ɛ] in the NCS data analyzed for this thesis. Note that this figure is identical to Figure 6; only the ovals have been added to draw attention to these vowels. Figure 9 illustrates the relationship in the same vowels [i , ɪ] and [e , ɛ] in AAE. It is identical to Figure 7; ovals have been added highlight these vowels. As in the previous figures, male vowels are presented in a black font, and female vowels in grey.

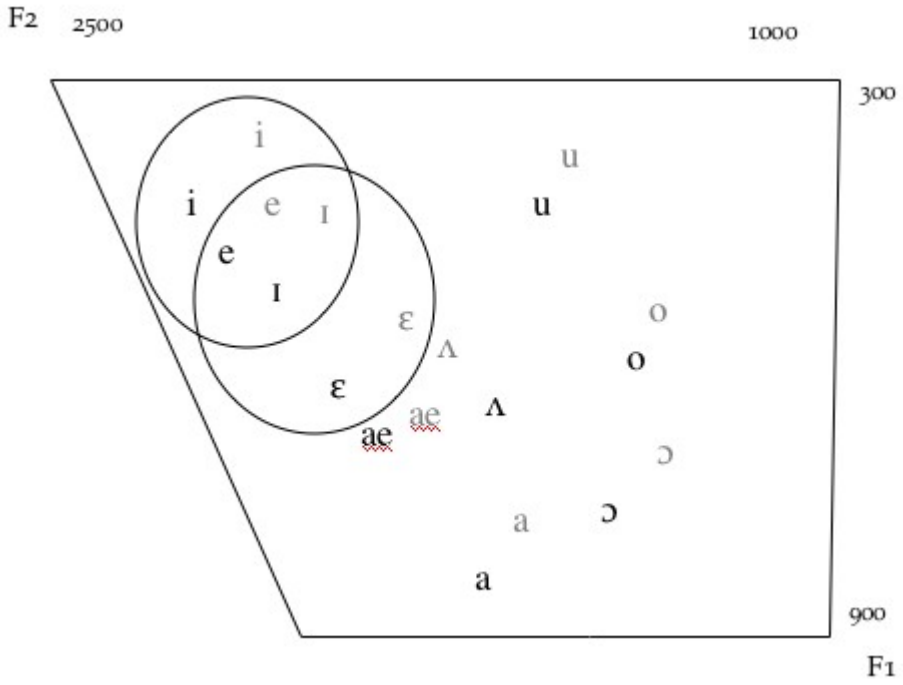


Figure 8. Front tense/lax vowel quality in NCS (males in black; females in grey)

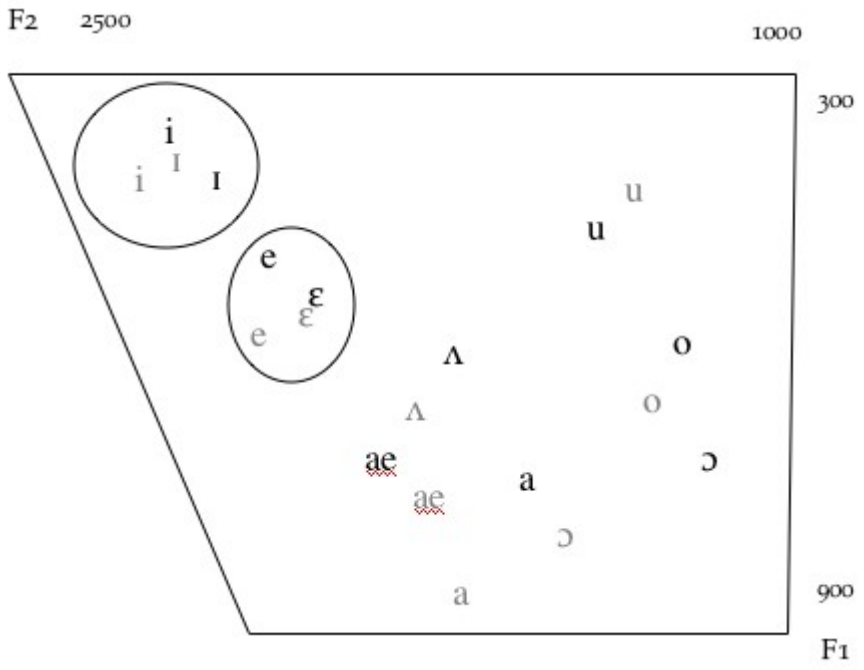


Figure 9. Front tense/lax vowel quality in AAE (males in black; females in grey)

Figures 8 and 9 highlight the differences found in the front tense/lax vowels pairs [i , ɪ] and [e , ɛ] as they occur in NCS and AAE. The most striking difference is in the space each dialect permits between the tense/lax vowel in each set. In NCS, a greater difference is permitted within a tense/lax pair (Figure 8). This space between vowels is predicted by the chain shift principles: tense vowels rise and lax vowels fall, repelling each other to maintain distinction. In AAE, the quality of each vowel in a tense/lax set is relatively close. Each tense/lax pair in AAE has a unique frequency, resulting in what appears as isolated [i , ɪ] and [e , ɛ] sets. The distinct ranges for the tense/lax pairs do not appear in NCS. In the NCS speakers, the lax vowel of the higher set [ɪ] and the tense vowel of the lower set [e] permit inter-set frequency sharing, or a quality overlap, that does not appear in the AAE data. This is illustrated in the non-intersection ovals of figure 9 and the overlapping

ovals in figure 8.

4.2.4 Summary of quality results

In this section, I presented results of an acoustic phonetic analysis of vowel quality in two coexisting dialects of the Detroit metropolitan area, Northern Cities Shift (NCS) and African American English (AAE). I found similarities in the quality of the vowel [æ]. In the NCS data, this functioned as the predicted pivot point for a vowel shift. In AAE, while the [æ] is raised, no shift occurred. I illustrated this difference using tense/lax front vowels. A listed summary of these results is as follows:

1) The [æ] in both dialects is raised, tensed and lengthened
2) In NCS, [æ] functions as the pivot point, shifting tense/lax vowel pairs (predicted). In AAE no shift occurs.
3) The front tense/lax vowel sets of AAE maintain a distinct quality range, i.e. [i , ɪ] are distinct from [e , ɛ]. In NCS, these sets overlap.
4) Back vowels [u , o , ɔ , a] are fronted in NCS, but not in AAE

4.3 Chapter Summary

African American English (AAE) is claimed to be a distinct cohesive dialect that does not share phonetic features with the other major dialects of American English, including the Northern Cities Shift (NCS). In this chapter, I presented the results from an acoustic phonetic investigation of speech samples from eight volunteer subjects, four AAE speakers and four NCS speakers. I examined the vowel duration and vowel quality to determine if these principle acoustic features are consistently and predictably varied between the speaker groups. My analysis revealed consistent variation between NCS and AAE in both duration and quality. In the following chapter, I discuss the implications of these variations.

Chapter 5: Conclusions

5.0 Introduction

Linguistic characteristics of African American English (AAE) are claimed to be shared across regional boundaries, so much so that AAE is often considered to be a cohesive independent dialect of American English. Results from perceptual experiments support this idea, suggesting listeners can distinguish AAE from other varieties of American English when presented with only recorded speech stimuli. Previous linguistic research has found that syntactic and sociolinguistic variables of AAE systematically vary from other varieties of English. To date, however, few phonetic investigations of AAE have been undertaken to verify if the sounds of AAE are measuredly different from other coexistent dialects.

In this thesis, I have investigated primary acoustic phonetic cues from two perceivably distinct coexistent dialects, African American English (AAE) and Northern Cities Shift (NCS). This research provides evidence as to why AAE may "sound" different from other American dialects. Additionally, it contributes new data and analysis to the body of linguistic research on AAE. Under investigation for this thesis were two primary acoustic cues, vowel duration and vowel quality. In the data analysis, I discovered predictable variations in both variables that were previously undocumented in the linguistic literature on AAE. I additionally discovered that AAE shares a quality feature supposedly unique to NCS. This acoustic phonetic analysis contributes new information to our characterization and understanding of African American speech patterns.

In this chapter, I review the results from the acoustic phonetic analysis and discuss the greater implications of these results. In section 5.1, I summarize results, and in section 5.2, I

discuss how the individual phonetic features interact to create a larger composite difference between the dialects that may contribute to why AAE and NCS are perceptually distinct dialects. I summarize the conclusions of this thesis in section 5.3 and discuss possible directions for future research in section 5.4.

5.1 Summary of Results

In this section, I review the results from my analysis of the primary acoustic vowel features, duration and quality, from the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] present in speech samples of two male and two female speakers of NCS and two male and two female speakers of AAE. In section 5.1.1, I review my results from an analysis of vowel duration and in section 5.1.2, my results from the analysis of vowel quality.

5.1.1 Summary of vowel duration

Vowel duration is a phonetic feature that can help listeners distinguish spectrally similar vowels, such as [æ] from [e], and helps to place vowels in large categories such as tense vs. lax (Kent & Read, 1992). It is a principle phonetic cue that has received little attention from linguistic studies of AAE.

In this analysis, I found regular and predictable differences between the lengths of AAE and NCS vowels. Vowels are consistently longer in AAE than they are in NCS. Additionally, the lengthening effect a consonant has on a preceding vowel is also different between the two dialects. When a final consonant is deleted in AAE, the length of the proceeding vowel can be used to predict the voicing of the following consonant. If word final

consonants are deleted from a minimal pair, and [+ / - voice] is the single feature distinguishing that pair as in the words *bud* and *butt*, these words would remain distinct. By contrast, in NCS the pair would become homophonous. This differences suggest that word final consonant deletion may foster a contrast in AAE vowel length.

In American English, it is predicted that tense vowels are longer than lax vowels. This relationship between tense/lax pairs is well illustrated in the front vowels. In the NCS data, the tense vowels [i] and [e] are longer than their lax counter parts [ɪ] and [ɛ]. The distinction in length as a correlate of tense vs. lax vowels is robust. In AAE, however, there is no length distinction between the front tense/lax vowel pairs. Rather, vowel length in AAE correlates with vowel height: the higher the vowel, the shorter it is. In the front vowel pairs, the tense vowels [i] and [e] are shorter than their lax counterparts [ɪ] and [ɛ]. This is a unique characteristic of AAE as examined here and has not been previously noted in studies of vowels in AAE. This finding suggests that duration is not a contrastive variable in front tense/lax vowels in AAE but remains so in NCS.

5.1.2 Summary of vowel quality

The analysis of the vowels revealed a previously undetected similarity in the quality of the vowel [æ]. In both dialects, [æ] was raised and lengthened. This feature is considered to be the pivot point for the vowel shift of the NCS dialect. Predictably, the raised [æ] was found in the NCS data, and the other vowels moved according to the chain shift principles in response to the pivot point.[16] In the AAE data, however, [æ] was raised as in the NCS but no vowel shift occurred. The raised quality of [æ] is not expected to appear in

16. See section 2.1.3 for the Chain Shift Principles

AAE as it is said to be distinctive feature of NCS. However, because of its crucial role in the chain shift, the presence of the raised [æ] in another dialect may, at some point, predictably have the same or similar effect within the vowel system. In the AAE data, the presence of the raised [æ] did not seem to affect the other vowels. It could be the case, however, that AAE illustrates only the beginning stage of the shift. Alternatively, the raised [æ] could simply be a characteristic of the dialect.

5.2 Implications of the Results

In comparing data from speakers of the two regionally dominant dialects in the Detroit metropolitan area, African American English (AAE) and Northern Cities Shift (NCS), I found regular differences between dialects in vowel duration and vowel quality. While these phonetic differences are interesting, they may be functioning in conjunction with one another to produce a greater difference between the dialects. In this section, I discuss the greater implications of the data analysis. In section 5.2.1, I discuss how the a raised [æ] interacts with the position of the front tense/lax vowels in a way that is distinct in AAE. In section 5.2.2, I discuss how vowel length interacts with the voicing properties of a following consonant. The patterning of vowels preceding voiced and voiceless consonants is notably different in AAE and NCS.

5.2.1 The relationship between [æ] and the front tense/lax vowels

According to Labov's Chain Shift Principles, the nuclei of [+ peripheral] vowels in NCS are said to rise while the nuclei of [- peripheral] vowels fall. This shift in the vowel space accommodates the position of the raised [æ], allowing each vowel to remain distinct. [+ / - peripheral] vowel behavior is typified in the tense/lax front vowel sets, the tense vowel [i , e] being peripheral and the lax vowels [ɪ , ɛ] being non-peripheral. The raised [æ] functions as the pivot point in NCS, whereby [i , e] are subsequently raised and [ɪ , ɛ] fall (Labov, 1991).

In the data I analyzed for this thesis, I found this shift of the [+ / - peripheral] vowels happens in the NCS data, but these same vowels did not shift in the AAE data. The AAE speakers in this study do not participate in the predicted vowel shift, despite the fact that the phonetic catalyst was present in the speech patterns (the raised [æ]). When these data are considered in conjunction with the durational differences found in the dialects, and in particular the differences between the front/tense lax vowel pairs, an explanation for the different reactions to the raised [æ] emerges.

The front tense/lax vowels [i , ɪ] and [e , ɛ] pattern similarly as sets, and differences in vowel length between the tense/lax vowels is a principle feature of these sets. It is predicted that the tense or peripheral vowels [i] and [e] will be longer than the lax or non-peripheral vowels [ɪ] and [ɛ]. This tense/lax length distinction was found within the NCS data, but not within the AAE data. Peripherality corresponds to the tense/lax feature, and this tense/lax feature is often manifested in American English by vowel length. If there is no length distinction in the front vowels in AAE, it may indicate the loss of the

[+ / - peripheral] feature, and the loss of this feature may prevent the vowels from shifting in reaction to the raised [æ]. By contrast, the front tense/lax vowel pairs [i , ɪ] and [e , ɛ] may be defined with the [+ / - peripheral] feature in NCS, indicated by the differences in length. The vowels in NCS, therefore, are able to shift accordingly in reaction to the raised [æ].

Length, however, remains as an indicator of vowel height, rather than peripherality, in AAE. Vowel length in AAE appears to correlate more strongly with vowel height, where the higher vowels are shorter than the lower vowels, and the front vowels consistently move from high to low. For example, of the front vowels, [i , ɪ , e , ɛ], [i] is the shortest and [ɛ] the longest. It is a possibility that distinction of tense/lax in front vowels pairs is not required in AAE. Because the [+ / - peripheral] feature may not exist in AAE, the raised [æ] cannot cause a shift in the front tense/lax vowels as it does in NCS.

5.2.2 Vowel lengthening and consonant voicing

The data analysis indicates that word final stop consonants are reduced in both African American English (AAE) and Northern Cities Shift (NCS). This reduction is similar in both dialects and occurs in the same environment, but in AAE, it is more likely that the consonants are completely deleted. In AAE, [+ voice] consonants are deleted and [- voice] final consonants are subject to either full glottal replacement or glottal co-articulation with the stop consonant. In NCS, [+ voice] final consonants are devoiced but not fully deleted, and [- voice] are often (but not always) glottalized. The reduction in both dialects is similar, but the subsequent effect on the vowels is different in each dialect.

Despite the similar neutralization of stops in word final position, the lengthening of preceding vowels is distributed asymmetrically between the dialects, and this difference is predictable and potentially contrastive. In AAE, the duration of vowel preceding a [+ voice] reduced word final stop consonant is double that of a vowel proceeding a [- voice] reduced stop. In NCS, vowels preceding [+ voice] reduced word final stop consonants are the same length as vowels proceeding [- voice] neutralized stop. The result of this phenomena in NCS is the creation of a homophonous pair like [bʌd] [bʌt], as in the words *bud* and *butt,* but that the pair is not homophonous in AAE. Because of vowel lengthening, these words remain phonetically contrastive in AAE after consonant reduction or deletion.

Considered in conjunction with the results of the preliminary perceptual test,[17] this observation suggests a phonological distinction between the vowel systems of AAE and NCS. In the preliminary tests, word pairs in which word final stops were neutralized (as in *bud* and *butt*) were excised from existing AAE corpus data and presented to listeners. Listeners who identified the correct form somewhat above chance – 50% of the time – were self-identified AAE speakers. Listeners who misperceived or misidentified the test items 80% of the time (i.e. identified *bud* when the word was actually *butt*) were self-identified NCS speakers.

This suggests AAE speakers can correctly identify the voicing of a deleted stop consonant based on length of preceding vowel, but NCS speakers cannot. This allows the total deletion of both stop consonants (in final position) in minimal pairs where voicing is the critical variable without lexical items becoming homophonous in AAE. NCS speakers, by

17. See Appendix B.

contrast, are unable to detect this length distinction, creating homophonous pairs when either is a voiced or voiceless stop is deleted.

5.3 Chapter Summary

In this chapter, I reviewed the results from my acoustic phonetic analysis of duration and quality of the vowels [i , ɪ , e , ɛ , æ , ʌ , a , u , o , ɔ] present in speech samples of two male and two female speakers of Northern Cities Shift (NCS) as well as two male and two female speakers of African American English (AAE). I selected vowel duration and quality as linguistic variables to investigate how AAE sounds different from other varieties of American English.

In my analysis, I found that both vowel duration and vowel quality are different between AAE and NCS in ways previously undocumented in the linguistic literature. In particular, I found that AAE shares the distinctive raised [æ] with NCS. This vowel functions as the pivot point for the chain shift in the NCS data but does not cause a vowel shift in AAE. I also found that vowel length is a contrastive phonetic feature that functions different in AAE than it does in NCS. In AAE, vowel length corresponds to vowel height. Additionally, AAE shows contrastive lengthening based on the voicing of a following consonant. In NCS, tense/lax pairs maintain regular contrastive lengths in which the tense vowel is longer than the lax regardless of vowel height. The lengthening effect from consonant deletion did not appear in NCS as it did in AAE.

The findings of this thesis provide empirical phonetic evidence to help substantiate the perception that African American Speech patterns sound different from other varieties of

English. Through this thesis, I have contributed new data and analysis for the future study of African American speech patterns and have contributed to our linguistic understanding of permissible variations in Modern American English.

5.4 Directions for Future Research

For this thesis, I limited my acoustic phonetic analysis to a few phonetic features from a small data sampling. The data I recorded for this analysis should be investigated further to provide complete context for our understanding of the differences between African American English and the Northern Cities Shift dialect of American English. An investigation of all vowels present in these recordings would additionally discover any other possible differences or distinctions. To determine if the phonetic differences discovered in this thesis are of significance to listeners, a perceptual test could be created using the recordings made for this acoustic phonetic analysis. Performing a perceptual test and performing a phonetic analysis using the same data set would provide more accurate correlation between what listeners are reporting and what actually exists in the data. Last, a similar comparison of African American English and another coexisting distinct dialect would provide more context for this data analysis. In doing so, we may be able to determine what phonetic features are unique to African American English and which features may exist in all coexisting regional dialects. The directions for future research are many, but this thesis lays a foundation for further comparative phonetic investigations of African American English.

References

Bailey, Guy, & Erik Thomas. 1998. Some aspects of African-American Vernacular English phonology. In Salikoko S. Mufwene, John Rickford, John Baugh & Guy Bailey (eds.), *African American English.* 85–109. London: Routledge.

Boersma, Paul & Weenink, David. 2008. Praat: doing phonetics by computer (Version 5.1.19) [Computer program]. http://www.praat.org/ (October 21, 2008).

Gooodman, Beverley, Maria Jones & Laura Sabadini. 1998. Duration and the English Tense/Lax Distinction. Paper presented at the Annual Meeting of the Linguistics Society of America (LSA). New York City, NY.

Graff, David, William Labov & Wendell A. Harris. 1986. Testing listeners' reactions to phonological markers of ethnic identity: a new method for sociolinguistic research. In David Sankoff (ed.), *Diversity and Diachrony (Amsterdam studies in the theory and history of linguistic science, Vol. 53)*. 45–58. Amsterdam, The Netherlands/Philadelphia, PA: John Benjamins.

Green, Lisa. 2002. *African American English: A linguistic introduction.* Cambridge University Press.

Kent, Ray & Charles Read. 1992. *The acoustic analysis of speech.* San Diego: Singular Pub. Group.

Labov, William. 1991. The three dialect of English. In Penelope Eckert (ed.), *New Ways of Analyzing Sound Change.* 1-44. New York: Academic Press.

Ladefoged, Peter. 1993. *A course in phonetics.* Fort Worth: Harcourt Brace Jovanovich College Publishers.

Massey, Douglas & Garvey Lundy. 2001. Use of Black English and racial discrimination in urban housing markets: New methods and findings. *Urban Affairs Review* 36. Sage Publications. 452 – 469.

Rickford, John. 1999. *African American Vernacular English: Feature, evolution, education implications (Language in society)*. 1-12; 252-257. Malden, MA: Blackwell Publishers, Inc.

Thomas, Erik R. 2001. *An acoustic analysis of vowel variation in New World English.* 320-327. Durham, NC: American Dialect Society, No. 85, Duke University Press.

Bibliography

Abrahams, Roger. 1976. *Talking Black.* Rowley, Massachusetts: Newbury House.

Alim, H. Samy. 2006. *Roc the mic right: The language of Hip Hop Culture,* New York: Routledge.

Alim, H. Samy. 2003. On some serious next millennium rap ishh: Pharoahe Monch, Hip Hop poetics, and the internal rhymes of internal affairs. *Journal of English Linguistics* 31(1). 60-84.

Alleyne, Mervyn. 1980. *Comparative Afro-American.* Ann Arbor, MI: Karoma.

Anderson, Bridget L. 2002. Dialect leveling and /ai/ monopthongization among African American Detroiters. *Journal of Sociolinguistics* 6. 86–98.

Anderson, Monica. 1994. *Black English Vernacular (From "Ain't to"Yo Mama": the words politically correct Americans should know).* Highland City, Florida: Rainbow Books.

Andres, Claire, & Rachel Votta. 2007. AAE and Anglo vowels in a suburb of Atlanta. Paper presented at the Annual Meeting of the Linguistic Society of America, Anaheim, CA.

Bailey, Beryl. 1965. Toward a new perspective in Negro English dialectology. *American Speech* 40. 171-177.

Bailey, Guy. 1987. Are Black and White vernaculars diverging? In Ralph Fasold *et al.* (eds). *American Speech,* 62. 3 – 80.

Bailey, Guy, Natalie Maynor, & Patricia Cukor-Avila. 1997. *The emergence of Black English*. Philadelphia: John Benjamins.

Baran, Jane and Harry Seymour. 1976. The influence of three phonological rules of Black English on the discrimination of minimal word pairs. *Journal of Speech and Hearing*

Research, 129. 467-474.

Baugh, John. 1979. Linguistic style-shifting in Black English. PhD dissertation, University of Pennsylvania.

Baugh, John.1983. *Black street speech: Its history, structure, and survival.* Austin: University of Texas Press

Baugh, John. 1983. Survey of Afro-American English. *Annual Review of Anthropology,* 12. 335-354.

Baugh, John. 2000. *Beyond Ebonics: Linguistic pride and racial prejudice,* New York: Oxford University Press.

Baugh, John. 2000. Racial identification by speech. *American Speech,* 75. 362-364.

Bernstein, Cynthia. 1993. Measuring social causes of phonological variables. *American Speech* 68. 227–40.

Bland-Stewart, Linda M. 2003. Phonetic inventories and phonological patterns of African American two-year-olds. *Communication Disorders Quarterly,* 24(3). 109-120.

Brown, H. Rap. 1972. Street talk. In Thomas Kochman (ed.) *Rappin and stylin out: Communication in urban Black America.* 205-207. Urbana, IL: University of Illinois Press.

Cassidy, Frederick (ed.). 1985. *Dictionary of American Regional English.* Cambridge, MA: Harvard University Press.

Cole, Jennifer, Erik R. Thomas, Erica Britt, & Elizabeth L. Coggshall. 2005. Intonational distinctiveness of African American English. Paper presented at Annual New Ways of Analyzing Variation 34, New York City, NY.

Denning, Keith. 1989. Convergence with divergence: A sound change in Vernacular Black English. *Language Variation and Change* 1.145–67.

Deser, Toni. 1990. *Dialect transmission and variation: an acoustic analysis of vowels in six urban Detroit families*. Boston University dissertation.

Dillard, J.L. 1972, *Black English: Its history and usage in the United States,* New York: Vintage House.

Dillard, J.L. 1977. *Lexicon of Black English*, New York: Seabury Press.

Dillard, J.L. 1992. *A History of American English.* New York: Longman.

Dorrill, George T. 1986a. Black and White speech in the South: evidence from the Linguistic Atlas of the Middle and South Atlantic States (Bamberger Beiträge zur Englische Sprachwissenschaft 19). New York, NY: Peter Lang.

Dorrill, George T. 1986b. A comparison of stressed vowels of Black and White speakers in the South. In Michael B. Montgomery & Guy Bailey (eds.), *Language variety in the South: Perspectives in black and white.* 149–57. Tuscaloosa, AL: University of Alabama Press.

Doss, R. C., & A. M. Gross. 1994. The effects of black English and code-switching on intraracial perceptions. *Journal of Black Psychology* 29. 282 - 293.

Eckert, Penelope and John Rickford (eds). 2001. *Style and Linguistic Variation.* Cambridge: Cambridge University Press.

Edwards, Walter F. 1985. Inner-city English. In Charlotte K. Brooks (ed.), *Tapping Potential: English and Language Arts for the Black Learner.* 78-80. Urbana, IL: National Council of Teachers of English.

Giles, Howard. 1973. Accent mobility: A model and some data. *Anthropological Linguistics* 15: 87-105.

Gordon, Matthew J. 2000, Phonological Correlates of Ethnic Identity: Evidence of Divergence? *American Speech,* 75(2). 115-136.

Grimes, Andrew & Gelvin Burley. 2005. In search of ethnic clues: The status of /æ/ and /1/ and their implications for linguistic profiling. North Carolina State University Master's thesis.

Guy, Gregory. 1991. Explanation in variable phonology: Sn exponential model of morphological constraints. *Language Variation and Change* 3. 1-22.

Hawkins, Francine Dove. 1993. Speaker ethnic identification: The roles of speech sample, fundamental frequency, speaker and listener variations. University of Maryland, College Park dissertation.

Hinton, Linette N. & Karen E. Pollock. 2000. Regional variations in the phonological characteristics of African American Vernacular English. *World Englishes* 19. 59–71.

Holloway, Joseph & W. Vass. 1997. *The African heritage of American English.* Bloomington: University of Indiana Press.

Hudson, Amelia I. & Anthony Holbrook. 1981. A study of reading fundamental vocal frequency of young black adults. *Journal of Speech and Hear ing Research* 24. 197–201.

Klatt, D.H. 1976. Linguistic use of segmental duration in English: Acoustic and perceptual evidence. *The Journal of the Acoustical Society of America (*59)5. 1208-1221

Labov, William. 1972. *Language in the inner city: Studies in Black English Vernacular.* Philadelphia: University of Pennsylvania Press.

Labov, William. 1983. Objectivity and commitment in linguistic science: The case for the Black English trial in Ann Arbor. *Language in Society* 11. 165-201.

Labov, William, & Wendell A. Harris. 1986. De facto segregation of Black and White vernaculars. In David Sankoff (ed.), *Diversity and Diachrony.* 1 – 24. The Netherlands: John Benjamins. 1–24.

Luelsdorff, Phillip. 1973. *A segmental phonology of Black English,* The Netherlands: Mouton.

Massey, Douglas & Nancy Denton. 1993. *American partheid: Segregation and the making of the underclass.* Cambridge, MA: Harvard University Press.

Martin Luther King Junior Elementary School Children vs. Ann Arbor School Distric Board, July 12, 1979. Civil Action No. 7-71861 (E.D. Mich).

Miller, Michael. 1986. The greatest blemish: plurals in *-sp, -st, -sk.* In Michael Montgomery & Guy Bailey (eds.). *Language Variety in the South.* Tuscaloosa, AL: University of Alabama Press.

Mufwene, Salikoko S., John R. Rickford, Guy Bailey & John Baugh (Eds.). 1998. *African American English: Structure, History and Use.* New York: Routledge.

Pierrehumbert, Janet. 1980. *The phonology and phonetics of English intonation.* MIT dissertation.

Perkins, William Eric (ed.). 1996. *Dropping science: Critical essays on rap music and Hip Hop culture.* Philadelphia, PA: Temple University Press.

Perry, Theresa & Lisa Delpit (eds.). 1998. *The real Ebonics debate.* Boston: Beacon Press.

Pollock, Karen E. 2001. Phonological features of African American Vernacular English (AAVE). <http://www.rehabmed.ualberta.ca/spa/phonology/features.htm>. Accessed Sept. 28, 2008.

Pollock, Karen and Linette Hinton Meredith. 2002. Phonetic transcription of African American Vernacular English. *Communication Disorders Quarterly* 23(1). 47-53.

Poplack, Shana (ed.). 2000. *The English History of African American English (Language and Society).* Malden, MA: Blackwell Publishers, Ltd.

Pullum, Geoffrey. 1999. African American Vernacular English is not Standard English with mistakes. In Rebecca S. Wheeler (ed.), *The Workings of Language: From Prescriptions to Perspectives*. 39 – 58. Westport, CT: Praefer.

Purnell, Thomas, William Idsardi & John Baugh. 1999. Perceptual and Phonetic Experiments on American English Dialect Identification. *Journal of Language and Social Psychology* (18)1. 10-30.

Seymour, Harry N., Seymour, Charlena M. 1981. Black English and Standard American English Contrasts in Consonantal Development of Four and Five-Year Old Children. *Journal of Speech, Language, and Hearing Research* 46. 274-280

Smitherman, Geneva. 1977. *Talking and Testifying: the Language of Black America*, Detroit, MI: Wayne State University Press.

Smitherman, Geneva. 1985. It bees dat way sometime: sound and structure of present-day black English. In Virgina P. Clark (ed.), *Language: Introductory Readings.* 552-568. New York: St. Martin's Press.

Tarone, Elaine, E. 1972. Aspects of intonation in vernacular white and black English speech. University of Washington dissertation.

Thomas, Erik. 2007. Phonological and Phonetic Characteristics of African American Vernacular English. *Language and Linguistics* Compass 1(5). 450 – 475.

Thomas, Erik & Phillip M. Carter. 2006. Prosodic rhythm and African American English. *English World-Wide* 27(3). 331-355.

Weldon, Tracey. 1995. Variability in negation in African American Vernacular English. *Language Variation and Change* 6. 359 – 397.

Wells, J. C. 1982. Accents of English. 3 vols. Cambridge, UK: Cambridge University Press.

Wideman, John. 1976. Frame and dialect: The evolution of the Black voice in American literature. *American Poetry Review* 5.5, September-October. 34-37.

Williams, Robert (ed.). 1975. *Ebonics: The true langugae of Black Folks.* St. Louis: Institute of Black Studies.

Wolfram, Walter. 1969. *A Sociolinguistic Description of Detroit Negro Speech.* Washington, DC: Center for Applied Linguistics.

Wolfram, Walter. 1974. *Social Dialects in American English.* Englewood Cliffs, NJ: Prentice-Hall.

Wolfram, Walter. 1974. The relationship of white southern speech to Vernacular Black English. *Language* 50. 498 – 527.

Wolfram, Walt & Erik R. Thomas. 2002. *The Development of African American English.* Malden, MA: Blackwell Publishing Ltd.

Appendix A: Approval letter from the College of Arts and Sciences Human Subjects Review Committee

December 8, 2008

Catherine Adams
English Department
612 Pray Harrold

Dear Catherine Adams:

The College of Arts and Sciences Human Subjects Review Committee (CAS HSRC) of Eastern Michigan University has reviewed and approved as exempt research your proposal titled, "An Acoustic Phonetic Analysis of AAE Vowels in Southeastern Michigan." The CAS HSRC determined that the rights and welfare of the individual subjects involved in this research are carefully guarded. Additionally, the methods used to obtain informed consent are appropriate, and the individuals participating in your study are not at risk.

Exempt research does not require reporting of continuation one year after approval if the project continues. However, should the sample or procedures change as to have an impact on human subjects, then CAS HSRC should be notified by using the *Minor Modification to Research Protocol* or the *Request for Human Subjects Approval* form depending upon the scope of the changes (see the forms online).

On behalf of the Human Subjects Committee, I wish you success in conducting your research.

Sincerely,

Ellen I. Koch, Ph.D.
CAS HSRC Chair

Cc: Beverly Goodman, Ph.D.

Appendix B: Preliminary study

B.1 Introduction

This study was designed in response to the perceptual tests conducted by Prof. Garrett in Winter 2008. Prof. Garrett's study and subsequent results is considered the pre-experiment of the current investigation. Results from the pre-experiment suggested a phonetic feature may be the cause of the perceived difference between "standard" American English (SAE) speakers and African American English (AAE) speakers within the EMU community.[18]

B.2 Experimental Design

A pre-experiment was designed and conducted to determine what features, if any, would prove to be the most promising points of close phonetic investigation.[19] The pre-experiment was conducted in two parts. First, distinguishing and singular syntactic and phonological features of AAE as identified in *African American English* (Green 2002) were summarized. A script targeting well-known features, such as final consonant cluster reduction and auxiliary deletion, was developed for experimentation.

Readers from differing racial backgrounds were asked to review and read this script a relaxed, conversational manner. Readers were given the opportunity to identify themselves as speakers of a specific dialect; three identified themselves as "AAVE" speakers. These recordings provided the foundation for the small corpus further developed and considered in

18. These recordings were not phonetically analyzed to determine if the non-AAE speakers were Northern Cities Shifters, and as a results, are generically referred to as "standard" American English speakers here.
19. Research designed by Prof. Edward Garrett and conducted with the students enrolled in the Winter 2008 LING 310 course.

the phonetic investigation.[20]

Recordings that concentrated on phonological features were compiled for preliminary perceptual tests. These recordings were randomized into a series of short samples for the perceptual tests. Each sample presented minimal pairs of monosyllabic words targeting the final stop consonants [t / d]. For example, recordings of *big butt* and *big bud* were presented as individual samples.

Thirty participants were asked to provide basic demographic information (age, gender, city of residence) and if they identified themselves as a speaker of a particular dialect. Participants were then presented with the prepared recordings. They were asked to identify what was said and, if possible, to identify the dialect of the speaker in the recording.

B.3 Results

Of the participants, those that self-identified as speakers of AAE correctly perceived and identified the correct form somewhat above chance, above 50% of the time, when presented with samples from speakers of either AAE or SAE.

By contrast, participants self-identified as SAE speakers misperceived the test times word final stops nearly 80% of the time., identifying, for example, 'butt' when the test item was 'bud'. These results are summarized here:

Participant	AAE Listener (12)		SAE Listener (18)*	
	[t]	[d]	[t]	[d]
AAE Speaker [d]	7	5	15	2
AE Speaker [d]	6	6	3	15

**Results from one SAE listener were unreported when presented with AAE test item*

20. Corpus voluntarily maintained by students under the supervision of Profs. Edward Garret and Beverley Goodman, and can be accessed online for free at www.altiplano.emich.edu.

B.4 Conclusion

The perceptual pre-experiment study does not provide conclusive evidence, and the results cannot be used for further analysis. The variables of the study were not controlled, the sample set was not representative and the analysis is ultimately impressionistic.

The results do, however, suggest a phonetic cue may be used or perceived by one dialect that is not present, distinct or contrastive in the other dialect. The experiment in this thesis was designed to target this cue by controlling and analyze the phonetic variables that may have influenced the results of the perceptual test.

Appendix C: Word list, test items

bot	vibe
hit	eager
bought	stayed
league	frugal
boob	bake
bed	haute
ebb	bared
shoe	hat
heep	cook
bib	broad
hoop	bug
ape	fought
corn on the cob	spoke
dude	heed
bit	cup
pout	tick
duke	jerk
hid	back
ooze	air
bird	beg
bud	bike
hate	optical
sap	sage
hype	doc
probe	out
big	heck
about	butt
Cupid	saw
boot	ode
Boyd	ache

fraud	tie
bid	Jeffrey Feiger
gawk	occur
cute	toad
bat	how
spare	mocha
tote	bite
brie	HUD
bowed	shape
hawk	kite
pudding	pipe
puke	up
optimal	robe
Cindy Lauper	bow tie
Vogue	go
cop	hair piece
thou	May
regular	eye
sawed	beep
speck	feud
bee bop	hog
hope	juke box (or jute box)
step	pep
hoot	My brother loves Yu-Gi-Oh
bag	Hoyt
back	tock
heat	Bob
oblong	at
food	hick
haughty	beat
due	Ed
hud	bawd

bode	dig
bog	tag
Google	bead
awesome	gap
heard	beak
hag	God
put	debt
hot	she
hug	bet
cherub	hip
crowd	eat
bide	dead
boat	bod
coke	hurt
gab	chirp
liger	cube
doob (as in doobie)	booger
book	my
habit	Lloyd
suburb	boy
bub	tiger
cow bell	fade
it	Cheboygan
pup	cued
edge	dope
babe	hike
Ypsi and Ypsilanti	buck
hide	bad
paw	Urdu
bogue	fate
hue	hey
Detroit	soup

Bible	tube
burp	Bert

Appendix D: Demographic questionnaire completed by subjects

Background Information

All information is optional. Please skip anything you do not wish to share.

Age:

Gender:

Hometown (city and state):

Current Residence (city and state):

Languages your Parent(s) Speak:

Your Native Language:

Other Language(s) you Speak:

Dialects of American English You Speak (circle all that apply):

- **Midwest/Northern**
- **Southern**
- **African American Vernacular English (AAVE)/Black English**
- **Hispanic/Latino English**
- **Indian/Native American English**
- **Other (please specify)**

Ethnic Background (circle all that apply):

- **Caucasian American**
- **African/Black American**
- **Hispanic/Latino American**
- **Indian/Native American**
- **Hawai'ian/Pacific Island American**

When I am with my family, we speak _____.

When I am with my friends, we speak _____.

I feel most comfortable when speaking _____.

I feel least comfortable speaking / feel pressure to speak_____.

Appendix E: Measurements of vowel quality (F1/F2, in Hz.) for NCS and AAE

Basis for Figure 6 and Figure 7 (vowel charts).

Table 5

Average vowel quality of NCS speakers by gender

NCS Vowel Quality				
	Male		Female	
Vowel	F1	F2	F1	F2
i	333	2195	439	2719
ɪ	482	1913	532	2224
e	447	1994	475	2373
ɛ	630	1831	697	2021
ʌ	624	1257	679	1448
u	354	1503	430	1806
a	755	1299	831	1596
o	505	1016	575	1313
ɔ	651	1092	724	1352
æ	696	1622	692	2174

Table 6

Average vowel quality of AAE speakers by gender

AAE Vowel Quality				
	Male		Female	
Vowel	F1	F2	F1	F2
i	357	2210	473	2888
ɪ	380	2069	457	2503
e	440	1882	602	2300
ɛ	482	1809	581	2269
ʌ	503	1227	635	1537
u	366	1213	358	1125
a	632	1503	783	1698
o	485	1062	556	1107
ɔ	532	999	690	1990
æ	587	1688	703	1339