This is to certify that the
dissertation entitled

Ethnicity and Sound Change:
Mexican American Accommodation to the Northern Cities Shift
in Lansing, Michigan

presented by

Rebecca Virginia Roeder

has been accepted towards fulfillment
of the requirements for the

Ph.D. degree in the Department of Linguistics, Germanic, Slavic, Asian and African Languages

Major Professor's Signature

June 22, 2006

Date

ETHNICITY AND SOUND CHANGE: MEXICAN AMERICAN ACCOMMODATION TO THE NORTHERN CITIES SHIFT IN LANSING, MICHIGAN

By

Rebecca V. Roeder

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Linguistics, Germanic, Slavic, Asian and African Languages

2006

ABSTRACT

ETHNICITY AND SOUND CHANGE: MEXICAN AMERICAN ACCOMMODATION TO THE NORTHERN CITIES SHIFT IN LANSING, MICHIGAN

By

Rebecca Virginia Roeder

This dissertation explores issues of language and dialect contact as they affect Mexican American speakers of English in Lansing, Michigan. Michigan is in the middle of a region labeled the Inland North by Labov, Ash and Boberg (2005), and the mainstream dialect in this area is characterized by a vowel change in progress known as the Northern Cities Shift (NCS). This thesis investigates 1) the degree to which Mexican Americans who have lived in Lansing for all or most of their lives have acquired an NCS pronunciation of the four vowels /æ, ɛ, ɑ, ɔ/ and 2) whether the effects of adjacent phonetic environment show any previously unattested patterns for the vowel /æ/. These topics are addressed separately, although the results of the investigation of coarticulatory effects reflect NCS influence.

In the first portion of the analysis, which uses wordlist data from thirty-two speakers, the focus is on the nature and extent of sociolinguistic stratification among the members of this group, who are examined as a unified minority group speech community. The first and second formant values of these vowels are analyzed statistically, in addition to duration for the vowel /æ/, for the effects of social factors such as age, sex, generation of residence in Michigan and socioeconomic status. Results indicate that women under 45, particularly those who have lived in Lansing their entire lives, have acquired NCS /æ/. Pronunciations of the other three vowels diverge somewhat from NCS norms, however, even among the youngest women, leading to the conclusion

that distinct norms of pronunciation have developed within this minority speech community. Evidence regarding substrate influence from Spanish on the dialect of these speakers is inconclusive.

In the second portion of the analysis, which uses wordlist data from only the sixteen speakers who are both lifelong residents of Michigan and native speakers of English, focus is on coarticulatory effects in the pronunciation of /æ/. Results are compared to findings from previous sociophonetic and laboratory phonology studies. Findings show dramatic raising of /æ/ pre-nasally—a feature that is prevalent in NCS speech—in female respondents under 25, supporting the conclusion that young women in this speech community have fully acquired NCS /æ/. T-tests show no statistically significant raising of /æ/ before nasals in the other ten speakers, however, providing a counterexample to Labov's hypothesis that some raising of /æ/ in a pre-nasal environment occurs in almost every dialect of American English (Labov 1994: 197). These results concur with Thomas (2001), who found a lack of /æ/-raising in a pre-nasal environment in Mexican American speakers of English in Texas. Results for other phonetic environments agree with previous findings.

References

Labov, William. 1994. *Principles of Linguistic Change*. Vol. 1, *Internal Factors*. Language in Society 20. Oxford: Blackwell.

Labov, William, Sharon Ash and Charles Boberg. 2005. *The Atlas of North American English*. Berlin: Mouton de Gruyter.

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

For my father

ACKNOWLEDGMENTS

My deep gratitude goes to the generous people of Lansing, Michigan, who agreed to be interviewed for this project and who shared their time and life stories with me, and to Dr. Dennis Preston, who is a model of the type of scholar and mentor that I aspire to be and who is tireless in his dedication to his students.

In addition, I would like to acknowledge my appreciation for the advice generously offered to me by Dr. Anne Violin-Wigent, who diligently read and commented on my thesis, and the members of my PhD Committee—Drs. David Dwyer, Grover Hudson, Yen Hwei Lin, and Brad Rakerd—whose doors were always open for questions and whose answers were always helpful and well informed.

In this, as in all of my endeavors, I am profoundly appreciative of my family and friends for the love, encouragement and much needed perspective they provide.

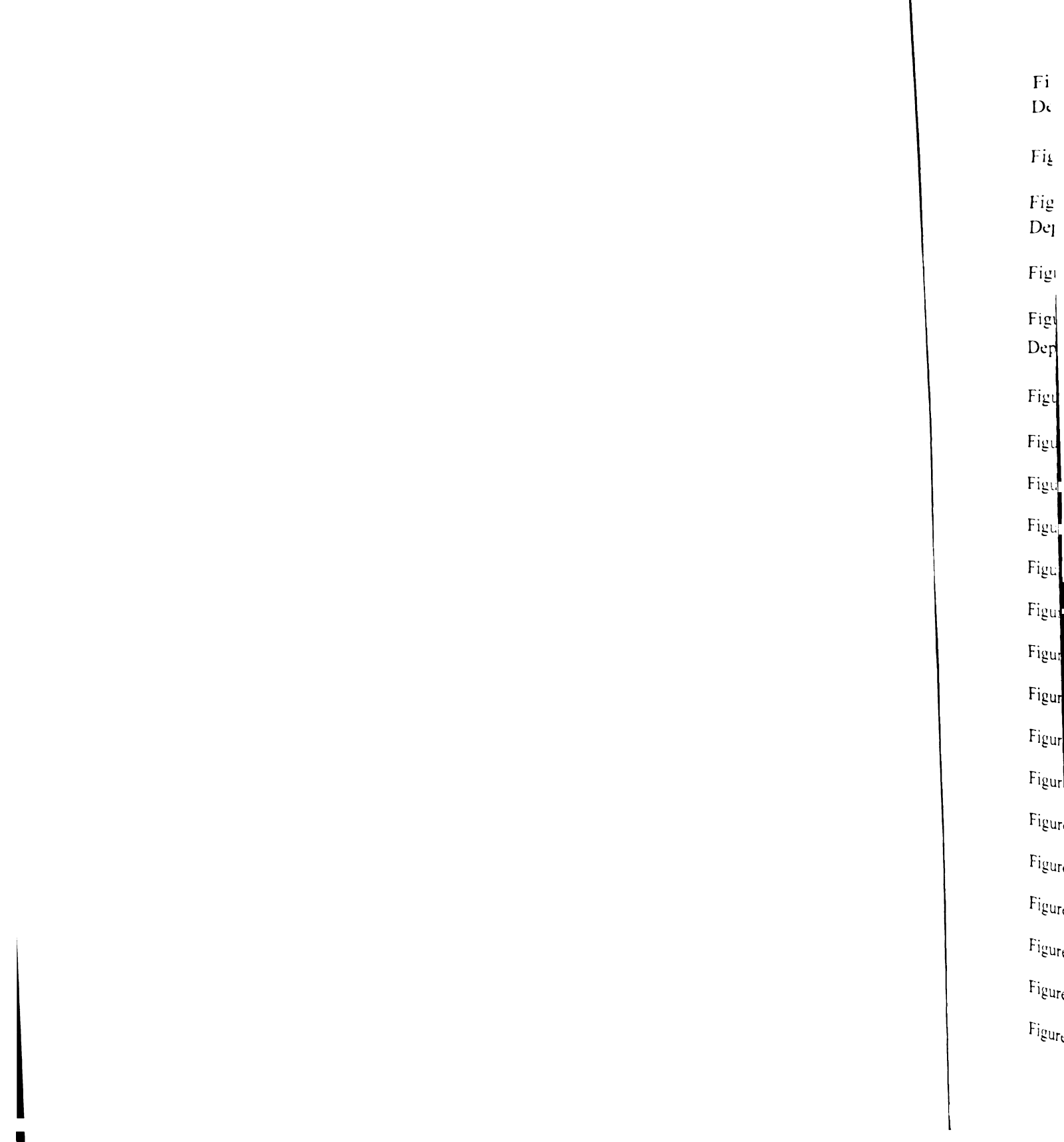
This work was made possible in part by a grant from the National Science Foundation (BCS-0444349) that supported a research project in which I have participated as an investigator.

Finally, I would like to express my gratitude to the creators of the speech software programs Akustyk and Praat, which continue to be indispensable to my work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES



CHAPTER 1: Introduction

1.1 Project Goals

The main goal of this dissertation is to contribute to the discussion among sociophoneticians about the influence of local majority group norms on ethnic minority speech communities, specifically when such a community has a second language background. While previous studies have found both assimilation and resistance to assimilation in the speech of members of ethnic minority groups, the results presented here support the hypothesis articulated most clearly by Denning (1989) that both may occur simultaneously. Results from this study indicate that a child born and raised in an ethnic minority speech community may fully acquire majority group characteristics in the pronunciation of one or more vowels — including the low-level phonetic complexity that marks a native speaker of the dialect — but yet diverge from the mainstream in the pronunciation of one or more other vowels in ways that reflect the minority group's history and linguistic norms. A corollary to this finding is the hypothesis that the order in which members of an ethnic minority speech community accommodate to local mainstream pronunciation features does not necessarily match the original order in which the changes in question entered the local dialect.

This study explores the impact of the local sound change in progress known as the Northern Cities Shift (NCS) on the speech of Mexican Americans in Lansing, Michigan, and the analysis is presented in two parts. The first part provides results for the pronunciation of the four vowels /æ, ɛ, ɑ, ɔ/ across social categories. As mentioned above, findings show that speakers can accommodate completely to some aspects of a system while failing to accommodate to others. This result highlights the advantages of

examining speech systematically, instead of focusing on the production of only one phoneme.

The findings also underscore Labov's notion that the speech community, not the individual speaker, is the primary unit of investigation in sociolinguistics (Weinreich, Labov and Herzog 1968; Labov 2001: 34). The vowel configuration that emerges from this research is very similar across speakers, as opposed to being found in the speech of only a few individuals. Since this pattern differs from majority group norms, and because those interviewed also share major demographic features (discussed in Section 2.3), the claim can be made that these speakers belong to the same speech community.[1] Any generalizations about the speech of this group would be lost if the focus was on the individual alone. Perhaps more importantly, membership in a speech community is the most plausible *explanation* for the unexpected pattern, not just a convenient label for the group being analyzed. The group studied here has become a community, with its own norms of speech that are passed on and hinder assimilation by the larger society.

The second part of the analysis presented here is a detailed account of the effects of phonetic environment on the pronunciation of /æ/. The results provide evidence of full accommodation to the local majority group pronunciation of this vowel by speakers who show a lack of assimilation to the mainstream in their pronunciation of other vowels. The findings presented in this section also demonstrate that dialects exploit natural coarticulatory effects to varying degrees.

The theoretical foundation of the dissertation draws on research in variationist sociolinguistics. There is also some reference to second language acquisition studies,

[1] The concept of the *speech community* is discussed further in Section 2.5.

although insight from that research is only relied upon to explain evidence of substrate features from Spanish that appear to be persisting in the native speaker dialect of English.

1.2 Sociophonetics as Applied to Ethnic Minority Dialects

Variationist sociolinguistics examines the relationship of social factors such as age, gender, ethnicity and socioeconomic status to language variation and change. The most common area of research within variationist sociolinguistics is phonology and phonetics, but until recently the majority of phonetic analyses were done impressionistically and relied on the efforts of trained phoneticians to attempt unbiased judgments of recorded speech. Although this research contributed valuable findings, several studies, most notably Kerswill and Wright (1990), have shown that even the most sophisticated ear is inherently biased perceptually.

Sociophonetics is a recent subfield of sociolinguistics that uses fine-grained instrumental measurements of speech sounds, in combination with quantitative statistical analysis, to discover correlations between phonetic characteristics, such as vowel quality and duration, and demographic factors. The precise measurement techniques that are available through instrumental analysis have enabled insight into gradient low-level phonetic distinctions between individuals and groups that were previously unattainable. Since evidence shows that pronunciation is the most difficult aspect of a second language to acquire (Scovel 1995: 170), sociophonetics is also well suited for research on ethnic minority dialects that are influenced by more than one language. Little research has been done, however, on the phonetics and phonology of individuals who, for example, are

monolingual speakers of English but are also members of an ethnic minority group in the United States that still includes native speakers of a non-English heritage language.

From a purely non-linguistic perspective, this type of research can bring science to bear on the popular belief in the U.S. that ethnic dialects are merely imperfect attempts at more standard regional norms. One of the myths that has been perpetuated about native speaker varieties of Mexican American English, often referred to collectively as Chicano English, is that it is simply a version of English tainted by interference from Spanish. Research over the last three decades has provided conclusive evidence, however, that Chicano English is largely independent of Spanish and is often spoken by people who do not speak Spanish, although some varieties retain elements of Spanish phonology and phonetics (Metcalf 1974 and 1979, Ornstein-Galicia 1984, Fought 2003).[2] Current trends in sociolinguistic research include interest in the means by which these elements of Spanish become embedded in native speaker varieties of Mexican American English[3].

From a linguistic perspective, research on emerging dialects such as those found in communities with new immigrant populations is not only descriptive, but affords valuable insight into the processes by which language changes and the ways in which language varies — in terms of both perception and production. The findings from such studies have implications for theories of dialect transmission (Wolfram 1974, Deser 1991, Henderson 1995, Kerswill and Williams 2000, Chambers 2002, Trudgill 2004) and

---

[2] I know of no work that has been done which examines the substrate influence of indigenous languages of the Americas on Chicano English.

[3] Throughout the rest of this thesis, the term *Mexican American English* is used instead of *Chicano English* for several reasons. First, many of those interviewed are not native speakers of English, and *Mexican American English* can refer to any variety of English spoken by people of Mexican American heritage. Secondly, judging from comments made by respondents, the term *Mexican American* appears to be less politically charged than the term *Chicano*.

lar
inc
Be
her

1.3

Th
eno
the
Sou
the
focu
198
Sou
Mex
both
repo
betw
situa
the f

language change (Labov 1963; Labov, Yaeger and Steiner 1972, Labov 1994) — including theories on the relationship between production and perception (Ohala 1981, Beddor and Hawkins 1990, Plichta 2004) and research on substrate influence from heritage languages (Godinez and Maddieson 1985; Purnell, Salmons and Tepeli 2005).

1.3 Mexican American Migration

The Mexican and Mexican American population in the United States has grown enormously during the last few decades, comprising 7.3 percent of the total population by the year 2000, according to U.S. census figures. Most Mexican Americans live in the Southwest, with well over half living in either California or Texas, and, not surprisingly, the majority of studies that have been done on Mexican American dialects of English are focused on these two states (e.g., Metcalf 1974, Sawyer 1975, Godinez and Maddieson 1985, Santa Ana 1996, Thomas 2001, Fought 2003). Large metropolitan areas outside the Southwest such as Chicago and New York also contain well established and expanding Mexican American communities, however, and Latinos, in general, are now migrating to both urban and rural areas all over the United States in unprecedented numbers. The reported Mexican American population in Michigan, for example, grew by 61 percent between 1990 and 2000. The recent influx of Latinos into new areas creates unique situations of language and dialect contact and affords an excellent opportunity to observe the formation of new dialects.

1.4 Ethnic Minority Dialects in the United States

This section begins with a discussion of previous findings on the influence of parents' speech on first language acquisition in situations where the dialect or language spoken by the parents differs from the local majority group norm. Although most studies show that childrens' pronunciation is not, in general, ultimately affected by the speech of their parents, a few studies have produced results that appear to contradict this generalization. If it is the case that children are not affected by their parents' speech, then the lack of full assimilation to mainstream norms by native speakers that the results of the present study show strongly supports the conclusion that Mexican Americans in Lansing do, in fact, constitute a speech community, with its own norms of pronunciation and mechanisms by which the dialect is acquired as a first language by children.

Section 1.4.2 discusses a few of the many sociolinguistic studies that have been done on the speech of African Americans. Research on this topic constitutes most of the research done on ethnic minority dialects in the U.S. Although the degree to which any given study on African American speech applies to other ethnic minority groups varies, the purely linguistic issues of dialect contact and language change are relevant to both situations. Section 1.4.3 summarizes findings from earlier studies on Latin American varieties of American English that informed the approach taken in the current study and the conclusions drawn.

1.4.1 First Language Acquisition

On the level of the individual, *communicative competence* — knowledge of not only the grammar of a language variety but also its communicative use, including attitudes and

beliefs about its usage — was first noted as distinct from linguistic competence by Dell Hymes (1974), and its acquisition is an integral part of first language acquisition. In the case of children of immigrants who are not native speakers of the local language, for example, a phenomenon labeled the "Ethan Experience" by Chambers (2002) is quite common. Children seem to have auditory "blinders" which help them to acquire the accent of their peers instead of their parents. The most amazing aspect of this phenomenon is that it appears to involve some kind of "accent-filter" which prevents young children from even hearing the differences between local speech and their parents' speech. Ethan reported not realizing that his parents spoke differently until, as Chambers puts it, he was "well into his school years." This has also been attested in the usually more subtle situation of dialect contact (Hazen 2002), although further research is needed in this area.

Other studies have concluded that children are influenced by their parents' accents. Deser (1991), using data from recordings done of African Americans in Detroit by Shuy, Wolfram and Riley in 1965, investigated the speech of pre-adolescents, adolescents and adults from six families. She found that in families where one parent was a native of Detroit and one was from the South and still had distinctively Southern speech characteristics, the children retained some of these characteristics at least into adolescence. Predictably, pre-adolescent children were more affected by their parents' speech than adolescent children. In contrast, even as a small child, Ethan exhibited none of his parents' non-native features in his dialect.

Degree of contact with the local mainstream norm and the size of the individual's native speech community are also significant factors and may explain the difference in

these findings. Ethan was not a part of an ethnic minority speech community; he was submerged in the local Anglo speech community, and his peers spoke the local dialect. The Detroit speakers, however, were more segregated from local Anglo speech, so contact with the local variety may have come primarily through their parents. Respondents for the current study were in a different situation because they were both part of an ethnic speech community — like the respondents in Deser's study, but unlike Ethan — and in frequent interaction with Anglos — like Ethan, but unlike the respondents in Deser's study. Findings from the current study were similar to Deser's findings, however, in that the teenagers and young adults interviewed do not differ drastically from their parents in their pronunciation of the vowels tested, but they do differ from local Anglos. The importance of the speech community for the maintenance of an ethnic minority dialect is apparent in all three studies.

1.4.2 African American English

For reasons that reflect the political and cultural history of the United States, together with the social milieu of the 1960's — the early days of the field of sociolinguistics — the bulk of the research on ethnic minority dialects of English in the U.S. has focused on African American English (AAE). Above the level of the individual, there is evidence of resistance to local majority group norms of English at the level of the speech community by speakers of AAE, in particular (Labov 1966, Labov and Harris 1986, Myhill and Harris 1986, Henderson 1995). Although social segregation may explain much of this, resistance to assimilation has also been found in situations where African Americans are in frequent contact with Anglos. Henderson (1995), for example, found a lack of

accommodation to what is known as Philadelphia short *a* by local, middle class African Americans under 40 who lived in predominantly Anglo neighborhoods and at least superficially appeared to be fully integrated into mainstream life.

There is also evidence of the spread of specific AAE features from one region to another, nationally, that results in further divergence of AAE from mainstream norms. Bailey and Maynor (1987), for instance, found spreading of a usage of copula *be* that appears to be unique in English to African American varieties.

Other studies on AAE have found accommodation to local norms, however. Denning (1989) found the pronunciation of word-final /i/ (e.g., *happy*) to be similar in young African Americans in East Palo Alto to the pronunciation found among Anglos there. Edwards (1992) found that younger speakers of AAE in Detroit who had more contact with Anglos than others showed fewer AAE features in their speech. And Jones (2003) found accommodation by African Americans in Lansing, Michigan, to the pronunciation of /ae/. The comprehensive linguistic reality clearly lies in the fact that, as pointed out by Denning (1989), accommodation and resistance (or divergence) are not necessarily mutually exclusive. He writes, "Distinct varieties in contact may, for complex sociological and linguistic reasons, be expected more realistically to appear to diverge and converge simultaneously" (145).

1.4.3 Mexican American English

Although many significant findings have come out of the research on AAE, it is not clear how much of the history of AAE is applicable to other ethnic minority dialects of English. Every ethnic minority group that emerges to stake a claim in the development of

American society brings a unique social, linguistic, and political mix to bear on the varieties of English that emerge within that group and how they are viewed by others. Within the group of people that are labeled *Hispanic* by the U.S. census, for instance, there is as vast an array of backgrounds as in any other group who share only a common heritage language. Very little is known overall about the process of language change in ethnic minority communities.

Several studies have been done on the influence of AAE and local Anglo varieties on the speech of Puerto Ricans in the eastern United States. Wolfram (1974) found both syntactic and phonological AAE features in the speech of young male Puerto Ricans in New York City. Poplack (1978) found some accommodation and some resistance by young Puerto Ricans in Philadelphia to local dialect features of both Anglo and African American speech. Interestingly, girls were more influenced by Anglo speech and boys were more influenced by AAE, which she attributes to both level of contact and identity. With respect to identity, Poplack's findings are similar to those of Fought (1999), who found the distribution of California Anglo /u/-fronting[4] among Mexican American teenagers and young adults in Los Angeles to be strongly correlated with the interacting factors of social class, gang membership and gender such that middle-class non-gang affiliated women were the most likely to have acquired this feature. Lower class gang affiliated men were the least likely to have a fronted pronunciation of /u/, and men, in general, did not front /u/ as much as the women. Both Poplack and Fought link non-

[4] Fought does not list specific words in her discussion of /u/-fronting, instead stating that tokens were taken from "passages of speech that occurred well into the interview, preferably during narrative passages, in order to access the most vernacular speech style" (11). High F2 values for realizations of /u/ were first documented in young Anglo Californians by Hinton et al. (1987).

Anglo speech features to a desire to express toughness on the part of the men. Fought comments that the pressure on men to appear tough is especially strong in Latino society (1999: 20). The correlation between non-Anglo speech and a perception of toughness in the speech of young people, in particular, is a quite plausible corollary to Trudgill's (1986) principle of *covert prestige* — that non-standard features may carry a type of prestige that is in opposition to mainstream standards, most commonly as a marker of toughness in male speech. It is not clear, however, the degree to which the teenage speakers in these studies represent the dialect found among adults in the ethnic minority speech communities of which they are members. It is possible that a high frequency of non-standard features is, at least partially, the result of age-specific behavior. The current study uses a wider lens, in an attempt to make general comparisons between one ethnic minority speech community and the surrounding mainstream speech norms.

Most analyses of Mexican American varieties of English have been impressionistic, including the three done on Mexican Americans in the Midwestern United States (Hartford 1975 and 1978, Frazer 1996, and Gordon 2000). Hartford (1978) examined the phonology of thirty Mexican American adolescents who lived in a predominantly African American area of Gary, Indiana. She did not talk specifically about accommodation to local norms, but her main conclusion was that the young Mexican American women used prestige variants more than the young men.

Based on his analysis of oral history interviews recorded in 1986 and 1987 of eleven Mexican American speakers in Rock Falls and Sterling, Illinois, Frazer (1996) found no evidence of a distinctive Mexican American dialect in that area. Gordon (2000) examines the influence of the Northern Cities Shift on African American and Mexican

American speakers in the Calumet area of northwest Indiana. These speakers do not appear to be participating in the NCS, although this result does not indicate resistance to local norms since the white speakers he interviewed are only very minimally participating in the shift themselves, and he surmises that the NCS is, in fact, "embryonic" in the region (121).

A small number of instrumental studies, all done outside the Midwest, have compared features of a regional standard dialect to the Mexican American English of that region (Godinez and Maddieson 1985; Fought 1999; Thomas 2000 and 2001; Wolfram, Carter and Moriello 2004). As with studies on AAE, some found accommodation to local Anglo norms, and some found resistance to accommodation. With respect to /u/-fronting, for example, Godinez and Maddieson (1985) found that 16 and 17-year-old Mexican American boys in East Los Angeles had not acquired fronted /u/. Fought (1999), however, in the study mentioned above, found that /u/-fronting was governed by a complex set of conditioning factors in the Los Angeles speakers she interviewed. In contrast to the findings of Godinez and Maddieson, some of the 15 to 32-year-old male respondents had accommodated to this feature — those who were both middle class and non-gang affiliated — although they were not fronted as much as some of the women.

Wolfram, Carter and Moriello (2004) report on accommodation to Southern /ai/ monophthongization—one of the most salient features of Southern Anglo speech—by Hispanics (mostly Mexican American) in two small cities in North Carolina. They did not find a high degree of accommodation to this feature by members of either group studied, but they state that this may be partially explained by the insularity of the Hispanic communities being examined and the low level of interaction between those they

interviewed and Anglos. In addition, because the study was focused on early signs of dialect emergence, the participants were all recent arrivals to North Carolina and spoke English only as a second language.

Thomas finds both phonetic and phonological variation between Mexican American varieties of English in Texas and Anglo varieties. For example, in Thomas (2000) his results show that the glide /ai/ follows the same rules of phonological conditioning in Mexican Americans in Laredo, Texas, and in Anglos in central Ohio, although there is some variation in production. Thomas (2001) briefly compares vowel features of Mexican American English in Texas to Anglo varieties of English, African American English and non-Texas varieties of Mexican American English. Most notable among these features, with regard to the present study, is his finding that /æ/ is not raised before nasals (e.g., *hand*) in the speech of Mexican Americans in Texas. He also shows charts for several middle class speakers who have partially accommodated to local Anglo speech.

Southern California and southern Texas, where almost all of the studies of Mexican American English have been conducted, have densely concentrated Mexican American populations where Spanish is still the first language for many speakers. The situation elsewhere is starkly different, both in terms of the Mexican American communities and the local Anglo varieties. Research in areas outside the Southwest will provide further information on which features, if any, are common across all varieties of Mexican American English, in what ways the regional varieties differ, and if there is any pattern in terms of the degree to which speakers in Mexican American speech communities assimilate to mainstream features. Potentially, such information could also shed more

light on AAE, other ethnic varieties of English, and general principles of change due to dialect contact.

1.5 Overview of the Dissertation

This dissertation attempts to provide insight into the dialect found among Mexican American speakers of English in Lansing, Michigan, with respect to four of the six vowels involved in the NCS—/æ, ɛ, ɑ, ɔ/. Chapter 1 has introduced the theoretical and empirical background for the project, illustrating the need for and usefulness of the present study. Chapter 2 presents the methodology, setting and participants, in addition to providing historical information about possible linguistic influences on the speech of Mexican Americans in Michigan. Chapter 3 presents the overall, normalized results across social categories for the vowels /æ, ɛ, ɑ, ɔ/. Chapter 4 presents findings on the coarticulatory effects of consonantal environment on the pronunciation of /æ/ in the speech of those respondents who are both lifelong residents of Lansing and native speakers of English. Finally, Chapter 5 is a summary of the study, with discussion of areas for future research.

CHAPTER 2: Methodology

2.1 Physical and Linguistic Setting

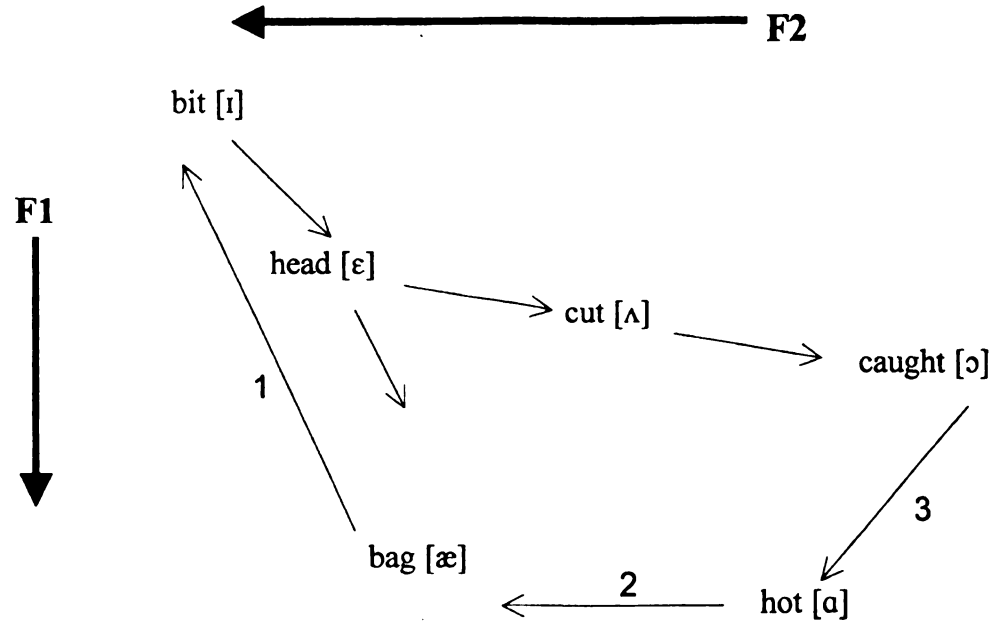
Data collection for this project was conducted in Lansing, the capital of Michigan, located in the south central part of the state — about 90 miles from the larger cities of Grand Rapids and Detroit, and only several hours from Chicago. Although the Lansing population was only 120,000 in the year 2000[5], several major highways run through the city, and many of its residents are from Detroit or Chicago, giving it an urban quality which is apparent in the speech patterns found there, as discussed below.

Michigan falls in the center of the dialect area defined by the *Phonological Atlas of North America* as the Inland North. The most distinctive regional speech feature that has been discovered in this area is the sound change in progress known as the Northern Cities Shift (NCS). This shift, illustrated schematically in Figure 2.1, is a vowel change that affects six vowels and has been under way among Anglos in urban areas across the north-central United States for 35 years or more. Labov (2001: 7) observes that all of the cities in which the NCS has been found were settled through westward migration from New York State, explaining the ubiquitousness of the dialect across such a huge and densely populated area as the Inland North. It has been found to follow the *cascade model* of expansion, spreading outward from the urban areas where it begins to progressively smaller cities and towns (Labov 2001: 436). Evans et al (2000) found the NCS to be well advanced among younger Anglos in Lansing, as would be expected given its status as a capital city and its proximity to several large urban centers. The current study investigates the degree to which Mexican Americans in Lansing are participating in

[5] U.S. Census 2000 figure

the shift in four of the six NCS vowels as a measure of their accommodation to predominant local norms.

Figure 2.1: The Northern Cities Shift (NCS)[6]
(based on Labov 1994: 191)



The NCS has been characterized as a chain shift, in which the vowels involved are rotating phonetically[7] in the acoustic space, in a domino-effect pattern that enables the maintenance of perceptual distinctness. This characterization rests on the assumption that the vowels in question began in one position, historically, and are now pronounced

[6] In sociophonetic descriptions of both the Northern Cities Shift and the Southern Shift, vowels are often referred to in terms of their first and second formant values, and it has become standard in the literature to refer to vowels involved in these shifts as "moving" when the F1 and F2 are different than the assumed earlier position. This practice will be followed here.

[7] No phonemic re-classification of words due to the shift has yet been documented. Evidence of such reclassification could come, for example, from answers to questions about which words rhyme with each other (e.g., "Does *can* rhyme with *den* or with *man*?")

differently. Although studies have shown that older people are less "shifted" than younger people (Labov, Yaeger and Steiner 1972), and rural speakers are less shifted than urban speakers (Callary 1975, Ito 1999), the actual positions of these vowels before the NCS is not completely known.

Some insight into the past comes from the *Linguistic Atlas of the North Central States* (LANCS) files, a collection of field notes and hand-written impressionistic transcriptions based on interviews, mostly done in 1948, with roughly 500 informants across the states of Wisconsin, Illinois, Indiana, Michigan, Ohio, Kentucky, and southwestern Ontario. Lansing is located in Ingham County, and while no Ingham County respondents were interviewed, three were interviewed in adjacent Eaton County, two by Raven McDavid and one by Harold Allen — both founding fathers of American dialectology. Of the three respondents, two were 73-year-old men — a carpenter and a farmer — and the third was a woman — described as a housewife — whose age was not noted. The elderly farmer did not show any raising of /æ/, the closest to raising being that in his speech — as well as in the speech of some other respondents from nearby counties — /æ/ was sometimes transcribed with a rising off-glide before velars, as in [bæˡg] 'bag' and [sæˡk] 'sack'. The carpenter's /æ/, however, was sometimes transcribed with a [^] mark that indicates raising, as in [pæ^stʃɚ] 'pasture' or even [sæ^ɛks] 'sacks', with an [ɛ] following a raised [æ]. Interestingly, this speaker's mother was born in Buffalo, New York — where evidence of strongly raised /ae/ was documented by Labov, Yaeger and Steiner (1972), and she may have been part of the migration that brought the early NCS west into Michigan. The pronunciations of the third Eaton County respondent — the housewife — and those of the LANCS respondents from Wayne County, where

Detroit is located, were also often marked as having a raised pronunciation of /æ/. The former result fits the hypothesis that women are the leaders of change, and the latter finding is expected given the characterization of the NCS as beginning in urban areas. In the words listed, there was no evidence of NCS-like pronunciation of either /ɛ/ or /ɔ/[8]. Unfortunately, there were too few legible tokens of words containing /ɑ/ to draw any useful conclusions about that vowel. Except for this lack of evidence on the pronunciation of /ɑ/, the LANCS data otherwise supports Labov's hypothesis that [æ] was the first vowel to shift (1994: 195), and they also indicate that the NCS is occurring relatively quickly and began fairly recently.

Labov (1994: 195) hypothesized that, based on evidence from previous findings, the NCS proceeded chronologically according to the following order:

1. Raising of /æ/
2. Fronting of /ɑ/
3. Centralization and fronting of /ɔ/
4. Lowering of /ɪ/ and /ɛ/
5. Backing of /ɛ/
6. Backing of /ʌ/

In the first step, /æ/ was realized in a high front position, nearing [ɪ] in its most extreme form, a position referred to as *fronted and raised* in the vowel space because the F2 is higher than older attested positions for this vowel and the F1 is lower. In the second step, /ɑ/ started sounding more like [æ] and was pronounced with a progressively higher F2. In the third stage, the back vowel /ɔ/ was pronounced as [ɑ] and referred to as

[8] Except before /g/, as in *hog* and *dog*.

lowered and fronted. In a later change, /ɛ/, the fourth vowel that will be discussed in this thesis, was pronounced further back in some shifted speakers and lower in others. The hypothesis is that, not only did the changes proceed in this order during the initial development of the NCS; they have continued to diffuse in this order, as well, with the oldest changes jumping first to a new region. It is important to note, however, that the order in which NCS features are adopted through geographical diffusion may not match the order in which such features are adopted by speakers who are members of a group that relocated from an unshifted area to an area that was already somewhat shifted, as is the case with the respondents in this study.

There is also controversy over whether the NCS is a chain 'shift' as opposed to a more random re-positioning of certain individual vowels. As pointed out by Gordon (2001: 13), "Our knowledge of the NCS is based on rather restricted sets of data produced by a handful of researchers." Although his own data are impressionistic, Gordon (2001:16) presents evidence that the NCS vowels have a much more complicated distribution than originally thought. The most difficult aspect of a chain shift to explain is the first step — the change that began the chain reaction. Motivation for the first step of the NCS, the fronting and raising of /æ/, stems from Ohala's (1981) theory of hearer-motivated sound change. Although Ohala viewed change based on perception as the result of misperception, change based on perception may instead be linked to the difference between the acoustics of perception and the acoustics of production. Several phonetic studies (Wright 1986, Beddor and Hawkins 1990, Kingston 1991, Plichta 2004) have shown that — although the perception of vowel height is dependent on more than just F1 and the nasal formant — nasalization appears to have a centralizing effect on

perception, such that nasalized low vowels are perceived as higher and nasalized high vowels are perceived as lower. Since low vowels are more likely to nasalize than high vowels (Plichta 2004), it may be the case that /ae/ nasalized first, in only some phonetic environments, but was perceived instead as raised, and began the NCS.

The listener-motivated theory of sound change, the LANCS data, and studies that show raised /æ/ appearing first in marginal areas affected by the NCS (Ito 1999, Evans 2001) all support the hypothesis that /æ/ moved first historically (and geographically) and the other changes followed. Additionally, as discussed below, Eckert (1988) documented two changes that were not recorded in earlier studies. For these reasons, and because the changes in pronunciation that occur ultimately result in the maintenance of perceptual distinction between phones, this dissertation adopts the hypothesis that these changes can be described as a chain shift.

Much of the research on the NCS has been conducted in Detroit, making Michigan a good location for continued studies on ongoing change in the shift and the effects of the shift on non-Anglo populations. Several early papers on the shift took their data from recordings made in 1965 by Shuy, Wolfram and Riley of over 700 Detroit speakers. Twenty-four of these speakers were analyzed impressionistically by Fasold in the late 1960's, and Labov, Yaeger and Steiner analyzed some of the Detroit data instrumentally, using a spectrograph, as a part of their 1972 report on sound change in progress. Based on these 1965 Detroit interviews and other interviews conducted from 1969 to 1970 in the northern cities of Buffalo, Rochester, Syracuse, Cleveland and Chicago as part of the Labov, Yaeger and Steiner study, all but two of the features labeled now as NCS characteristics were first documented. Labov (1994: 178) credits

Ralph Fasold with first recognizing raised /æ/, fronted /ɑ/ and fronted /ɔ/ in an unpublished paper written in 1969. Labov, Yaeger and Steiner (1972) refined NCS /æ/ to fronted and raised, and added low /ɪ/ and low /ɛ/ to the list of NCS characteristics. Based on results from research she conducted only a few years later, during the 1970's, in a high school in the Detroit suburbs, Eckert (1988 and elsewhere) completed the list by adding backed /ɛ/ and backed and lowered /ʌ/ to the NCS inventory. Callary (1975), in a study on the relative position of /æ/ in the vowel systems of eighteen young Illinois women, was the first to discover that the NCS spreads to progressively smaller cities and towns instead of spreading outward in concentric circles, like a wave.

Studies since then have confirmed the earlier results and traced the path of the shift into new regions and non-Anglo populations. Several recent studies have revisited Anglos in urban areas (Herndobler 1993; Labov, Ash and Boberg 2005), while other NCS studies have moved away from this group to focus on Anglos and others in rural areas (Gordon 1997 and 2000, Ito 1999), minority groups in urban areas (Knack 1991, Evans 2001, Jones 2003), and attitudes about language variation (Preston 1996). Not all of the vowels involved in the NCS have been equally well documented, however. The range of instability and direction of change of /ɪ/ and /ʌ/, in particular — two of the three vowels described as undergoing "new and vigorous changes" by Labov (1994: 195) — are not well understood. For this reason, only the vowels /æ, ɛ, ɑ, ɔ/ are discussed here.

2.2 Mexican Americans in Lansing

Migrants of Mexican heritage began settling in the Lansing area in substantial numbers during WWII, when workers were needed in the factories, and the population has been steadily growing since then — unlike the Anglo population which, incidentally, is decreasing in number. For the present study, the longest anyone interviewed had lived in Lansing was 68 years, and this man indicated that the five "first" settled families all knew each other well. A majority of Lansing's Mexican American families are originally from south Texas and still maintain strong ties to Texas.

A strong sense of solidarity is apparent in this close-knit community, but Mexican Americans are also well integrated throughout the Lansing area now, and many families have been in Michigan for one, two or even three generations. Although no official numbers are available on how many migrant workers come to Michigan each summer, the pastor at Cristo Rey Church, a centralizing institution for the Latino community in Lansing, estimated that between four and five thousand undocumented migrants continue to come to Lansing each summer. Many thousands more than this migrate to the agricultural regions in western, southwestern and north central Michigan every year. The group mobility and the constant influx of people help to keep both Texas English and Spanish alive — although many second and third generation residents are monolingual.

As reported in the 2000 U.S. Census, the documented Hispanic[9] population in Lansing approaches the national average of 12.5%. Hispanics made up 10% of Lansing's total population in the year 2000, with Mexican Americans comprising the majority of this group, at 6.8% of Lansing's total population — roughly 8,000 people.

---

[9] The term *Hispanic* is used here in accordance with U.S. Census terminology.

2.3 Participants

Out of a total of forty-seven interviews, data from thirty-two respondents are included in the analysis presented here. Table 1 shows each participant's pseudonym, sex, age, age group (for the statistical analysis), generation of residency in Michigan, bilingualism, age of arrival to Michigan if the speaker is first generation, whether he or she is from Texas, and socioeconomic status.

Table 2.1: List of Participants

Pseudonym	Sex	Age	Age Group	Gen. in MI [10]	Speaks Spanish	AOA in MI [11]	From TX [12]	SES [13]
Andy	M	14	1	2	no		no	W
Ronald B	M	16	1	2	no		yes	M
Isaiah	M	27	2	1	yes	14	no	W
Rodolfo	M	27	2	2	yes		yes	W
Rene	M	27	2	1	yes	10	yes	M
Jesse	M	28	2	3	no		yes	W
Melito	M	29	2	3	no		yes	W
Jose	M	35	2	2	no		yes	M
Ralph	M	41	2	2	no		yes	M
Laurence	M	41	2	1	yes	4	yes	W
Rafael	M	43	2	2	no		yes	W
Edmund	M	45	3	2	no		yes	M
Martin	M	47	3	2	yes	1	yes	M
Jack	M	49	3	2	yes		yes	M
Gilberto	M	54	3	1	yes	24	yes	M
Terence	M	56	3	1	yes	22	yes	M
Walter	M	71	3	2	yes	3	yes	W
Lucy B	F	14	1	2	no		yes	M
Melinda H	F	16	1	3	no		yes	M
Estela	F	17	1	3	no		yes	W
Lola	F	19	1	1	yes	10	no	W
Emelia	F	20	1	2	yes		yes	W
Judith	F	21	1	2	yes		yes	W
Solana T	F	22	1	3	no		yes	M
Ana	F	28	2	3	no		yes	M
Sabina H	F	35	2	2	yes		yes	M
Cynthia	F	39	2	1	yes	21	yes	M
Loretta B	F	40	2	1	yes	10	yes	M
Melissa	F	42	2	1	yes	10	yes	W
Mabel	F	45	3	2	yes		no	M
Madeleine	F	47	3	1	yes	12	no	M
Simona H	F	59	3	1	yes	24	yes	M

[10] Gen. in MI = Generation in Michigan. Generation 1 = not born in Michigan; Generation 2 = born in Lansing, or moved there by the age of 3, but parents not born in Michigan; Generation 3 = born in Lansing, and one parent born in south central Michigan

[11] AOA in MI = Age of arrival in Michigan

[12] From TX = the speaker's family is originally from Texas. The speaker himself/herself may be native to Lansing.

[13] SES = Socioeconomic status (see Appendix B for method used to calculate status). M = middle class; W = working class

2.3.1 Demographic Constants

Participants had to fulfill two criteria. First, the respondent's parents were both required to be of Mexican descent. Secondly, participants needed to be fluent speakers of English. Nineteen of the thirty-two were self-reported native speakers of English. Ten stated that they began speaking English at the start of primary school or earlier. The three remaining participants began speaking English at the ages of 9, 10, and 14, when their families moved to Michigan. The speaker who began learning English at the age of 14 was included for two reasons. The placement of his vowels was not significantly different from that of the native speakers interviewed, possibly because he learned English in Michigan and so acquired the local dialect. Furthermore, second language acquisition studies on Italian bilinguals in Canada have found that, until the age of 14, near native acquisition of second language phonology is still possible (Flege, MacKay and Meador 1999; Flege, Schirru and MacKay 2003).

The fifteen participants whose data were not used were eliminated from the analysis for the following reasons: two had colds that affected their speech production; two had lived in Michigan for only two years; two had one parent who was not of Mexican descent[14]; one grew up with a white family; one had trouble reading the wordlist; two older men and two women in their eighties were interviewed for oral history purposes and did not wear a microphone much of the time; and in three cases, the recording quality was inadequate for the purposes of instrumental measurement.

[14] The Polish population is also large in southern Michigan, and these two speakers are from one of several Polish Mexican families I met while doing research for the project.

2.3.2 Independent Social Variables

Initially, the three primary social variables under investigation were sex, socioeconomic status and whether the respondent was born in Lansing or not. Table 2.2 provides the cell distribution across these variables.

Table 2.2: Cell distribution across sex, socioeconomic status and birthplace

	Middle Class Women	Working Class Women	Middle Class Men	Working Class Men
Generation 1	4	2	3	2
Lansing native[15]	6	3	6	6

Speakers were split into two groups based on birthplace, such that first generation residents were compared to Lansing natives. First generation speakers from Texas or Mexico were required to have lived in Lansing for at least half their lives. Most had lived there well over that, although two younger speakers who fell just short of this mark were also included in the final analysis – a 27-year-old who moved to Lansing at 14, and a 19-year-old who moved to Lansing at 10 years of age. Participants who moved to Lansing by the age of 3 were considered Lansing natives and categorized as second generation. Although none of the participants had parents who were both born in Lansing, six speakers had one parent who was born in Michigan and had lived in Michigan all of his or her life. None of the speakers who were native to Lansing had lived outside of the

[15] This category includes one man who moved to Lansing by the age of 3 and one man who had only lived in Lansing for 10 years at the time of the interview but was native to urban south central Michigan.

Lansing area for more than two years, except for one 35-year-old man, Jose, who had only lived in Lansing for 10 years but was native to urban south central Michigan.

Speakers were also placed into one of two socioeconomic status categories — working class or middle class. Categorization was accomplished by assigning each respondent an index score based on the formula provided by the Warner Index of Social Characteristics (1960), which takes into account occupation, housing, neighborhood, and level of education (Appendix B). Index score was inversely related to status, such that an index score of 17-50 was assigned the rank Middle Class, and an index score of 51-70 was assigned the rank Working Class. Respondents who were still in high school were assigned the rank of their parents.

Seven speakers scored in the Middle or Upper Middle Class range and only two speakers scored above 55 (Working Class). Over two thirds of the speakers fell near the Lower Middle/Upper Working Class boundary, however. This distribution is representative of the overall socioeconomic situation of Mexican Americans Lansing. Many adults work at good factory, retail or middle management jobs, have attended several years of community college, and own modest houses. Possibly due to this lack of sharp stratification between social classes, socioeconomic status was not correlated with any significant differences in vowel production.

Lansing's settled Mexican American community is also upwardly mobile, however. All five of the speakers under 18 who were interviewed planned to get a 4-year college degree; eight of the twenty-seven respondents over age 18 had received a bachelor's degree, and three of these had master's degrees. It remains to be seen whether an increase in the average level of education among members of this speech community

has lasting effects on the dialect due to the resulting greater mobility of some of its speakers.

Analysis of Variance (ANOVA) tests were also performed across age group and sex categories. Interestingly, three distinct age groups emerged from the data (14-24, 25-44, 45-71), although this unfortunately resulted in an uneven cell distribution. Table 2.3 provides the cell distribution across age and sex.

Table 2.3: Cell distribution across age and sex

Men 14-24	Men 25-44	Men 45-71	Women 14-22	Women 25-44	Women 45-71
2	9	6	7	5	3

Dialect background was also taken into account — where each individual learned English and whether or not he/she learned English as a native language. The linguistic situation of many Mexican Americans in Lansing is quite complex and is discussed in greater detail in Chapter 3.

2.4 Field Work and Data Handling and Processing

The majority of the respondents for this study were recruited through contacts made while the author was working as a volunteer in the after-school program for children at Cristo Rey Community Center from September 2003 to June 2004, and then again from January to June 2005. Contacts were also made through going to Cristo Rey Church, visiting restaurants and grocery stores, talking with neighbors, and general word of

mouth. The primary interview locations were Cristo Rey Community Center, respondents' homes, and respondents' places of employment.

The data presented here are based on recordings of each speaker reading a wordlist (Appendix A) as part of a longer session that included the reading of a short passage, a dialect perception test, and a conversational question-based sociolinguistic interview (Appendix C) that lasted anywhere from 15-60 minutes (mostly dependent on the respondent's willingness to talk). Over 1,500 tokens of the four vowels /æ, ɛ, ɑ, ɔ/ were measured, in various phonetic environments. Over 2,500 tokens were measured in all, from the wordlist alone.

The Northern Cities Shift has been shown to be a change from below the conscious level, meaning that people are not aware of it in their own speech, and they do not tend to notice it in the speech of others locally. This suggests that the NCS is not a characteristic that speakers actively attempt to remove from their speech, even when doing a very careful task, such as reading a wordlist. The degree to which it is present in a person's speech is likely, therefore, to be constant across speech styles (Ash 1999). Furthermore, the analysis of wordlist data leads to conservative results since, if a feature such as the NCS is present in the speech of someone who is being quite careful — for example, when reading a wordlist in an interview situation — then it is likely be present in more casual speech.

All interviews were conducted entirely in English. Analog recordings were made using a Marantz PMD201 portable cassette recorder for some speakers, a Marantz PMD222 for the rest, and an AT831b Audio-technica uni-directional clip-on microphone. The recordings were then digitized (16 bit samples, 10 kHz sample rate) using the

acoustic analysis software Praat. First and second formant measurements were taken through Praat, using the sociophonetic software program Akustyk. When possible, the vowel was measured during the steady state. For diphthongs, a single measurement was taken just after the perceptual end of the transition from the preceding consonant. The data used in the calculation of overall averages for groups of individuals, as presented in Chapter 3, were normalized using a Nearey normalization algorithm (without F3) to produce regularized measurements, whereas the phonetic conditioning results discussed in Chapter 4 are based on raw data. In this latter part of the project, analysis for each individual was performed separately on the 31 words from the wordlist that contain /ae/ as the stressed vowel.

2.5 Linguistic Influences

Although the *speech community* has been a fundamental unit of analysis in sociolinguistics since the mid-1960's, or earlier, defining what a speech community is has proven tricky. Labov, interested in generalizations across monolingual speakers, defines it as a group of speakers with shared norms for the production and the evaluation of speech (Labov 1972: 120-121). In his 2001 survey of Philadelphia speech, he concedes that his approach fails to take into account issues such as language and dialect contact, but states that he is interested in "those changes that occur from within a linguistic system" (Labov 2001: 20), and hence his definition of speech community is appropriate to this goal. Gumperz and Levinson (1996) give a broader definition and emphasize the significance of "networks of interacting individuals" to socialization, both linguistic and cultural (Patrick 2002: 581). This more expansive definition is perhaps too general, but it

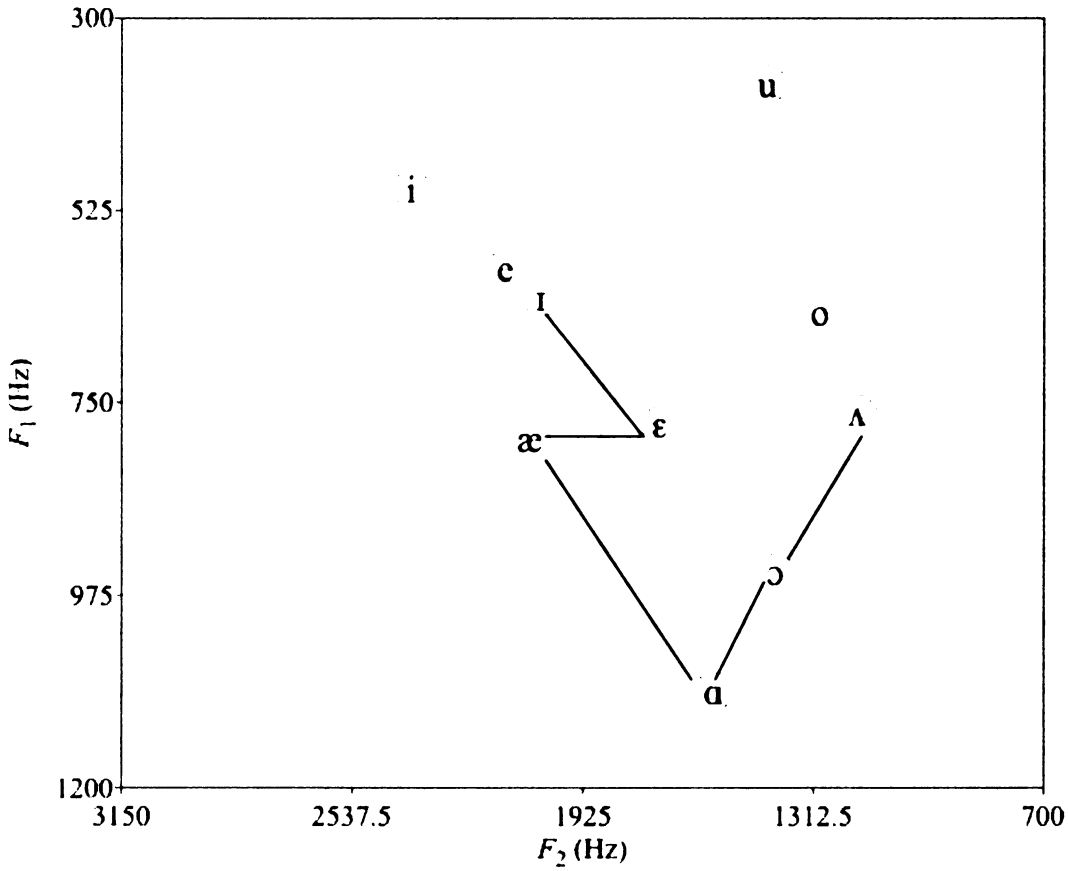
does potentially accommodate speakers who are members of the same community but do not share the same set of norms, such as non-ethnic speakers in an ethnic community. Santa Ana (1993) formalizes the idea of networks that extend beyond a single group of speakers with shared norms by proposing the *language setting*, "a model of the contact between a number of dialects and languages in a social setting for a given population." This model takes into account the linguistic complexity that is found in most ethnic communities in the United States and elsewhere. He writes, "In the case of the Chicanos, the language setting should include monolingual Spanish and English as well as bilingual speakers, and the non-Chicanos with whom Chicanos come into contact" (Santa Ana 1993: 4). This is the linguistic context in which Lansing's Mexican Americans find themselves, and so the language setting, because it has broader scope than the more traditional speech community, is a useful framework for explaining linguistic influences on the speech of members of this group.

Given this context, there are at least four language varieties that need to be taken into account when discussing the speech of Mexican Americans in Lansing, Michigan: Northern Cities Shifted speech; the older local norm that was representative of Lansing speech during the 1940's; Texas Mexican American English, or Tejano English; and, finally, Spanish, the heritage language. This section addresses these four varieties.

2.5.1 Northern Cities Shifted English

Northern Cities Shifted speech is a constant influence on the dialect of this group. Figure 2.2 shows the vowel space of a group of young, female Detroit speakers, born between 1970 and 1976.

Figure 2.2: Normalized means for female Detroit area speakers, ages 19-25, interviewed in 1995 (data from Preston, personal communication)



The averages presented are normalized, using the same algorithm used for the data presented in Chapter 3 below. The use of normalized means allows for the comparison of

individuals who vary with respect to overall acoustic range and is also an estimation of the process of regularization performed by the human brain during speech perception. Speech would be incomprehensible without some internal procedure for regularizing and relativizing input. Normalized data is especially useful when comparing men and women, who differ dramatically in both formant range and pitch range, on average, but is also effective in the comparison of same-sex individuals. Although a normalization procedure that is completely accurate in its elimination of all and only the physiological differences between speakers has not yet been found, normalization does allow for comparison between studies, especially those that use the same normalization algorithm. The Nearey formula used in this study is the same as that used in the speech software program Plotnik, created and developed by William Labov, which is popular in sociolinguistics.

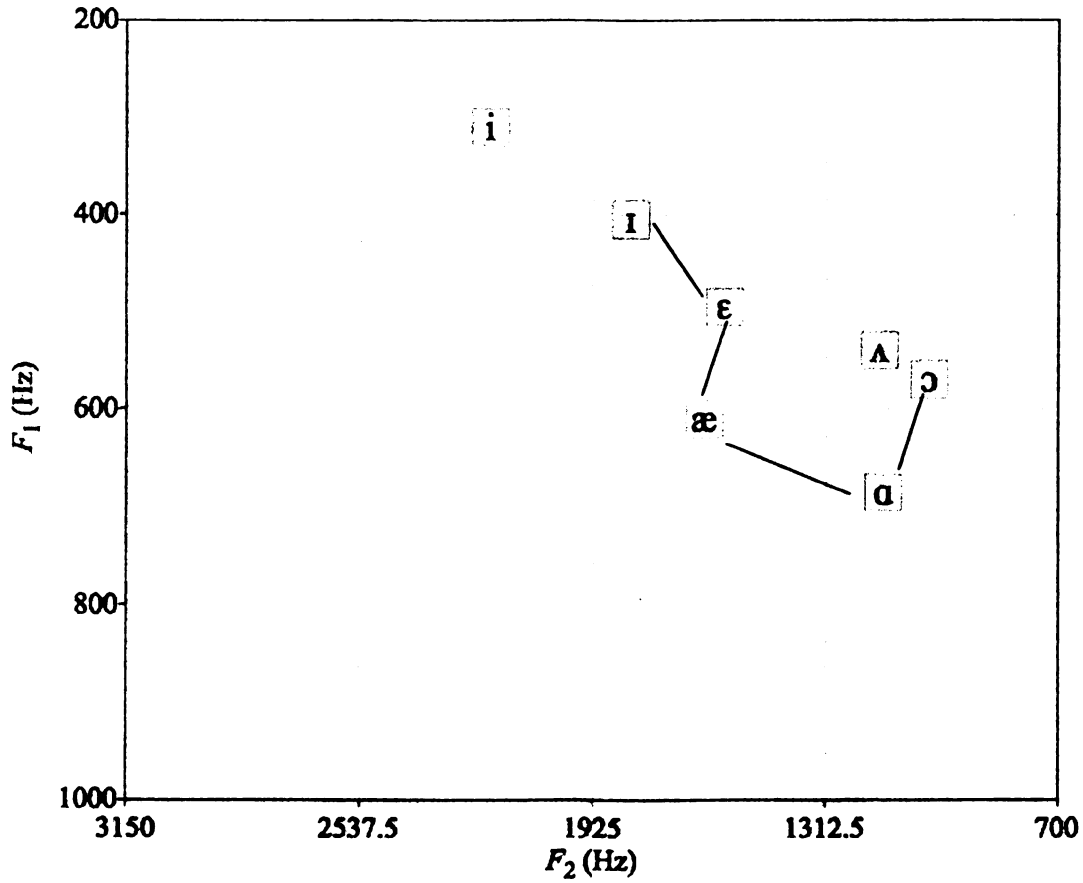
Although the young women whose vowel means are presented in Figure 2.2 are from the Detroit area rather than Lansing, their speech represents an advanced stage of the Northern Cities Shifted dialect that has been found throughout Lower Michigan, including Lansing (Evans et al. 2000). Therefore, the normalized vowel measurements for the female respondents in the present study are compared against the normalized results seen here as a measure of the degree to which Mexican American women in Lansing have accommodated to the NCS.

2.5.2 Older Rural Michigan Speech

The speech of Anglos in Lansing during the 1940's, when the current Mexican American speech community in Lansing was beginning to form, must also be considered. Evidence from analyses of recordings made during the 1960's for the *Dictionary of American*

Regional English (DARE) project suggests that at least some features of the NCS have been around for well over 50 years. Figure 2.3 shows the vowel chart of a middle-aged man from rural Lower Michigan who was born in 1920.

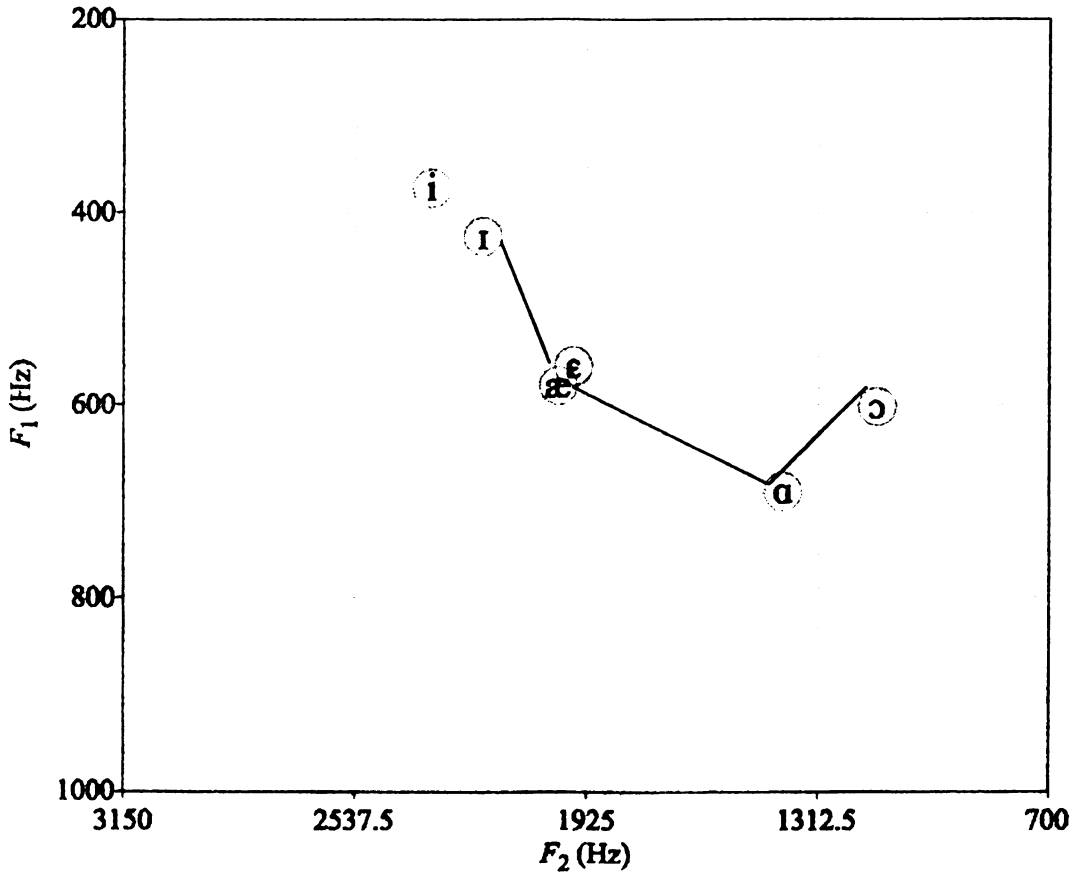
Figure 2.3: Vowel chart of a 50-year-old Anglo man from Gaylord, MI, interviewed in 1970 (data from DARE files, chart modified from Ito 1999: 55)[16]



[16] Normalized data is not used in Figures 2.3 - 2.5 because the vowels of only one individual are shown in each chart. These figures vary in scale because they are based on raw formant measurements, but they are still useful for making comparisons between speakers with respect to relative vowel positions.

Older Anglo men from rural communities such as Gaylord tend to be the most conservative in their speech and the last speakers to show any kind of innovation. However, this man's vowel configuration clearly indicates incipient stages of the NCS. For example, although his /æ/ and /ɛ/ do not fit the pattern of the young Detroit area women seen in Figure 2.2, in which /æ/ and /ɛ/ are at the same height, these two vowels are much closer on the F1 axis in his speech than they would be in a completely unshifted speaker. Figure 2.4 shows the vowel chart of his sister, who was roughly the same age at the time of the interviews.

Figure 2.4: Vowel chart of a middle-aged Anglo woman from Gaylord, MI, interviewed in 1970[17] (data from DARE files, chart modified from Ito 1999: 55)



Her system is even more NCS-like than her brother's. Her /æ/ and /ɛ/ are at the same height, as in the young Detroit women's speech. If this degree of shifting was found in rural Anglo speakers who were born around 1920, then it can reasonably be expected to have been active already in the Lansing area during the 1940's, when the Mexican American community was just beginning to establish roots there. Further indication that the NCS was in Lansing by the 1940's comes from Shuy, Wolfram and Riley's 1965

[17] Ito (1999) reports that although there is no documentation on this speaker, the content of the interview reveals that she is the sister of the previous speaker and close to the same age.

Detroit recordings, discussed above, which revealed that all stages of the NCS except backed /ɛ/ and backed and lowered /ʌ/ were strong there by that time. If it is a shift that advances in stages, the shift had to be well under way in Detroit if four of the six stages were noticeable by 1965. In addition, the previously mentioned LANCS indicates the presence of raised /æ/ in the speech of even older speakers by 1948 in areas close to Lansing; and Thomas (2001: 76) points out that McDavid (1958) noted fronted /ɑ/ in the speech of older Linguistic Atlas informants from the general NCS region.

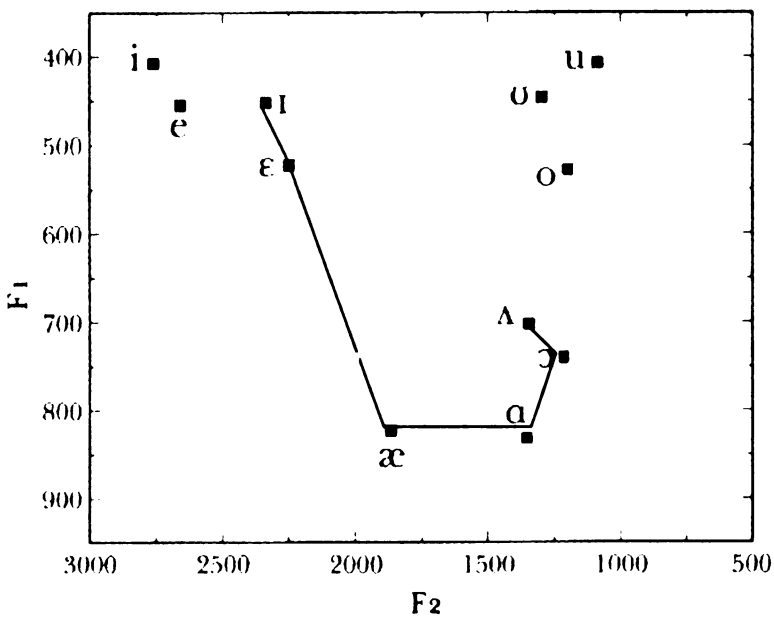
2.5.3 Mexican American English in Texas

Twenty-seven respondents for this study came from families that had migrated from Texas to Michigan, and only five came from families that had migrated directly from Mexico to Michigan. Ten respondents moved directly from Texas to Michigan (Appendix D and Appendix F). A third linguistic influence, therefore, on the English spoken by Mexican Americans in Lansing is the Spanish-influenced English of Mexican Americans in south Texas — sometimes referred to as Tejano English[18] (Bayley 1994 and 1997) — a variety which is kept alive in Lansing by a constant flow of migrants from south Texas. Thomas (2001) presents the most comprehensive evidence available on the English of Mexican Americans in Texas. Although actual formant values are not listed and no averages or normalized data are given, he provides individual vowel charts for

[18] Bayley (1997) uses the term *Tejano English* to refer specifically to "the variety of English spoken natively by working-class *barrio* residents" in San Antonio (209). He comments that he chose this term in large part because participants did not object to it. Thomas' (2001) data suggest that the vowel quality found in such speakers is not unique to San Antonio. Reference to this term here is intended to put emphasis on those features of the speech of Mexican Americans from south Texas that may be widespread enough to have an impact on the English of Mexican Americans in Lansing.

seventeen Mexican American speakers of English, sixteen of whom are from Texas and were recorded between 1988 and 1992. All of these speakers learned English as children, and the data for each individual is either from a reading passage or from a conversation. Three respondents are described as "middle-class Mexican Americans from Texas who have assimilated to some features of Anglo vernaculars" (188), and the other thirteen are described as representative of "what seems to be the mainstream of Mexican American English in Texas" (188). The age range of these thirteen is 14 to 68, and the majority are from southern Texas. Figure 2.5 shows a modified version of one of these charts — that of a 31-year-old woman from San Antonio who was born in 1961 and recorded in 1992.

Figure 2.5: Vowel chart of a 31-year-old Mexican American woman from San Antonio, TX, interviewed in 1992 (modified from Thomas 2001: 189)



Her /æ/ and /ɛ/ are widely separated, with /æ/ clearly a low vowel, not fronted or raised, and /ɛ/ very high. Also, her /ɑ/ is well back, almost in line with the other back vowels. Many first generation Mexican Americans in Lansing are about her age or a little older — she would have been 44 in 2005 — and so may have been exposed to a similar dialect of English before they came north to Michigan.

There are two differences between this chart and some of the others provided by Thomas, however, which reveal substantial variation between speakers. In several of the charts presented as typical, the speaker has an average position for /æ/ that is noticeably higher than the average of /ɑ/ — in the most extreme speaker, the height of /æ/ is the same as the height of /ʌ/, although it is still well below the height of /ɛ/ in all speakers.[19] Therefore, for some first generation Mexican Americans from Texas, the relative position of /æ/ in NCS speech is not dramatically different from its relative position in their Texas dialect of English. The implication of this perceptual similarity for the dialect of English that is emerging among Mexican Americans in Lansing is discussed in section 3.3.1.

Another major difference between the speaker whose vowels are represented in Figure 2.5 and the speech of some of the other Mexican Americans from Texas whose vowel charts are shown in Thomas (2001) is that over half of them have the low back, or /ɑ/~/ɔ/, merger. The charts indicate that merger of these two vowels is not strictly correlated with age or location, but is instead a feature that has been adopted from the speech of local Anglos. Thomas (2001: 140) reports that the /ɑ/~/ɔ/ merger in Anglo

[19] Thomas recently confirmed this finding by commenting that he found an average for /æ/ that is higher than local Anglo /æ/ to be common in the speech of the Mexican Americans he interviewed in Texas (personal communication).

speech has now spread throughout most of the state. In contrast, /ɑ/ and /ɔ/ are well separated in the speech of all those interviewed for the present study — as they are in the speaker whose vowels are represented in Figure 2.5. While analysis of the reading passage or conversational data might reveal some merger, this is unlikely because the standard deviations for both /ɑ/ and /ɔ/ tended to be very small, with no overlap.

Figure 2.5 is included here because this speaker is the same age as many first generation Mexican Americans in Lansing, and she appears to be more representative of conservative Mexican American English than some of the others because she does not exhibit the low back merger. She is not intended to represent all Mexican Americans from Texas, however. The differences between her vowel chart and some of the others make it somewhat difficult to generalize about the speech of Mexican Americans in Texas; however, the fact that no participant in the current study has merged /ɑ/ and /ɔ/ indicates that this aspect of variation in the English of Mexican Americans in Texas has not had a strong influence on the current dialect found among Mexican Americans in Lansing.

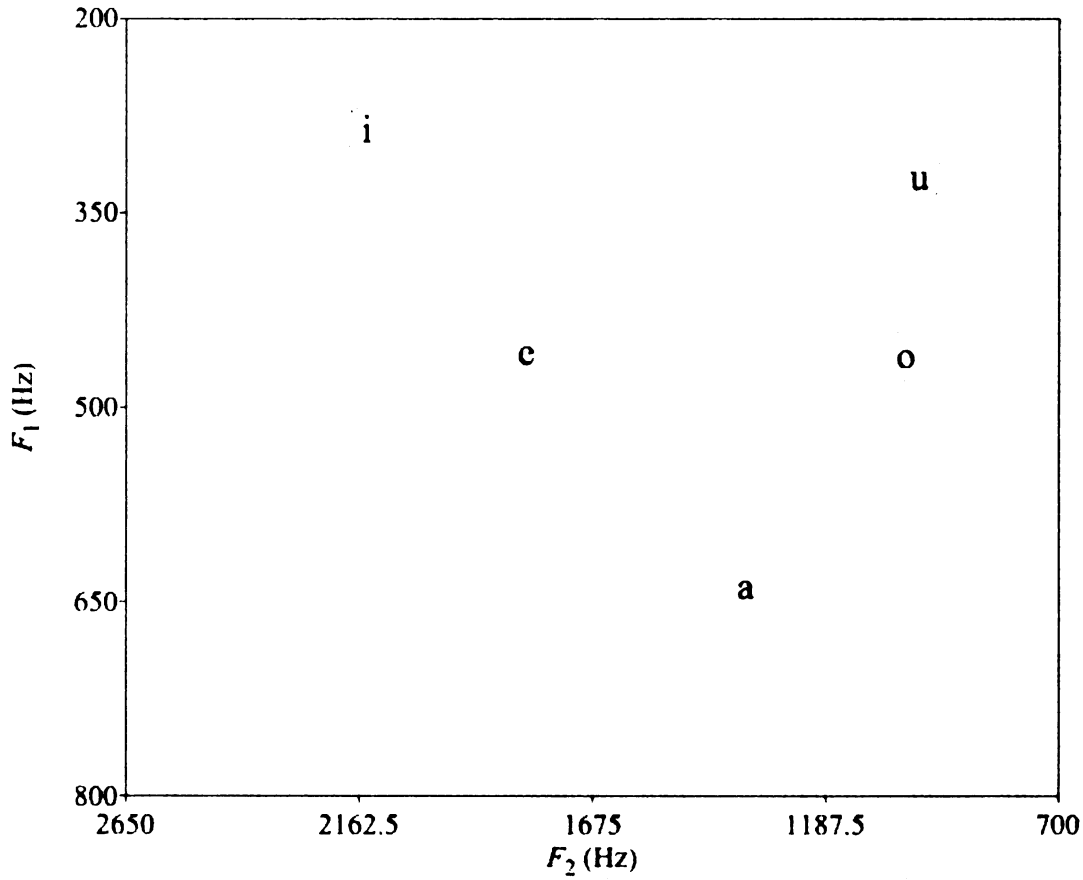
2.5.4 Spanish

The fourth linguistic influence that must be taken into account is Spanish. All of the respondents who were born in Michigan or arrived in Michigan by the age of 3 are either native speakers of English or began English with primary school. Of the eleven respondents who arrived in Michigan after the age of 3, eight came from Texas and three came from Mexico. The eight participants who came from Texas all reported learning

Spanish as a first language and beginning English in primary school. Therefore, they came north as bilinguals who spoke both Spanish and English. The three participants who came straight from Mexico, however, were monolingual Spanish speakers before they arrived in Michigan. It is likely that those who came to Michigan speaking only Spanish have assimilated their speech to the dialect of the majority Mexican American community in Lansing — whose members are mostly from Texas, although many have ancestors from Mexico. The degree to which this dialect still shows substrate influence from Spanish is expected to be comparable with results from other ethnic minority communities in which, by the third generation, most people are monolingual speakers of English. Although the ethnic minority dialect may differ from the local mainstream Anglo norm, studies have shown that the links to the heritage language are often not direct or obvious (Labov 2001: 247). Figure 2.6 shows the averaged Spanish vowel pattern for several men from Madrid. No raw data is available for Mexican Spanish, but, as discussed below, there is no evidence that this vowel positioning would be different in Mexican Spanish.

Figure 2.6: Mean scores of Spanish vowels for four men from Madrid.

(data from Bradlow 1995: 1918)



The evenly spaced five-vowel system of Spanish is quite common among languages of the world. Phonetically, it has none of the vowels involved in the Northern Cities Shift, although the Spanish vowel /a/ is similar in production to an NCS /ɑ/ because it is pronounced in a more central position than an unshifted American English /ɑ/[20]. Tsuzaki

[20] The IPA symbol [a] is used by Bradlow (1995) and is the symbol commonly used to represent this vowel in phonetic studies on both Spanish and Italian, although it is characterized as a low front unrounded vowel (Ladefoged 1993 and others). This symbol is used to represent the phoneme, as well, although it is not phonemically contrastive in

(1970: 38), who investigated the influence of English on the Mexican Spanish of first generation speakers in Detroit who had migrated from Texas and Mexico, also describes Mexican Spanish /a/ as a "low central vocoid, including a set of nondiscretely scattered phones ranging from [æ>] to [a<]."[21] Godinez (1981), for the Spanish of Tijuana, Mexico, reports similar placement of /a/ in the vowel space. /ɑ/ is, therefore, the NCS vowel most likely to be affected by Spanish, since it is also a low central vowel in its realization and is therefore produced in a position close to where Spanish /a/ is produced.

2.6 Summary

This chapter outlined the setting, participants, social and linguistic variables, and methodology of the study. The various linguistic influences that may have affected the variety of English spoken by Mexican Americans in Lansing have also been discussed. Chapter 3 presents the results from ANOVA's performed on the normalized F1 and F2 of /æ, ɛ, ɑ, ɔ/ across the social variables of sex, generation in Michigan, socioeconomic status, linguistic background and age. Among these variables, the strongest variation occurs between age groups. The results for age are also compared to measurements of these same four vowels in the speech of the young Anglo women from the Detroit suburbs (Figure 2.2).

Spanish. The symbol is also used to represent the phoneme that contrasts, for example, with low back /ɑ/ in Danish (Ladefoged 1993, 224). Both /a/ and /ɑ/ are used in the literature to represent the American English low back vowel. However, since it contrasts phonemically with low front /æ/, the symbol /ɑ/ is more accurate.

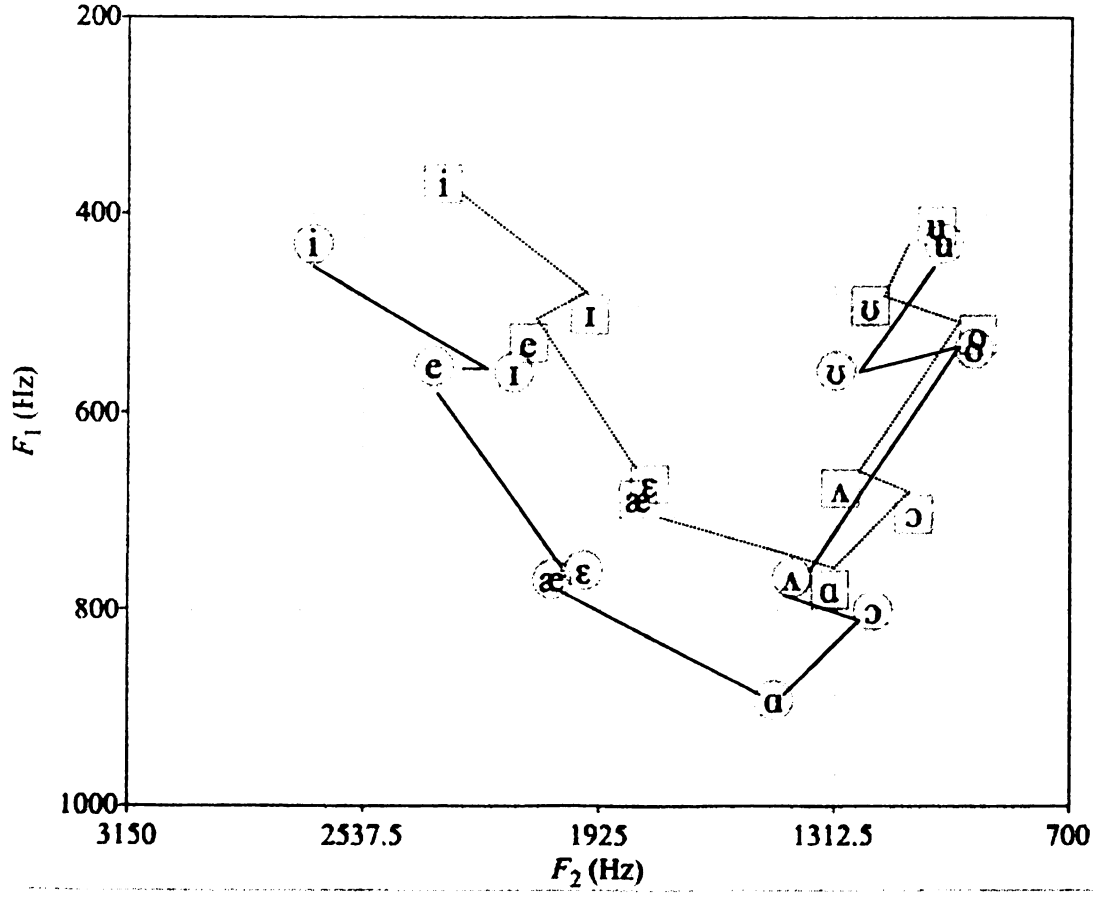
[21] The symbols > and < indicate *backed* and *fronted*, respectively.

CHAPTER 3: Statistical Results

This chapter begins with a discussion of the overall vowel pattern found among members of Lansing's Mexican American speech community then presents the variation that is apparent between social categories in the pronunciation of the vowels /æ, ɛ, ɑ, ɔ/.

Figure 3.1 shows the normalized vowel space for both men and women, with men's averages represented by squares and women's averages represented by circles.

Figure 3.1: Normalized means for all 32 respondents. Men (N = 17) = squares; Women (N = 15) = circles.



The most obvious difference between men and women is that the women have a larger acoustic range than the men, especially in the low vowels and the front vowels. This is

primarily for physiological reasons that are unrelated to the NCS, as suggested by the regularity of this effect, and this difference is not completely overcome by the normalization procedure used here and in most sociophonetic investigations (Adank, Smits and van Hout 2004: 3103). The vowels of both men and women are in very similar relative positions, however. Since studies have shown that women are usually the leaders of linguistic change in progress (Labov, Yaeger and Steiner 1972; Eckert 1988; Ito 1999), women's and men's vowel patterns would be expected to differ noticeably if aggressive change were underway. The fact that the vowel patterns do not differ suggests a stable dialect in this community. More detailed analysis further supports this conclusion, although some variation correlated with social variables is apparent, especially in the results for the vowel /æ/.

The relative positions of /æ, ɛ, ɑ, ɔ/ in Figure 3.1 are also similar to the relative positions of these vowels in the speech of the middle-aged Anglo woman from rural Michigan who was recorded in 1970 for DARE (Figure 2.4). One particular similarity is that the vowels /æ/ and /ɛ/ are very close together[22]. In contrast, /æ/ and /ɛ/ are quite far apart in the Texas speaker's vowel space (Figure 2.5), with /æ/ low and central and /ɛ/ high and front. As noted above, several Texas speakers in Thomas (2001) were found to have a raised /æ/, but /æ/ was still well below /ɛ/ in all cases. In the speech of the young Detroit women (Figure 2.2), /æ/ and /ɛ/ are at the same height but well separated,

[22] Although standard deviations are not shown in Figure 3.1, for purposes of simplification, the standard deviations of /æ/ and /ɛ/ overlap almost completely in both men's and women's speech.

primarily due to the backed position of /ɛ/ (Figure 3.9), which is associated with an advanced stage of the NCS (Labov 1994: 195).

Another similarity between the overall vowel pattern of the respondents for this study and that of the older Anglo woman whose vowel chart is presented in Figure 2.4 is the relative positions of /ɑ/ and /ɛ/ along the F2, or front/back, dimension. One diagnostic measure of Northern Cities Shiftedness used by Labov is the relative positions of these two vowels. The closer /ɑ/ and /ɛ/ are to being in vertical alignment, the more shifted the speaker is considered to be (Labov, Ash and Boberg 2005). According to this measure, the Detroit women (Figure 2.2), who show /ɛ/ directly above /ɑ/, are judged to be very shifted, whereas the Lansing Mexican American speakers (Figure 3.1), who have a mean F2 for /ɛ/ that is over 500 Hz higher than the mean F2 of /ɑ/ for both men and women, are considered more similar to the Gaylord speakers and not shifted in this regard. For the reasons mentioned above, the overall vowel configuration of Mexican Americans in Lansing resembles a conservative version of the NCS with several unique characteristics that are discussed further below.

The rest of this chapter provides statistical results across the social variables of generation, socioeconomic status, linguistic background and age to further illustrate and clarify this general picture.

3.1 Generation and Socioeconomic Status

In addition to similar overall vowel configurations for male and female respondents, another indication of the stability of this dialect is that ANOVA results revealed no statistically significant variation within gender based on generation of residence in Lansing or socioeconomic status. As discussed in section 2.3.2, most respondents fell within a narrow range of scores with regard to socioeconomic status, presumably because of the relatively short history of Lansing's Mexican American community and the common roots of many of its members; so, it is not surprising that no significant linguistic variation correlated with this variable.

With regard to generation, a possible explanation for why first generation respondents do not have a significantly different vowel pattern from respondents who were born in Michigan may be that all of the first generation speakers interviewed have been living in Lansing for most of their lives (see Table 2.1, p. 24). Of the eleven first generation respondents, seven came to Michigan as children—three straight from Mexico and four from Texas—and they may have acquired the local phonology quickly. This possibility is further investigated below in the discussion on length of residence. The remaining four first generation respondents began speaking English in primary school in Texas, came to Michigan between the ages of 21 and 24, and are either married to a Michigan native or have lived in Lansing for over 30 years. In addition, all 4 have jobs in which they interact constantly with the public.

Phonetic accommodation to local ethnic group norms by adults was also found by Knack (1991) in her research on Jewish speakers in Grand Rapids, Michigan. In order to establish a baseline for comparison, Knack performed a general survey of high school

students in Grand Rapids, and found the pronunciation of /ɔ/ to be Northern Cities Shifted—low, front and unrounded, approaching [ɑ]. Labov (1966) had found a quite different high /ɔ/ that was closer to [o] among New Yorkers, and especially Jewish New Yorkers. Knack consequently found a correlation in the Jewish Grand Rapids speakers between high /ɔ/ and a combination of heavy involvement in the Jewish community and close friends who were Jewish New Yorkers[23]. This was even true for people who had not met their New York friends until they were adults. She, therefore, drew the conclusion that "the speech behavior of the Jewish participants has changed in a consistent way in their adult lives" (1991: 261).

The Lansing data does not show, of course, that all Mexican Americans living in Lansing have the same accent. But the overall results of this study indicate the existence of a stable dialect, with its own norms of pronunciation, in the settled Mexican American community.

3.2 Linguistic Background as a Variable

The linguistic history of Mexican Americans in Lansing is extremely complex, and that complexity is reflected in the diversity found among respondents for this study. Although all of the participants have lived in Lansing for a good part of their lives, most have Texas heritage, and none of them learned English after the age of 14, this still leaves

[23] Of the Jewish people in Grand Rapids at that time who were not born in Grand Rapids, more were born in New York than anywhere else (12% of the total population).

room for a great deal of variation. Table 3.1 shows the distribution of respondents across the variables of sex and linguistic background.

Table 3.1: Cell distribution across sex and linguistic background

	NES	ESL	OENG	OENG2	OESL
Men	10	2	2	2	1
Women	6	3	2	2	2

Legend:
NES = born in Michigan or moved there by the age of 3; learned English as a first language; five of the sixteen are bilingual
ESL = born in Michigan; began learning English in primary school
OENG = not born in Michigan but moved there between the ages of 10 and 14; native speaker of English
OENG2 = not born in Michigan but moved there between the ages of 21 and 24; began learning English in primary school
OESL = not born in Michigan but moved there between the ages of 10 and 14, learned English in Michigan

Although most cells have at least two people in them, the data is skewed by an uneven distribution of age across cells. For example, all NES female respondents are under 25. Furthermore, there are no male speakers under 25 — and only one female speaker under 25 — in any of the non-NES cells (Appendix E). This reflects the cultural history of the community, but since age is a crucial factor in this group, as discussed in the following section, more data would be needed to draw clear conclusions about 1) the influence of learning English as a second language as a child and 2) age of arrival to Michigan, on the English of these speakers. Regardless of the variation found due to this factor, there is nonetheless evidence of a stable and unique accent within this speech community that is independent from the local mainstream accent.

3.3 Age

This section presents first and second formant values for the four vowels /æ, ɛ, ɑ, ɔ/ as they are correlated with the social factors of age group and sex. Although results for men are mentioned below when they are significant, the emphasis is on women's results because young women do appear to be the leaders of change in this community, as in many others. A comparison of the normalized vowel means of the young Mexican American women with the normalized vowel means of several young Anglo women from the Detroit suburbs gives some indication of the degree to which this speech community has been affected by the NCS. When the F1 and F2 averages of the young Mexican American women match those of the young Detroit women, it is concluded that the young Mexican American women have assimilated to the Northern Cities Shift. When there is a mismatch, however, the possible effects of language and dialect contact on the members of the Mexican American speech community in Lansing are examined. Since the pronunciation of /æ/ is perhaps the most widespread and perceptually distinct marker of the shift, statistical results for this vowel are discussed first.

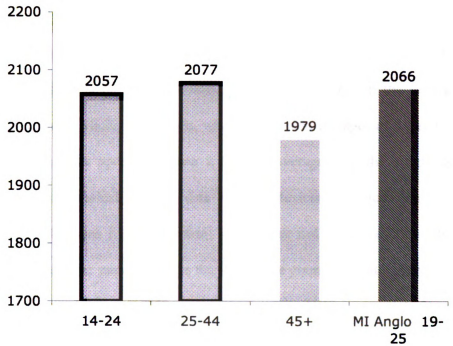
3.3.1 Results for /æ/

Only non-prenasal /æ/ tokens are used in the analysis presented in this chapter (see Appendix A). Previous studies have found that the pre-nasal environment is often correlated with extreme raising in the pronunciation of NCS /æ/ (Labov 1994, Thomas 2001). Degree of raising of pre-nasal /æ/ in Lansing's Mexican American speech community appears to be closely correlated with age, sex, and generation of residence, as discussed in Chapter 4 below. The pattern that emerges is consistent with the finding

reported by Thomas (2001) that, in general, /æ/ is not raised pre-nasally in the English of Mexican Americans in Texas. Since the social distribution of this feature in the Lansing respondents is complex, and phonological environment is not taken into consideration in the analysis of the normalized data, only non-prenasal /æ/ tokens were used in the statistical tests that produced the results presented in this chapter.

As outlined in Chapter 2, the fronting and raising of /æ/ is believed to be the oldest feature of the NCS (Labov, Yaeger and Steiner 1972, Labov 1994) and has also been found to be the first stage of the NCS in its geographical diffusion through Anglo communities (Ito 1999, Callary 1975). Tensing, which causes movement to the periphery of the vowel space and is referred to as *fronting*, is correlated with a higher F2 and is thought to be a prerequisite of raising in the NCS (Labov, Yaeger and Steiner 1972, Ito 1999). Fronting does not appear to precede raising among older Mexican American women in Lansing, however. Figure 3.2 shows the results — for female respondents only — of an ANOVA that tested the effect of age group and sex on the normalized F2 of /æ/.

Figure 3.2: Results for female respondents only of ANOVA analysis (N = 290)
Dependent variable = normalized F2 /æ/; Independent variable = Age group
Degrees of freedom = 2; F-ratio = 7.84; p = 0.0005



In Figure 3.2, and the charts to follow in this chapter, a black border around a bar indicates that there is a statistically significant difference between the value of that bar and the value of one or more of the non-bordered bars (excluding the bar for Anglo women), at a probability level of less than .05. For example, the two bordered bars representing average F2 for women under 45 in Figure 3.2 signify that both groups of women under 45 are significantly more fronted in their pronunciation of /æ/ than women 45 and over.

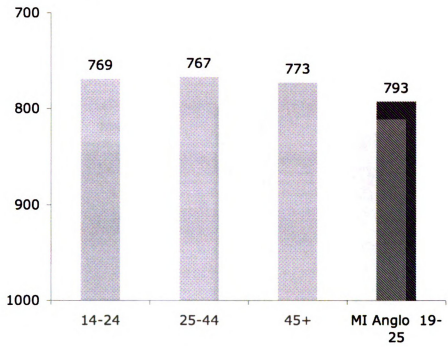
The ANOVA shows age group to be significant at a probability level of 0.0005, and a Tukey posthoc test reveals the source of the variation. The F2 average for the seven women in the 14 to 24 year old age group is 78 Hz higher than the F2 average for the three women 45 and over, a difference that is significant at a probability level of 0.0032.

The F2 average for the five women in the 25 to 44 year old age group is 98 Hz higher than the F2 average for women 45 and over, a difference that is significant at a probability level of 0.0004.

Figure 3.2 also shows that the average F2 of /æ/ in female respondents under 45 matches the young Detroit women. The dark grey bar on the far right represents the young Anglo Michigan women, who are between the ages of 19 and 25 and are clearly shifted in their speech (Figure 2.2). The averages for the Anglo women cannot be compared statistically to the data for the Mexican American women because data on individual tokens for each Detroit speaker are not available. Since the bars for women under 45 are the same height as the bar for the young Detroit women, however, it appears that accommodation to this characteristic of the NCS is complete in younger women in this community. ANOVA and Tukey results for men show no statistically significant variation between age groups for the F2 of /æ/.

Figure 3.3 presents a comparison of F1 averages for /æ/ by age group for female respondents.

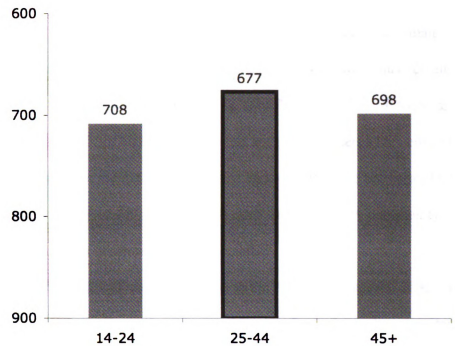
Figure 3.3: Results for female respondents only of ANOVA analysis (N = 290)
Dependent variable = normalized F1 /æ/; Independent variable = Age group
Degrees of freedom = 2; F-ratio = 0.0981; p = 0.9066



This time, neither ANOVA nor Tukey uncovered any variation between age groups in women. Average F1 is virtually identical across all three groups of Mexican American women and also matches that of the young Detroit women. Combined results for F1 and F2 in the speech of female respondents indicate, therefore, that the oldest female speakers have an /æ/ that is raised, but not fronted, to NCS levels. This means that raising of /æ/ precedes fronting in these speakers, a finding that is contrary to previous hypotheses and may be due to dialect contact, as discussed in the next section.

As shown in Figure 3.4, results are slightly different for the average F1 of /æ/ compared across age groups in men.

Figure 3.4: Results for male respondents only of ANOVA analysis (N = 319)
Dependent variable = normalized F1 /æ/; Independent variable = Age group
Degrees of freedom = 2; F-ratio = 04.9503; p = 0.0076



The ANOVA shows age group to be significant at a probability level of 0.0076. A Tukey posthoc test reveals that the two youngest and six oldest men pronounce this vowel at a similar height, while the nine men in the 25 to 44 year old age group have a significantly higher, or more NCS-like, pronunciation. The F1 average for men 14-24 is 31 Hz lower than the F1 average for men 25 to 44, a difference that is significant at a probability level of 0.0397. The F1 average for men 45 and over is 21 Hz lower than the F1 average for men 25 to 44, a difference that is significant at a probability level of 0.0000. That men in the middle age group have a slightly more raised—or NCS-like—pronunciation of /æ/ than older men is not surprising. The height of /æ/ as produced by the youngest men is puzzling, however, and invites further investigation. An ANOVA that compared both age group and sex showed no interaction between these variables, and a Tukey posthoc test

revealed no statistically significant differences between age group in men when the data for both men and women was combined. This suggests that the variation found in men when they are compared in isolation is not strong enough to be significant overall.

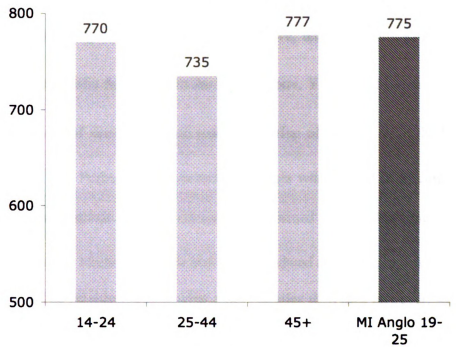
To summarize the results for /æ/, all age groups of female Mexican American respondents are at NCS levels for the height of this vowel. Only female respondents under 45 have accommodated to the F2, or front/back, position of NCS /æ/, however. Within men, no significant differences between age groups emerged for either F1 or F2 except the minor variation mentioned above. The lack of difference between older and younger men in the fronting of /æ/ suggests that men in this speech community are lagging behind women in their accommodation to the NCS.

The order of accommodation to the NCS in the speech of at least some members of this community appears to be different from the order expected if change were occurring by means of the cascade model of diffusion, a possibility acknowledged by Labov (2001). A possible explanation for this divergent pattern is discussed in the next section.

3.3.2: Results for /ɛ/

One reasonable explanation for why raising of /æ/ precedes fronting in some members of this group becomes more clear after an examination of the results for /ɛ/. Figure 3.5 shows the average height of /ɛ/ by age group for the female respondents.

Figure 3.5: Results for female respondents only of ANOVA analysis (N = 102)
Dependent variable = normalized F1 /ɛ/; Independent variable = Age group
Degrees of freedom = 2; F-ratio = 2.6802; p = 0.0735



The results for the F1 (height) of /ɛ/ are exactly the same as the results for the F1 of /æ/. There is no statistically significant difference between older and younger speakers — for either men (not shown) or women. Also, the mean F1 for the Mexican American women is nearly identical to the mean F1 for the young Anglo Michigan women. Since even the oldest group of female speakers has averages for the F1 of /æ/ and /ɛ/ that match the young Detroit women, and men show similar relative positions for both vowels with no statistically significant variation across age group, it can by hypothesized that accommodation to the local norm for the height of these vowels occurred early in the development of this speech community.

Accommodation to F2 norms is more recent, for /æ/ —appearing only in the speech of females under 45—and has not yet occurred for /ɛ/, as discussed below. This is unexpected given that, as mentioned above, tensing (fronting) of /æ/ was thought to be a prerequisite for raising in the NCS (Labov, Yaeger and Steiner 1972). The result of this pattern of accommodation was the overlap of /æ/ and /ɛ/ in the F1/F2 vowel space (Figure 3.1). Perhaps first generation speakers who arrived in Michigan before a strong Mexican American speech community had formed perceived /æ/ and /ɛ/ as very similar to each other in Michigan speech and accommodated according to this perception.

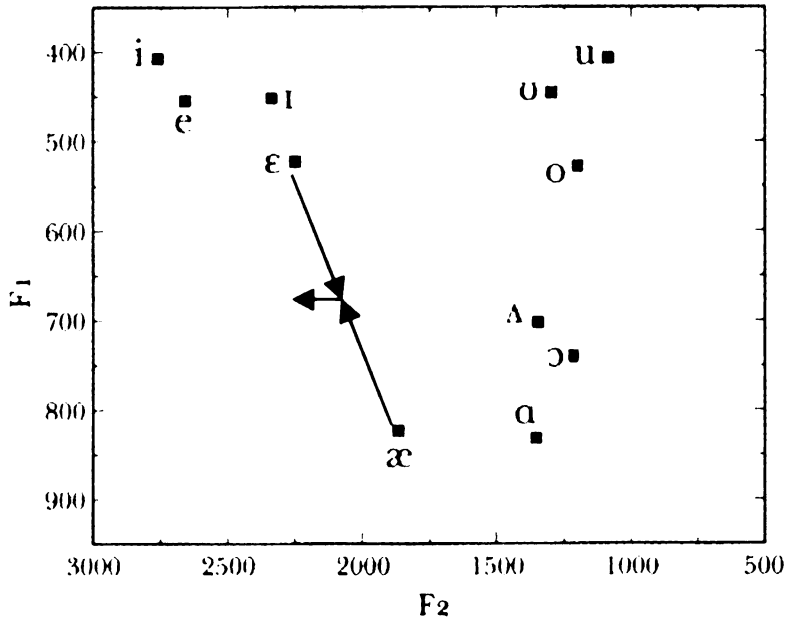
The situation is somewhat more complex than this, however, since the English of Mexican Americans in Texas is not homogenous (see section 2.5.3). Relevant here is the finding by Thomas (2001) that /æ/ was high relative to /ɑ/ in the speech of several of his respondents. Three of the thirteen speakers presented as representative of Mexican American English in Texas had a mean for /æ/ that was roughly 100 Hertz lower — indicating a "higher" vowel — than the mean for /ɑ/[24]. One was a man from Donna, Texas, born in 1946; the other two were females, one born in 1970 (from "Springville"[25]) and the other born in 1971 (from Laredo). Since Donna, Laredo and "Springville" are not located in the same area of Texas — although none of them are in the north or west —this characteristic appears to have been widespread, but variable, by the time the

[24] The vowel charts in Thomas (2001) indicate that, although /æ/ is raised in the English of some Mexican Americans in Texas, it is not raised to the degree found in the NCS.
[25] The quotation marks are from Thomas (2001), probably used to indicate that Springville is not the official name of the town, although this is not explained.

interviews were done in 1988 and 1989. For such speakers, only NCS /ɛ/ would sound dramatically different. Since the pronunciation of NCS /ɛ/ is much closer to [æ] than to [e] or [ɪ], it is likely to be pronounced as [æ] by speakers who are not native to the NCS dialect area but do have /æ/ as a phoneme.

In contrast, second generation respondents, who were born in Lansing and learned English as a native language there, were sensitive to the F2 distinction between /æ/ and /ɛ/ and reflect this in their pronunciation. Figure 2.5 is adapted below as Figure 3.6 to further illustrate this difference between the first and second generation.

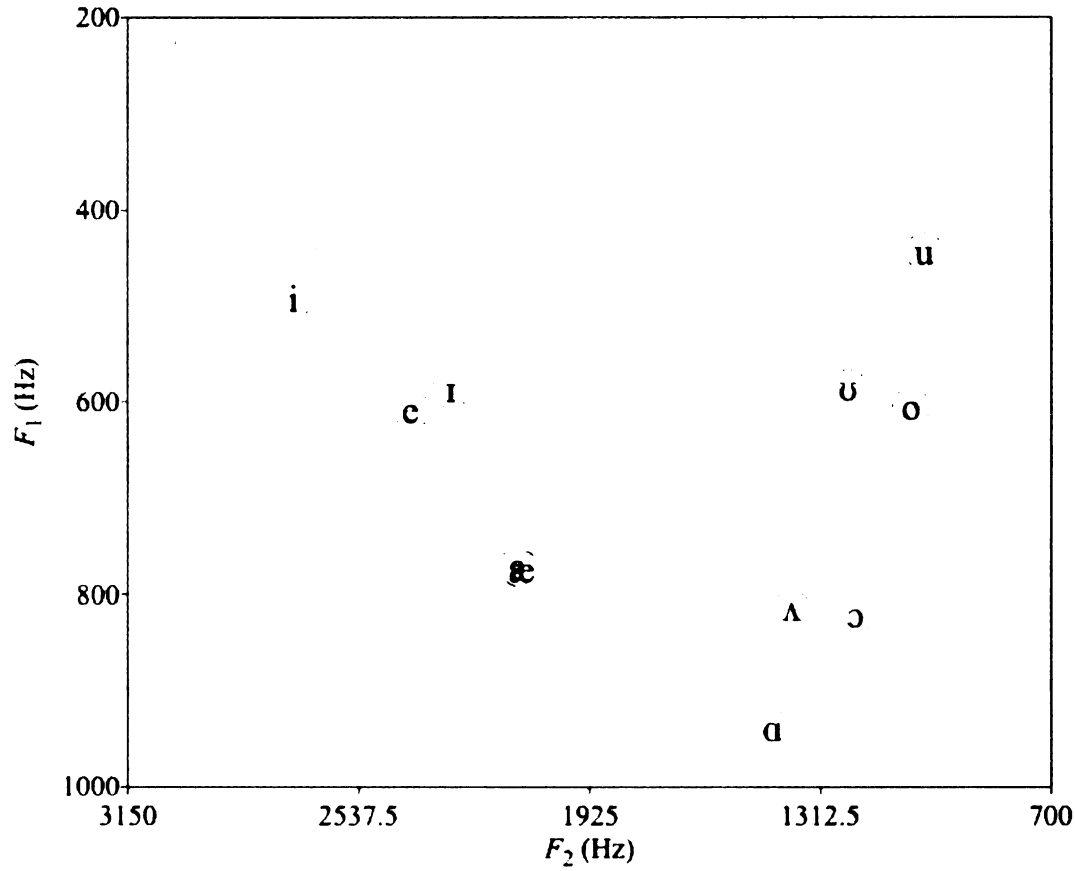
Figure 3.6: Vowel chart of a 31-year-old Mexican American woman from San Antonio, TX, interviewed in 1992 (modified from Thomas 2001: 189)



If we take the chart in Figure 3.6 to be representative of the speech of a Mexican American from south or east central Texas, the arrows indicate the changes in the pronunciations of /æ/ and /ɛ/ that would lead to the patterns now attested to in the Lansing respondents. The arrow pointing forward represents the difference in the pronunciation of /æ/ by speakers under 45 as compared to speakers over 45.

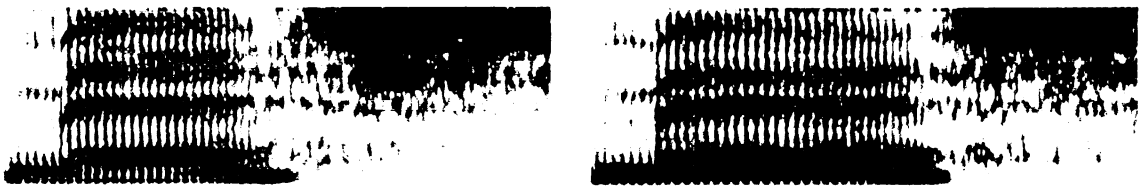
It is important to point out that identical F1/F2 measurements for two vowels does not necessarily mean that these vowels are merged in a speaker's system. For example, an older first generation speaker who arrived in Lansing, from Texas, after the age of 20 would have learned English in Texas and would, therefore, have made a clear distinction between /æ/ and /ɛ/. There is no reason for such a speaker to lose this distinction upon encountering a new dialect of English in Michigan. The vowel chart of just such a speaker appears in Figure 3.7.

Figure 3.7: Vowel chart for Simona, age 59, came to MI from TX at 24



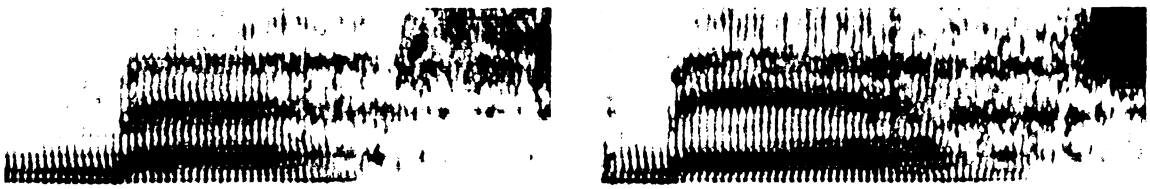
Simona's /æ/ and /ɛ/ overlap completely, so that the symbols are stacked in Figure 3.7. There is evidence from other acoustic cues that they are not merged in her phonology, however. Figures 3.8 and 3.9 shows spectrograms of Simona's pronunciation of the words *mash* and *mesh* and the same words pronounced by Lucy, a second generation teenager.

Figure 3.8: Spectrographic images of words spoken by Simona, age 59, first generation



"mesh" (F1=784, F2=2193) "mash" (F1=819, F2=2189)

Figure 3.9: Spectrographic images of words spoken by Lucy, age 14, second generation



"mesh" (F1=823, F2=2159) "mash" (F1=772, F2=2460)

All four of the images show 350 milliseconds of speech. In both speakers, there is a clear distinction in vowel duration between /æ/ and /ɛ/; in fact, /æ/ is consistently longer than /ɛ/, in general, across all speakers. This is true for respondents who had moved from Texas only recently, as well, indicating that duration also distinguishes the two vowels in the English of Mexican Americans in south Texas.

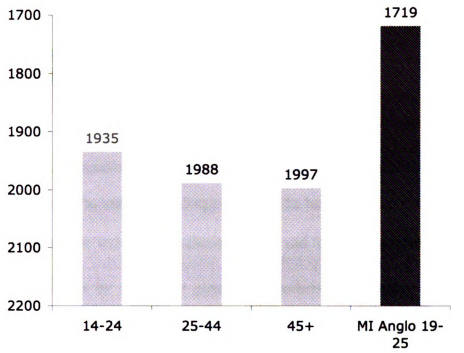
There are two features of Lucy's speech that are not present in Simona's pronunciations of *mesh* and *mash*, however. The first is that the F2 of /æ/ and /ɛ/ are quite different in Lucy's speech but nearly identical in Simona's. This is visually recognizable as the height of the second band in each spectrogram. Their similarity in Simona's speech accounts for the overlap of /æ/ and /ɛ/ in her vowel chart. Lucy's /æ/ in *mash*, on the

other hand, is considerably fronter than her /ɛ/ in *mesh*. This is consistent with the finding that younger speakers are fronting /æ/, but older ones are not.

The second difference between Lucy's speech and Simona's occurs at the end of the vowel. NCS /æ/ is characterized by a centralizing off-glide that ends in a schwa-like sound. This off-glide is clear and elongated in Lucy's speech, stretching her vowel out to nearly 25 milliseconds and resulting in a low amplitude second steady state that is almost devoiced, so that *mash* sounds like [mæəʃ]. Although more research is necessary in this area, preliminary results indicate that this off-glide is often absent in first generation speakers, who, like Simona, arrived in Michigan after the age of 20 but does appear in first generation speakers who arrived around the age of 10 or younger. This finding concurs with the Flege et al. (2003) finding that native Italian speakers in Canada who arrive in Canada before the age of 14 may achieve near-native speech production ability in English, especially if they do not speak Italian often. It may be that, although later arrivals maintain the natively learned distinction between /æ/ and /ɛ/ at the level of duration, they do not acquire new low-level phonetic cues, such as the F2 difference between /æ/ and /ɛ/ and the centralizing off-glide of /æ/.

The results for the F2 dimension of /ɛ/, presented in Figure 3.10 below, explain why the distance between /æ/ and /ɛ/ is so great in the young Detroit women but is not large in the Mexican American speakers, even though some have accommodated to the fronting aspect of /æ/.

Figure 3.10: Results for female respondents only of ANOVA analysis (N = 102)
Dependent variable = normalized F2 /ɛ/; Independent variable = Age group
Degrees of freedom = 2; F-ratio = 1.6486; p = 0.1975



Although backed /ɛ/ was not found in the 1965 Shuy, Wolfram, and Riley Detroit recordings, Eckert (1988, 1989) found that /ɛ/ was backed towards [ʌ] in the speech of working class Detroit teenagers, and Evans et al. (2000) found this feature again in the young, middle class suburban Detroiters they interviewed in 1995, who are being used as a control group here. As figure 3.10 shows, however, Mexican American women in Lansing have not acquired this feature.

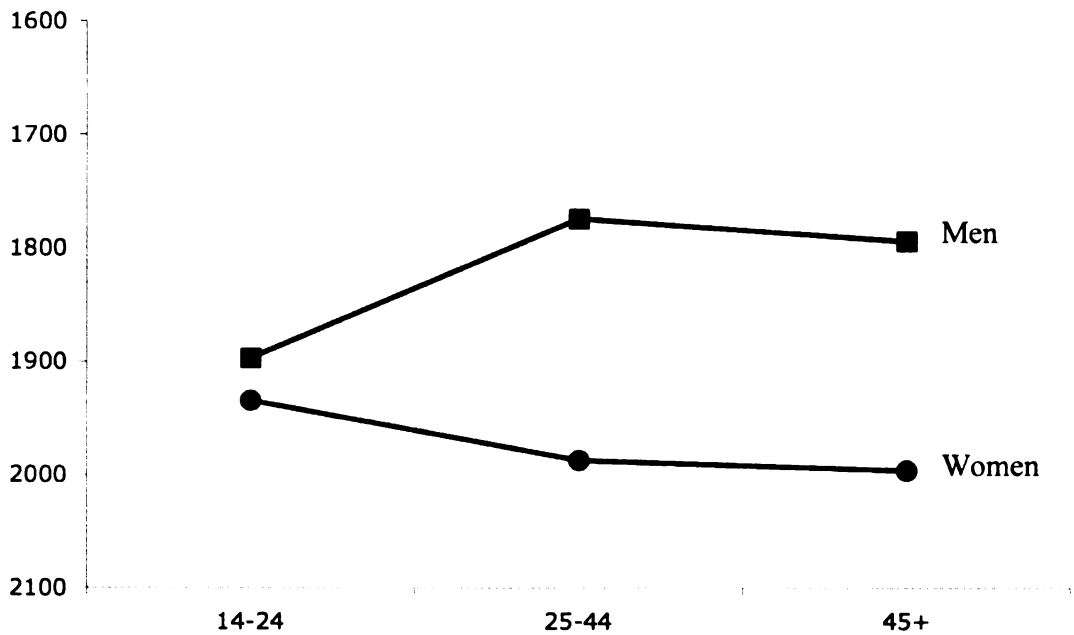
Labov (1994: 195) lists the backing of /ɛ/ as a "new and vigorous change," so it may not have spread yet to all NCS speakers or NCS areas. Lowering of /ɛ/ is also described by Labov as a "new and vigorous change," however and, as seen in Figure 3.5, the Mexican American female respondents have fully accommodated to this feature.

Since the Mexican American women are similar to the Detroit women in F1 of /ɛ/, as well as in the F1/F2 of /æ/, their dramatic lack of accommodation to the backed position of NCS /ɛ/ may be related to historical consequences of dialect contact instead of lack of exposure to NCS backed /ɛ/.

It has already been shown that /æ/ and /ɛ/ have overlapping formant values in older, first generation speakers, and that only female respondents under 45 have an /æ/ that is fronted to match local Anglo norms. The lack of accommodation to NCS backed /ɛ/ is consistent with the hypothesis that /æ/ and /ɛ/ were perceived as having the same formant values by older first generation speakers. Since many native NCS speakers pronounce /æ/ and /ɛ/ at the same height, the overlapping pronunciations of these two vowels in the Mexican American speakers matched NCS F1 norms, but not F2 norms. It is plausible that younger speakers are accommodating to the Anglo norms for the F2 of /æ/ but not for the F2 of /ɛ/ because fronted /æ/ is a more well established and common feature and so it is more frequently heard.

The line graph in Figure 3.11 provides an illustration of the results for both sexes.

Figure 3.11: Average F2 of /ɛ/ by age group and sex (N = 221)
Dependent variable = F2 /ɛ/; Independent variables = Age group, Sex
Degrees of freedom = 2; F-ratio = 5.97; p = 0.003



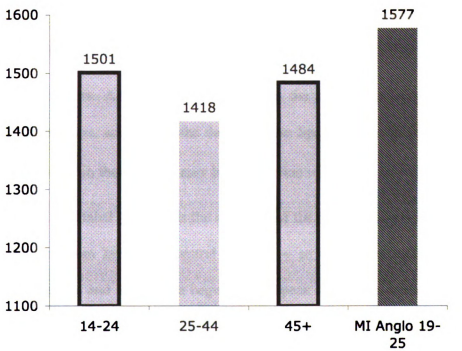
There is one apparent discrepancy in the data given in Figure 3.11. The ANOVA run on the F2 of /ɛ/ across the independent variables of age and sex shows an interaction between these two variables at a probability level of 0.003. However, a Tukey posthoc test reveals no statistically significant variation between age groups within sex. The interaction signficance in the variation between men and women clearly lies in the results for the 14 to 24 year old speakers. Young men have a high F2 relative to older men, indicating a fronter vowel, and a Tukey posthoc analysis shows the difference to be significant at a probability level of 0.0467. This result is unexpected because it suggests that men over 25 are more advanced NCS speakers than men under 25. However, the two male speakers under 25 have a combined total of only thirteen /ɛ/ tokens. Therefore, more

evidence is needed to verify whether this is, in fact, a robust tendency among young men in this speech community.

3.3.3 Results for /ɑ/

The story is different yet again with /ɑ/. Figure 3.12 shows the average F2 of /ɑ/ by age group for the female respondents.

Figure 3.12: Results for female respondents only of ANOVA analysis (N = 186)
Dependent variable = normalized F2 /ɑ/; Independent variables = Age group
Degrees of freedom = 2; F-ratio = 8.2624; p = 0.0004



The ANOVA analysis shows age group to be significant (p = 0.0004), and a Tukey posthoc analysis shows that women in the 25 to 44 age group have a significantly different F2 for /ɑ/ than either the younger (p = 0.0002) or the older women (p = 0.0296).

As illustrated in Figure 3.12, the women in this middle group are significantly less fronted — meaning less NCS-like — than either women under 25 or women 45 and over. The oldest and youngest groups of women are not significantly different from each other, however. These findings show an interesting situation in which teenage and young adult women are more similar to speakers from their grandmothers' generation than speakers from their mothers' generation in the production of /ɑ/. Furthermore, although a statistical comparison of the measurements for the Detroit women and the Lansing Mexican Americans is not possible because only averages are available for the Detroit women, it appears that even the young female respondents are somewhat behind the Detroit speakers in /ɑ/-fronting.

For each age group of women, their pronunciation of /ɑ/ may be the result of different factors. All three of the women in the oldest age group speak English as a second language, and two of the three still use Spanish on a daily basis; so, the fronted position of /ɑ/ in their speech may be a reflection of Spanish /a/, which is a central vowel (Figure 2.6). Mabel (age 45) is the only one of the three who was born in Michigan. Her parents are from Jalisco, in central Mexico — so she would not have been exposed to Texas English, and she reports beginning to speak English in primary school. Madeleine (age 47) came to Michigan from Reynosa Tamaulipas, Mexico, at the age of 12. Although this is a border town — near McAllen, Texas — Madeleine said that she did not begin learning English until she was 10 ½, only a couple of years before coming to Michigan. It is likely, therefore, that she acquired a Northern Cities shifted variety of English — influenced by Spanish but, like Mabel, not influenced by Texas speech.

Madeleine says that she still uses Spanish every day, both at home and at work. Simona H (age 59) is from Laredo, Texas, and did not move to Lansing until the age of 24. She also reports that she spoke mostly Spanish until she began primary school, and she still uses Spanish on a daily basis.

In his theory on phonological acquisition known as the Speech Learning Model, Flege emphasizes that all the phonemes in a bilingual's system exist in the same phonological space (Flege et al 2003: 469). Therefore, the likelihood of a new phoneme being created in the system of a speaker who is learning a second language is related to how close that new speech sound is perceptually to speech sounds that already exist in the speaker's system. The farther away a speech sound is from any other speech sound perceptually, the more likely a speaker is to create a new phoneme to accommodate that sound. Otherwise, the sound will be assimilated into an existing phoneme. This appears to be affected by both age of exposure to the L2 and continued use of the L1.

In a study done on Italian-English bilinguals living in Canada, Flege et al (2003: 487) found that both age of arrival in Canada and degree of continued use of Italian affected the participants' production of English vowels. The age range of the participants in the Flege et al study was 29 to 62, and it is not clear how many participants had begun speaking English prior to arrival in Canada. All but three of the ninety subjects had lived in Canada for at least 20 years. Participants who arrived in Canada from Italy between the ages of 2 and 13 were labeled as "early bilinguals", and those who arrived in Canada from Italy between the ages of 15 and 26 were labeled as "late bilinguals" (472). In addition, participants who reported using Italian between 1% and 13% of the time were

labeled "low-L1-use", and those who reported using Italian between 25% and 85% of the time were labeled "high-L1-use" bilinguals.

Results showed that age of arrival in Canada had the strongest impact on a speaker's production of English vowels. Native English speakers judged late bilinguals as significantly less accurate than early bilinguals in their production of ten of the eleven English vowels tested (Flege et al. 2003: 479). Degree of usage of Italian affected production in both early and late bilinguals, so that late bilinguals who used Italian frequently were rated as least accurate.

Demographically, the "early-high" group of speakers in the Flege et al. study — people who had arrived in Canada under the age of 14 and still used their heritage language frequently — most closely match the three speakers who are in the oldest female age group for the present study. Mabel and Simona H are native to English-speaking areas — a group not tested by the Flege et al. study, but both of them spoke Spanish as their first language and still use it on a daily basis. The third, Mabel, nicely fits the Flege et al. definition of an early bilingual. She uses Spanish at home, so she may also qualify for the "high-L1-use" group.

Early bilinguals, in general, performed much more accurately in the Flege et al. study than late bilinguals. However, "early-high" were slightly less accurate than "early-low" speakers in their production of English vowels. This result corresponds with the finding in the present study that the three oldest women do not appear to be fully assimilated to an NCS pronunciation of /ɑ/. Further explanation for a lack of accommodation to NCS norms in these speakers' averages comes from the fact that since Simona H (age 59) did not move to Michigan until the age of 24, she would have been

exposed to NCS speech only as an adult. If Flege's conclusions are applicable to second dialect acquisition, then she would not be expected to have accurate pronunciation of NCS vowels.

The influence of both a high level of Spanish use (in all three cases) and Texas English (in Simona's case) may explain why /ɑ/ has not reached a fully shifted position in these speakers.[26] Since Spanish /a/ is so close to NCS /ɑ/, Flege's Speech Learning Model would predict that NCS /ɑ/ would be assimilated by Spanish /a/, especially for the two speakers who were not born in Lansing. It is not possible to know for sure, however, since the Spanish of these speakers was not tested. The third speaker, Mabel, who was born in Lansing, may have acquired the same vowel for both Spanish and English.

Four of the five female respondents in the middle age group (ages 25 to 44) also reported learning Spanish as a first language.[27] However, of these four, all of them began speaking English by the time they were primary school age. Two were born in Lansing and have lived there all their lives; one is married to a Mexican American man who is a native of Michigan and does not speak Spanish fluently,[28] and one moved to Lansing at 10 and reports that English is also a native language for her. In addition, all five either moved to Michigan from Texas or have parents who are from Texas. These women, therefore, have been heavily exposed to both NCS speech and the English of Mexican Americans from

---

[26] There is some evidence of extreme lowering of /ɑ/ in advanced NCS speakers such as the young Anglo women from the Detroit suburbs. Very little research has been done on this aspect of the NCS, however, and it is unclear how widespread this feature is. But see Corrine McCarthy, Tracking the Northern Cities Shift in Chicago: A Look at Age and Gender. NWAV 34, New York University, October, 2005

[27] Ana (age 28) reports that she does not speak Spanish now and can only understand it.

[28] He is also a respondent in this study (pseudonym Ralph).

Texas — either by living in Texas or because their parents are natives of Texas — to a degree that the women in the first group have not (except possibly Simona).

This group's pronunciation of /ɑ/ may be influenced by the Spanish-influenced English of Mexican Americans in Texas (Figure 2.5), in which /ɑ/ is further back in the vowel space than in either Spanish (Figure 2.6) or NCS English (Figure 2.2). It is also possible that, in an attempt to resist the very salient Northern Cities Shifted fronted /ɑ/, this group kept their pronunciation of this vowel backed.

The youngest group of female respondents consists of seven women, ages 14 to 22, six of whom were born in Lansing. Only one, Lola, who is from Mexico City and moved to Lansing at the age of 10, reports speaking Spanish as her first language. Four of the seven report that they do not speak Spanish. This age and sex group is the most likely to accommodate to the Northern Cities Shift. If their production of /ɑ/ is not quite as fronted as the /ɑ/ of the young Anglo Detroit women, it may be because of the influence of the alternative norms for the pronunciation of this vowel that have already been established in Lansing's Mexican American speech community.

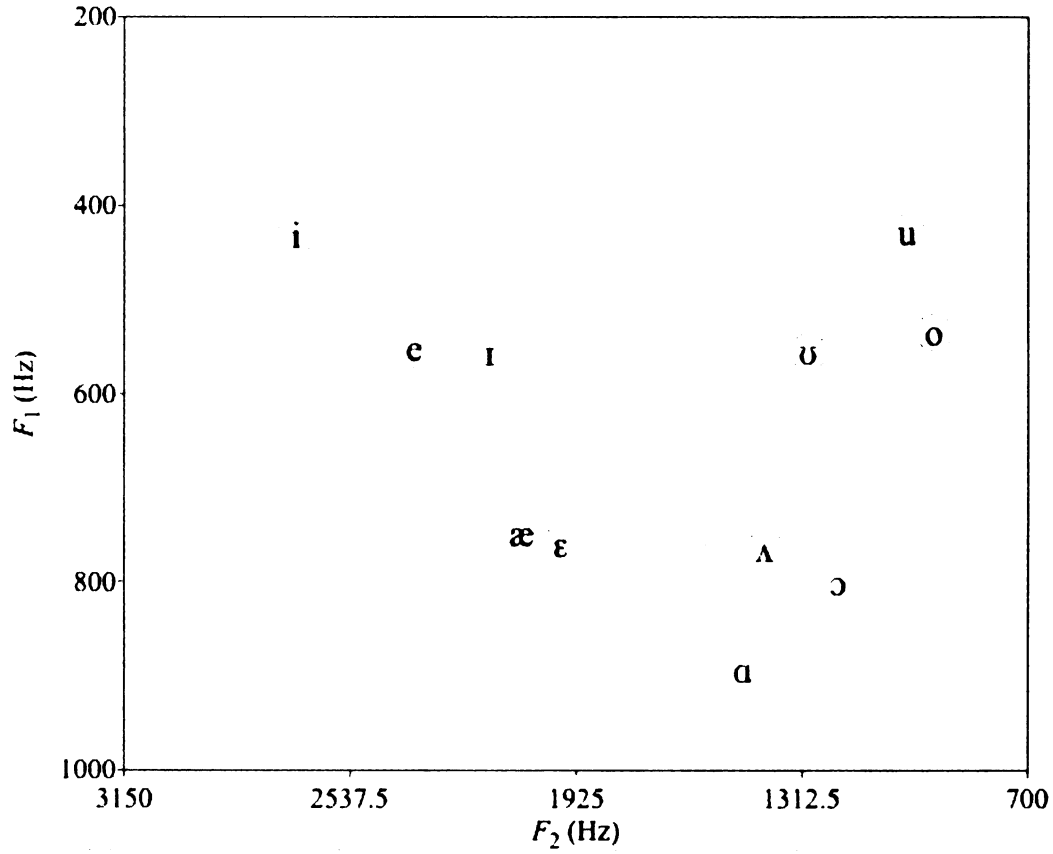
3.3.4 Results for /ɔ/

In research on the NCS, the parameters for shifted /ɔ/ are not well defined. It is described by Labov as a change that is neither new nor near completion, but "midrange", with the direction of change "centralization and fronting" (1994: 195). Gordon (2001) comments that previous research on NCS /ɔ/ has characterized it as "lowered, fronted, and

unrounded to approach [ɑ]" (2001: 16). There are several detailed impressionistic studies on NCS influence that include /ɔ/ (Knack 1991, Gordon 2001), and several instrumentally-based studies that include information on /ɔ/, as well (Labov, Yaeger and Steiner 1972, Eckert 1988). The point at which /ɔ/ can be considered shifted is not made clear, however. As with the other NCS vowels, the strongest indication of shiftedness is its position relative to other vowels within an individual speaker's system. The closer it is to the bottom and middle of the vowel space, the more shifted it is considered to be.

This abstract framework is, nevertheless, useful as a starting point for a discussion of /ɔ/ in the speech of Mexican Americans in Lansing. Figure 3.1 is adapted as Figure 3.13, with the addition of larger faint circles around the means that represent one standard deviation. It shows the normalized vowel space for the fifteen female Mexican American respondents.

Figure 3.13: Normalized means for female Mexican American respondents. (N=158)



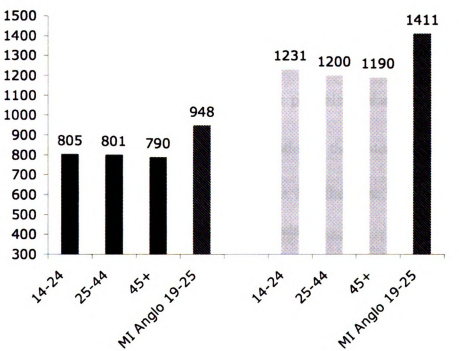
Variability can occur both between speakers and within individual speakers, based on phonetic environment, and vowels in transition—such as /æ, ɛ, ɑ/—tend to have large standard deviations[29]. The fact that the position of /ɔ/ varies only minimally across 158 tokens and fifteen speakers indicates that this is not a vowel in transition. Formant values for /ɔ/ in this speech community — in both men and women — are more stable than for any other vowel, and no significant variation appears between age groups within sex. As

[29] The large standard deviation for [ʊ] is caused by the effect of phonetic environment, which had a strong influence due to the small number of wordlist words that included this vowel.

illustrated in Figure 3.14, however, the means for /ɔ/ in female Mexican American respondents differ considerably from the mean for /ɔ/ in the young Detroit women, indicating that this vowel is not Northern Cities shifted, either.

Figure 3.14: Results for female respondents only of ANOVA analysis (N = 155)
Dependent variable = F1 /ɔ/; Independent variables = Age group
Degrees of freedom = 2; F-ratio = 0.7978; p = 0.4522

Dependent variable = F2 /ɔ/; Independent variables = Age group
Degrees of freedom = 2; F-ratio = 2.3610; p = 0.0978

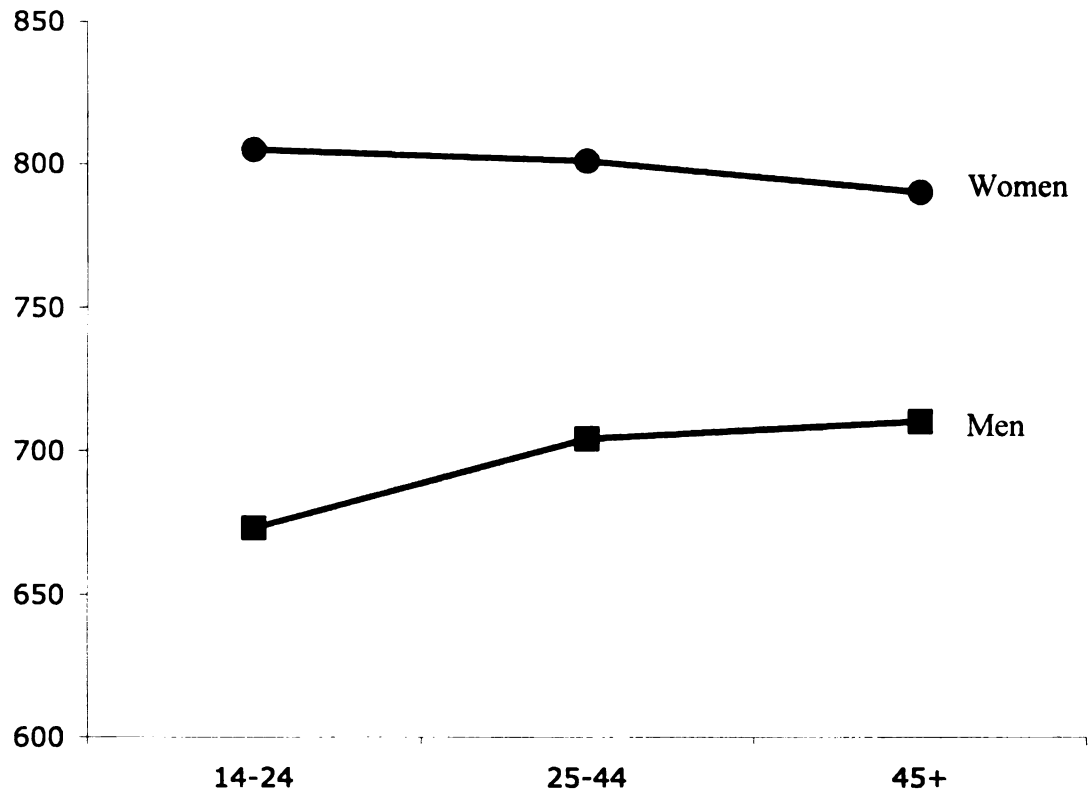


The differences between the Lansing Mexican American women and the Detroit Anglo women in F1/F2 means for this vowel are larger than for any other vowel—133 Hz to 158 Hz for F1 and 180Hz to 221Hz for F2. Unlike the vowels /æ/ and /ɛ/, which are

distinguished by both duration and off-glide in the NCS, /ɑ/ and /ɔ/ run the risk of merger if they get too close perceptually. In order for /ɔ/ to "centralize and front" as characterized by Labov, room must be cleared for it to do so, but, as shown above /ɑ/ has not fronted as far as is typical in NCS speech (Figure 3.12), so it is possible that /ɔ/ is resisting movement due to the position of /ɑ/. The position of /ɔ/ indicates strong northern influence, since the /ɑ/~/ɔ/ merger has been found to be widespread in the speech of both Anglos and Mexican Americans in Texas (Thomas 2001). It may be that the Lansing Mexican American speech community was established by speakers who came north before the low back merger was widespread in Texas, but also before /ɔ/ had lowered and fronted dramatically in NCS speech. Another possible explanation is that /ʌ/ is in the way. /ʌ/ is also in a dramatically different position in the system of the study participants than in the system of the young Detroit women. In either case, the back vowels appear to be less affected by the NCS than the front vowels.

The ANOVA results show that there is an interaction between the independent variables of age group and sex for the F1 of /ɔ/. Figure 3.15 is a line graph showing the F1 of /ɔ/, by age group and sex.

Figure 3.15: Average F1 of /ɔ/ by age group and sex (N = 335)
Dependent variable = F1 /ɔ/; Independent variables = Age group, Sex
Degrees of freedom = 2; F-ratio = 4.02; p = 0.0189



Tukey posthoc analysis does not show that any of the differences between age groups, within sex, are statistically significant, however, indicating that the difference between the men's and women's patterns for this vowel is not robust enough to draw useful conclusions. The smaller number of men under 25 in the study may have caused this apparent interaction.

3.4 Summary

The general pattern found in the NCS vowels among respondents for this study is surprisingly constant across age groups, but only partially influenced by the NCS. The only significant variation based on age group to emerge is that Mexican American women under 45 in Lansing appear to have fully accommodated to the relative F1 and F2 norms of NCS /æ/, while women over 45 have accommodated only to F1. Results for men show no variation across age groups. In Mexican American women under 45, the position of /æ/ is both fronted and raised to a degree that is comparable to its position in the speech of young women from the Detroit suburbs, who are members of the demographic group that is leading the change. Preliminary results also indicate that respondents who are native to Lansing have acquired the centralizing off-glide that is characteristic of NCS /æ/.

So far, these results are consistent with the conclusion that members of the Mexican American speech community in Lansing are following the order of accommodation to the NCS that has been observed previously in Anglo speech communities (Ito 1999, Evans 2001). Similarities to the findings of previous studies on the NCS end here, however. Evidence suggests that the order of accommodation to the NCS among Mexican Americans in Lansing does not match the order of NCS changes suggested by Labov (1994: 195). For example, female respondents over 45 appear to have a position for /æ/ that is raised but not fronted, a result that contradicts the proposal by Labov, Yaeger and Steiner (1972) that /æ/-fronting precedes /æ/-raising in the NCS. Labov (1994: 429) comments that "In the Northern Cities Shift, all short *a* (=/æ/) words are tensed and raised." Therefore, the lack of fronting (equated with tensing) in the

speech of these women indicates that they are not Northern Cities Shifted, at least according to Labov's criteria.

Regarding accommodation to other vowels, /ɑ/, which is listed by Labov (1994: 195) as the second vowel to shift, is not yet fronted to NCS levels (although a statistical comparison of F2 values for Mexican American women and the Detroit Anglo women is not available to verify this impression). The vowel /ɔ/, which is listed by Labov (1994:195) as the third vowel to be affected by the shift, is dramatically different in pronunciation between Mexican American respondents and the young Detroit women.

A lack of accommodation to NCS /ɔ/ would not be irregular if /ɛ/ were also unshifted in these speakers. But /ɛ/, which is typically thought to be shifted only in speakers who also show the first three stages, is lowered to NCS levels in these speakers, so that F1 is similar between the Mexican American women and the young Detroit women. The F2 of /ɛ/ does not match local Anglo norms, however, such that /ɛ/ is much further back in the vowel space of the Detroit women than in the vowel space of the Mexican American women.

The result is that, in the speech of most of the Mexican American respondents, /æ/ and /ɛ/ are very close, overlapping almost completely in about half of the respondents — especially the older, first generation speakers—although a distinction in duration is still maintained by all speakers. It is likely that these two vowels were perceived as similar, and consequently produced similarly, by speakers not native to an NCS region. The

cultural and linguistic past of Lansing's Mexican American community has given rise to the creation of a dialect that is both local and unique.

Vowels in transition often show great variability based on phonetic environment. In addition, different dialects may exploit and exaggerate different conditioning factors, leading to variation across dialects. One distinctive feature of the NCS, for example, is an extremely high /æ/ before nasals. Chapter 4 examines the pronunciation of /æ/ in various phonetic environments among respondents who are native speakers of English, in order to gain further insight into the extent to which the NCS is infiltrating the speech of members of this community.

CHAPTER 4: Influence of Phonetic Environment on the Production of /æ/

Based on the results of Chapter 3, it appears that Mexican American women under 45 in Lansing have accommodated fully to an NCS pronunciation of the vowel /æ/. Analysis of the coarticulatory effects of adjacent segments provides a more complex picture, however.

4.1 Previous Research

Laboratory studies on the conditioning effects of phonetic environment on vowel formant frequencies in English have generally paid little attention to dialect variation. In an early study, Stevens and House (1963) measured formant frequency values for three men pronouncing the eight vowels /i, ɪ, ɛ, æ, ɑ, ʌ, ʊ, u/ in the following three environments: 1) in isolation, 2) in /hVd/ syllables, and 3) in stressed, symmetrical CVC syllables, preceded by unstressed /hə/ (e.g., /həbVb/, /hədVd/, etc.) with the 14 consonants /p, t, k, b, d, g, f, v, s, z, θ, ð, ʧ, ʤ/. Surprisingly, no significant F1 or F2 differences were found between the first two environments — vowels in isolation and in /hVd/ syllables; therefore, these two sets of tokens were combined into a category that was somewhat confusingly labeled the *null* context (Stevens and House 1963: 116), for purposes of comparison to other environments. Reflecting the contemporary perspective of the field, no additional demographic information was offered on the three informants.

The over-arching result of the Stevens and House study is that consonantal environment (excluding the /hVd/ environment) causes vowel centralization, or *undershoot*. A number of more specific systematic effects, some of which are discussed

further below, were also found to correlate with manner, voicing, and place of articulation features of the adjacent consonants.

Hillenbrand, Clark and Nearey (2001) expanded on Stevens and House (1963) in several ways. They interviewed six men and six women, all but one of whom were from the same general Northern Cities Shifted dialect area. In order to maintain comparability with the earlier study, they chose the same eight vowels, and used a subset of the consonants (initial /h, b, d, g, p, t, k/ and final /b, d, g, p, t, k/). The vowels were recorded in isolation, and in CVC syllables read from a wordlist. The main difference in procedure from Stevens and House was that every combination of initial and final consonantal context was tested for each vowel, instead of being limited to symmetrical syllables. Therefore, although this study eliminated the variable of manner by using only stop consonants, the researchers were able to comment on differences in effect between initial and final consonants. Overall, conditioning environment had minimal effect on vowel pronunciation in the Hillenbrand et al. study, but this may be because natural speech was not elicited due to the extremely controlled nature of the experiment. The effects they did see largely agreed with Stevens and House, with the additional finding that preceding consonants showed larger effects, in general, than following consonants, especially for F2[30]. With regard to social factors, Hillenbrand et al. found the same effects in both men's and women's speech.

[30] This study also included a perceptual experiment, which found unexpected results when production and perception were compared. The tokens that were most often confused in the perceptual experiment were not those that were most acoustically displaced due to phonetic conditioning. The authors offer an explanation based on relative distance of the token from a prototype.

Although the vowel patterns found in these two studies suggest different dialects, the similarity of results suggests universal tendencies in the coarticulation of specific consonants and adjacent vowels, and the issue of whether coarticulatory effects may differ across dialects is not addressed. Throughout his work, Stevens gives evidence that the majority of coarticulatory effects found in speech production are not speaker-controlled but are instead due to "inherent dynamic properties of the articulatory structures and of the neuromuscular system that controls them" (Stevens and House 1963: 122). Stevens and House do state, however, that phonetic cues can be manipulated by speakers for the purpose of perceptual contrast and give the example of vowel lengthening in English before voiced consonants (122). More research is needed in this area, and the current analysis is intended to contribute to this discussion by providing information from an ethnic minority dialect with a diverse linguistic past.

The present analysis is concerned with the same general Northern Cities Shifted dialect area investigated by Hillenbrand et al. (2001) but takes a more sociolinguistic approach. For example, in the Hillenbrand et al. study, speakers who were familiar with linguistics were asked to read phonetic transcriptions that were blocked by vowel (not scattered) from a word list.[31] In the current study, however, naïve speakers were asked to read actual words, written in regular orthography and presented one-by-one on a computer screen, to avoid the intonational effects that often accompany reading a list.

Several other sociolinguistic studies on the effects of phonetic environment on vowel production have been done in this dialect region. Ito (1999) analyzed Anglo

[31] Stevens and House (1963) do not indicate whether or not the three male speakers recorded were linguistically trained or not. The speakers were asked to read words in the form of "bisyllabic nonsense utterances in iambic form" (112), but it is not clear if they were presented as phonetic transcription or using regular orthography.

speakers in rural Lower Michigan; Evans (2001) analyzed speakers in Ypsilanti, near Detroit, who were originally from Appalachia; and Jones (2003) analyzed African Americans in Lansing. The methodology used in these studies is very similar to the methodology used in the current study, enabling a comparison of results. Labov (1994: 100) discusses the fronting and raising of /æ/ together as "advancement" into the NCS. He provides ordered lists of environments that promote this advancement, based on the results of a few major studies, including his own, in several Northern Cities Shifted areas, including Detroit. The two environments on which he comments are following manner of articulation[32] and point of articulation (not specified as preceding or following)[33]. The combined results of these studies are discussed below in section 4.3.

4.2 The Study

Of the 32 speakers discussed in Chapter 3, half are both native speakers of English and lifetime residents of Lower Michigan. This half was chosen for further analysis of the influence of conditioning phonetic environment on the pronunciation of /æ/. The sixteen participants consisted of ten men, ages 14 to 71, and six women, ages 14 to 23. All but two are second or third generation residents of Lansing. Of the remaining two, one is a 35-year-old man who has only lived in Lansing for 10 years, but has lived in south central Michigan his entire life. The other is a 71-year-old man who came to Lansing at the age of 3.

---

[32] "The relative degree of advancement is influenced by the manner of articulation of the following segment, in the order nasals > voiceless fricatives > voiced stops > voiced fricatives > voiceless stops," (Labov 1994: 100).

[33] "Point of articulation follows the ordering palatal > apical > labial, velar," (Labov 1994: 100).

In the most advanced NCS speakers, /æ/ is pronounced further front and higher in the vowel space than /ɛ/, ultimately being realized as a high front vowel in some speakers. As discussed in Chapter 3, this pattern is different than what has been found in the English of Mexican Americans in south Texas by Thomas (2001) and in Lansing in the present study. As one indicator of the degree to which a speaker had accommodated to the NCS, therefore, the relative positions of the mean unnormalized F1 and F2 values for /æ/ and /ɛ/ were calculated for each individual separately and are listed in Table 4.1.

Table 4.1: Relative positions of /ae/ and /ɛ/ in native speakers of MI English

Pseudonym	*F1(norm) of /æ/ (in Hertz)*	*/æ/ relative to /ɛ/ (based on F1/F2 means)*	*Sex*	*Age*	*College Degree*	*SES*
Judith	765	fronted and raised /æ/	F	21	No	W
Jose	696	fronted and raised /æ/	M	35	Yes	M
Lucy	729	fronted /æ/	F	14	N/A[34]	M
Estela	703	fronted /æ/	F	17	N/A	W
Emelia	694	fronted /æ/	F	20	No	W
Solana	731	fronted /æ/	F	22	Yes	M
Ralph	662	fronted /æ/	M	41	No	M
Edmund	680	fronted /æ/	M	45	Yes	M
Andy	722	/æ/ = /ɛ/	M	14	N/A	W
Rodolfo	702	/æ/ = /ɛ/	M	27	No	W
Melito	677	/æ/ = /ɛ/	M	29	No	W
Martin	684	/æ/ = /ɛ/	M	48	No	M
Walter	743	backed /æ/	M	71	No	W
Melinda	798	/æ/ below /ɛ/	F	16	N/A	M
RonaldB	657	/æ/ below /ɛ/	M	16	N/A	M
Jesse	668	/æ/ below /ɛ/	M	28	No	W

The second column of Table 4.1 lists normalized F1 means for /æ/ and shows that only two speakers have a normalized F1 above 750 Hz. 700 Hz (normalized) is considered Northern Cities Shifted by Labov, Ash and Boberg (2005), so most of these speakers are shifted or close to shifted in their pronunciations of /æ/, which agrees with the results

[34] N/A indicates that the speaker was too young to be in college at the time of the interview.

presented in Chapter 3. Examination of the position of /æ/ allophones relative to /ɛ/ allophones further distinguishes the respondents.

The third column in Table 4.1 gives the position of the average for tokens of /æ/ relative to the position of the average for tokens of /ɛ/ in the vowel space, based on T-tests done in Plotnik. For example, Lucy has a mean F2 for /æ/ that is different from her mean F2 for /ɛ/ at a probability level of $\leq .05$, such that /æ/ is significantly further front in the vowel space than /ɛ/. But her F1 means for the two vowels are not significantly different. The difference in means for /æ/ and /ɛ/ is significant in both F1 and F2 for only two speakers, Judith and Jose, who are at the top of the list. In these speakers, /æ/ is fronted and raised in relation to /ɛ/, which is typical of an advanced NCS system and suggests that Judith and Jose are more advanced into the NCS than any of the other speakers.

The next six speakers have an /æ/ that is fronted in relation to /ɛ/ but is not raised above /ɛ/. This is not surprising given that many Anglo NCS speakers, including the young Detroit women discussed in Chapters 2 and 3, do not raise /æ/ above /ɛ/ either. The F1/F2 means for /æ/ and /ɛ/ in the next four speakers on the list are not significantly different between vowels. Overlapping means are common in the speech of people who exhibit only incipient or conservative accommodation to the NCS, as may be the case with these speakers. Finally, the last four respondents listed in Table 4.1 have non-NCS vowel configurations, in which /æ/ is backer or lower than /ɛ/.

In the following analysis of environment, the top eight speakers in Table 4.1, who appear to be more affected by local norms than the others, are grouped together and referred to as Group A. Both gender and level of education have been strongly correlated with accommodation to local standards in previous studies, and it is notable that, out of these sixteen participants, the three who have college degrees and all but one of the young women are included in Group A. Ralph, the only Group A respondent who is neither a woman nor a college graduate, is a monolingual speaker of English who works in sales at an upscale department store and presumably must conform to accepted norms to fulfill the requirements of his occupation.

The next section presents an analysis of how /æ/ patterns allophonically and the extent to which it seems to follow the same rules of conditioning environments that have been found previously. If some environments promote the shift more than others, this should be observable in terms of relative variation among tokens across individuals. If phonological environment has no relationship to the shift, then there should be no difference in environmental effects in people who are strongly influenced by the shift, as compared to people whose speech is not strongly influenced.

4.3 Phonetic conditioning of /æ/ production

Table 4.2 presents an ordered list that ranks the effectiveness of conditioning environment on the pronunciation of /æ/, based on a comparison of Labov's (1994) results to those of the three Lower Michigan studies mentioned above.

Table 4.2: Ranked list of the influence of consonantal environment on the production of /æ/, based on the combined findings of Labov (1994), Ito (1999), Evans (2001) and Jones (2003)

Preceding Consonant	/æ/	*Following Consonant*
VELAR		NASAL
APICAL		VOICED STOP VOICED FRICATIVE VOICELESS FRICATIVE
LABIAL		VOICELESS STOP
LIQUID		

Although the four studies did not find identical rankings, they are in agreement with respect to the first and last feature in each environment. The leftmost column in Table 4.2 provides an ordered list of preceding consonant features, beginning at the top with the factor that most promotes the fronting and raising of /æ/ (velar consonants), and ending at the bottom with the least promoting factor (liquids). Following the methodology used in Plotnik, these studies did not test every preceding manner and place environment separately, but rather tested for only those environments that had been shown previously to have the strongest conditioning influence.

The rightmost column gives a similarly ordered list of following consonant manner features. Although Labov (1994) does include a ranked ordering for following place of articulation, this factor had little effect on /æ/ in any of the Michigan studies.

Table 4.2 indicates, for example, that /æ/ in a word such as *gamble*, which begins with a velar consonant and ends with a nasal, should be more raised and fronted than /æ/ in any other environment.

Eight ANOVA's were run for each individual. The dependent variables were F1 and F2, analyzed for the following environmental factors: preceding manner and voice, preceding place of articulation, following manner and voice, and following place of articulation. Unlike the previous studies, manner and voice were separated from place of articulation for preceding environment, so that every possible combination of features could be tested. In accordance with the findings of previous studies, the influence of following place of articulation was minimal. No significant difference between the effects of any two following place of articulation features was found in more than two speakers, so those results are not presented here. In addition, only results for other environments that are significant in at least four speakers will be discussed below. The discussion notes, in particular, the number of Group A speakers for whom these categories are significant, since that may shed light on the relevance of each feature to the NCS.

4.3.1 Following Manner and Voice

Five following manner and voice environments were tested: voiced and voiceless stops, voiced and voiceless fricatives, and nasals. Table 4.3 lists words used by environment[35].

Table 4.3: Following Manner and Voice Features and Words

Manner/Voice	**Words**
Voiced Stop	tab, cabin, dad, Saginaw, brag, rag
Voiceless Stop	apple, nap, zap, pat, mattress, rack, black
Voiced Fricative	have, has, jazz
Voiceless Fricative	Bath, laugh, ask, past, cash, mash
Nasal	Sam, Lansing, plant

Excluded (singleton): pal (liquid); badge (affricate); gamble, gang, thank, banker (velar)

The only feature that is significant in at least two speakers is following nasal manner, but the effects on F1 in this environment are dramatic. Table 4.4 indicates the effects of following nasal environment on the production of /æ/ for each individual.

[35] Although the words *gamble, gang, thank* and *banker* contain /æ/ in a pre-nasal environment, they were removed from the analysis because of the strong raising effects of velar consonants, which would have skewed results.

Table 4.4: Results for Raising of /æ/ Before Nasal Consonants
X = statistical significance ≤ .05 level of probability between pre-nasal /æ/ and /æ/ in all other environments

Name	*Age*	*Overall F1/F2 means (/ae/ relative to /ɛ/)*	*Pre-nasal /ae/, raised (F1)*	*Pre-nasal /ae/, fronted (F2)*
Judith	21	fronted and raised /ae/	X	
Jose	35	fronted and raised /ae/		
LucyB	14	fronted /ae/	X	
Estela	17	fronted /ae/	X	X
Emelia	20	fronted /ae/	X	
Solana	22	fronted /ae/	X	X
Ralph	41	fronted /ae/		X
Edmund	45	fronted /ae/		
Andy	14	/ae/ = /ɛ/		X
Rodolfo	27	/ae/ = /ɛ/		
Melito	29	/ae/ = /ɛ/		
Martin	48	/ae/ = /ɛ/		
Walter	71	backed /ae/		
Melinda	16	/ae/ below /ɛ/	X	
RonaldB	16	/ae/ below /ɛ/		
Jesse	28	/ae/ below /ɛ/		

T-test results show that all six young women, but none of the men, raise /æ/ in front of nasals to a degree that is statistically significant at or below the .05 level of probability. In addition, the only two speakers whose pre-nasal /æ/ is both fronted and raised are young women who also have an overall mean for /æ/ that is fronted, indicating NCS

accommodation. There are two other people (out of the 32 participants total) who show statistically significant fronting and raising of /æ/ before nasals. Both are women under 40 who, although they are speakers of English as a second language, learned English in Lansing and have lived in Lansing for most or all of their lives. The fact that statistical significance is achieved for these speakers based on only three words per speaker in which /æ/ appears before a nasal — *Sam, Lansing, plant* — underscores how dramatically different pre-nasal /æ/ is from /æ/ in other environments.

Figure 4.1: Vowel chart for Solana, 22, third generation. Pre-nasal /æ/ = $æ^N$

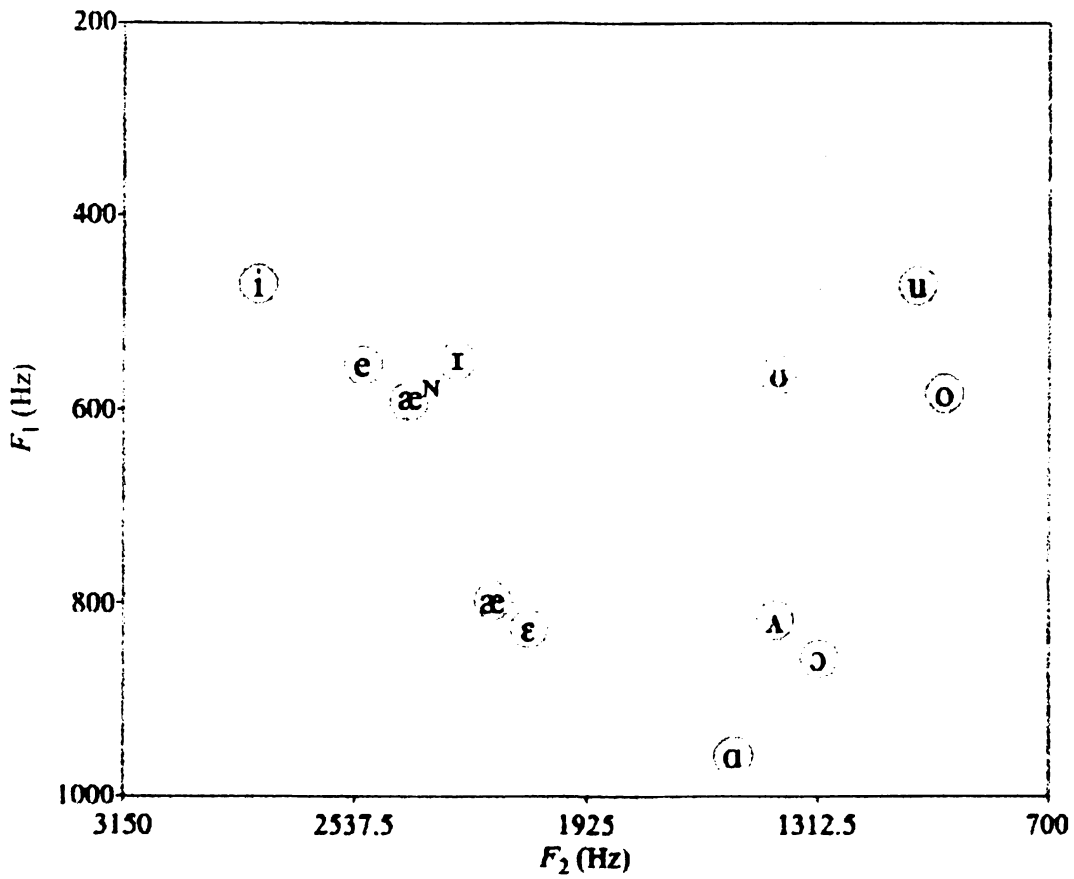
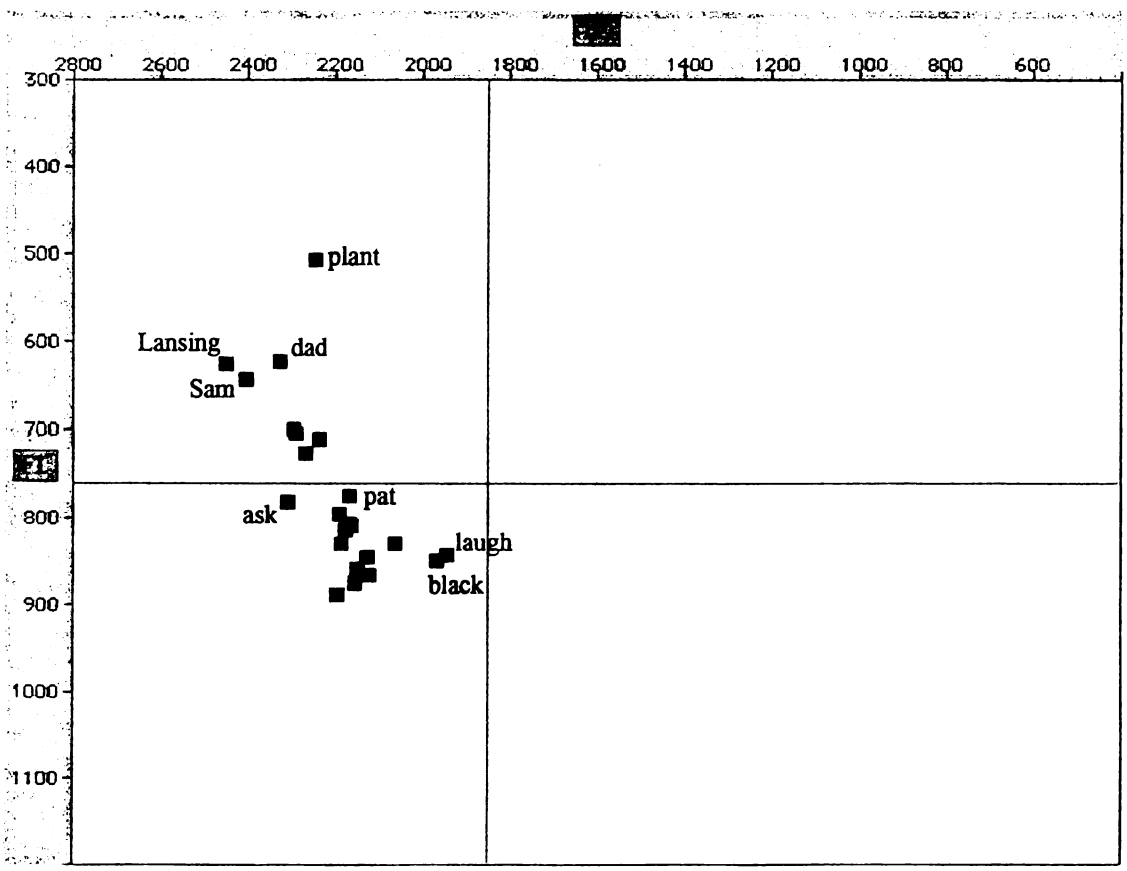


Figure 4.1 is the vowel chart of Solana, one of the two young women whose pre-nasal /æ/ is both fronted and raised above non-pre-nasal /æ/. Solana's mean for /æ/ before nasals is very high in her vowel space, near both [e] and [ɪ]. Figure 4.2 shows individual tokens of /æ/ in Solana's speech, as graphed in the software Plotnik.

Figure 4.2: Plotnik chart of /æ/ tokens for Solana, age 22, third generation



Except for the word *dad*, which contains /æ/ between voiced alveolar stops — an environment that may cause fronting and raising because the constriction involved in the

articulation of /d/ causes a lowered F1 and a raised F2 — Solana's pre-nasal tokens of /æ/ are the highest /æ/ tokens in her vowel system.

A dramatically raised position for tautosyllabic pre-nasal /æ/ is common in NCS speech (Labov 1994: 266). To explain this, Labov and others have posited that raising of /æ/ before nasals is a default feature in American English that is simply exploited to a more extreme degree in the Northern Cities Shift. However, Thomas (2001) found that some of the Mexican American speakers of English he interviewed in Texas did not have an /æ/ that was raised at all before nasals,[36] suggesting that there are dialects of American English in which pre-nasal raising of /æ/ is not a diagnostic feature. More importantly for the present study, none of the Texas Mexican American speakers whose vowels charts are shown in his 2001 book have a dramatically raised pre-nasal /æ/. Therefore, the presence of a high position for pre-nasal /æ/ in all six women under 25 in the present study indicates strong NCS influence. In the Mexican American speech community in Lansing, raising of /æ/ before nasals may be as indicative of NCS influence as any overall change in vowel means. Furthermore, if young women are the leaders of change in this speech community as in many others, this finding also indicates that the Mexican American speech community in Lansing is headed towards full accommodation to NCS patterns in the production of /æ/.

Neither Stevens and House (1963) nor Hillenbrand, Clark and Nearey (2001) examined vowels in the nasal environment. Stevens and House state "nasal consonants were not included because of the difficulties of measuring formant frequencies for

[36] Personal communication.

nasalized vowels" (112). Hillenbrand et al. focus on stop consonants and make no comment about nasal environment.

Technology has advanced considerably since Stevens and House published their article in 1963. For the current study, measurement of vowel tokens in a nasal environment was done through careful identification of the nasal formant, followed by individual readings for F1 and F2 in Praat.

Production does not match perception in this situation, however. Evidence shows that listeners average the first oral and nasal formants when perceiving a vowel (Beddor and Hawkins 1990, Stephens 1998). As pointed out by Plichta (2004), this means that nasalized /æ/ will be perceived as higher than oral /æ/. Plichta (2004) discovered that nasalization of vowels, even in an oral environment, is a common feature of NCS speech, but perhaps it is most salient perceptually in a pre-nasal context. If so, this provides an impetus for the genesis of the NCS, in that pre-nasal /æ/ was perceived as raised and subsequently produced as raised by children learning the dialect as a first language, creating the first step in the chain shift.

4.3.2 Preceding Manner and Voice

With regard to preceding manner and voice, the following four environments were tested: voiced and voiceless stops, voiceless fricatives, and liquids. The words used in each environment are listed in Table 4.5. Results show that preceding voiced stops are correlated with a significantly lower F1 for /æ/ in four of the sixteen speakers. Only one of these four is a Group A speaker, supporting previous hypotheses that raising after voiced stops is a universal tendency.

Table 4.5: Preceding Manner and Voice Features and Words

Manner/Voice	**Words**
Voiced Stop	banker, bath, dad, gamble, gang, badge
Voiceless Stop	cabin, cash, pal, past, pat, tab
Voiceless Fricative	Saginaw, Sam, thank
Liquid	black, brag, Lansing, laugh, plant, rack, rag
Nasal	mash, mattress, nap
/h/ *or* Vowel Initial	apple, ask, has, have

Excluded (singletons): zap (voiced fricative), jazz (affricate)

Although preceding manner and voice was not tested separately by the sociolinguistic studies mentioned, these findings coincide with Stevens and House (1963) and Hillenbrand, Clark and Nearey (2001). Since Stevens and House only tested vowels in symmetrical CVC environments, they make no claims about the influence of preceding versus following environment. They do, however, consider /hVd/ as a *null* environment, which implies that preceding /d/ has more influence than following /d/. Hillenbrand, Clark and Nearey provide inconclusive evidence on the effects of initial versus final voiced consonants, although, as mentioned above, they did find that preceding consonants have more influence overall.

Hillenbrand, Clark and Nearey (2001: 755) suggest that one physical characteristic of voiced consonants that may contribute to the raising effect they have on adjacent vowels is that the larynx is slightly lower in the production of voiced consonants than it is in the production of voiceless consonants. Although this in itself may not cause a lowering of F1, Stevens (1998: 474) discusses changes in F1 that occur in conjunction

with the changes in airflow, transglottal pressure, vocal tract volume and vocal tract stiffness that are all associated with the production of voiced stops.

4.3.3 Preceding Place of Articulation

The environments tested here for the effects of preceding place of articulation were labial, apical, liquid apical, velar, /h/ and vowel initial. The words used are listed by environment in Table 4.6. Results show that preceding apicals and velars were correlated with significantly raised /ae/ in four male speakers, only two of whom are in Group A. These results suggest that this effect is not correlated specifically with the NCS.

Table 4.6: Preceding Place of Articulation Features and Words

Place of Articulation	**Words**
Labial	badge, banker, bath, pal, past, pat, mash, mattress
Apical	thank, dad, tab, zap, saginaw, sam, nap
Liquid	brag, rack, rag, black, lansing, laugh, plant
Velar	gamble, gang, cabin, cash
/h/ *or* Vowel Initial	has, have, apple, ask

Excluded (singleton): jazz (palato-alveolar)

Independent factors indicate that raising in the context of velars is a universal feature. The tongue body is high during the articulation of the velar consonants /k, g, ŋ/, and these are the only consonants of English that are classified with the feature [+high] by Stevens (1998: 254). In addition, the CV and VC transitions are slower for velars than for labials or alveolars (Stevens 1998: 365). It follows, therefore, that the velar environment may lead to undershoot in the articulation of a vowel, resulting in a lower F1, especially for non-high vowels.

Although apicals are not classified as [+high] by Stevens, the tongue tip is in a high position for the articulation of the consonant, and this is correlated with a raising and fronting effect on the transition into following front vowels. However, the transition out of this constricted position should occur more quickly than it does with velars (Stevens 1998: 354). Despite the rapid transition time, depending on the duration of the vowel and the place of articulation of the following consonant, the vowel trajectory may never reach the target position. Especially with a non-high vowel such as /æ/ is in these speakers, undershoot may cause lower F1.

The only preceding environment that had a conditioning effect on F2 in the present study was preceding liquids. When tested against other preceding manners, it was significantly correlated with backing in five speakers, particularly in comparison to preceding voiced stops, which have already been shown to promote raising. Three of the five speakers who showed this effect are from Group A.

When liquids were separated from other apicals and tested against place features for following consonant, they were found to correlate with a backed /æ/ in ten speakers, six of whom are in Group A. This was the most widespread effect I found in my study, but is probably due to the fact that four of the seven words used end with a velar consonant, which further promotes backing and therefore exaggerated the results for liquids. Since this result appears in both Group A and other speakers and has articulatory motivation, it again suggests a universal, default tendency.

4.4 Conclusions

In summary, results for the conditioning effects of following consonant manner and voice are the most striking and suggest that dramatic raising of /æ/ in front of nasals is a marker of accommodation to the NCS among Mexican American speakers of English in Lansing. The results for preceding environment provide clear evidence in support of previous conclusions about the conditioning effects on /æ/ of several specific consonantal environments[37]. Overall findings show that preceding voiced stops, velars and apicals promote raising of /æ/. Preceding liquids are significantly correlated with a low F2, or backed /æ/. All of these findings except the pre-nasal raising of /æ/ agree with results found in studies on laboratory phonology and therefore suggest universal rather than area-specific effects.

In general, therefore, no previously unattested coarticulatory effects on the production of /æ/ are apparent in the speech of Mexican Americans in Lansing who are native speakers of English. However, there is evidence of complex social stratification in one local feature. Very low F1 in tautosyllabic pre-nasal /æ/ — ubiquitous in the local Anglo population — is present among those interviewed for the present study only in women under 25 who were born in Lansing and speak English as a native language. This supports the hypothesis that young women are the leaders of change, but it also raises the question of whether raising in the production of /æ/ before nasals is a distinctly female marker in this group. Given the precise accommodation to NCS /æ/ found in these young women — as evidenced by their pronunciation of both raised pre-nasal /æ/ and the

[37] The number of words used was fairly small in this study, and all possible environments were not tested. Therefore, a lack of statistical significance with regard to the coarticulatory effects of any given environment does not necessarily constitute conclusive evidence about that environment.

centralizing off-glide that is distinct in the pronunciation of NCS /æ/ (see section 3.3.2), it is apparent that lack of assimilation to the pronunciation of vowels other than /æ/ in these speakers cannot be attributed to lack of contact with the Anglo community or lack of perceptual acuity. Subtle and accurate assimilation to local mainstream norms appears to be occurring in only some aspects of the phonetics and phonology for other reasons. Communicative competence in Lansing's Mexican American community clearly involves more than just the ability to assimilate to Anglo speech characteristics. The final chapter in this thesis examines the potential for research in this speech community on the interaction between ethnic identity and language use.

CHAPTER 5: Conclusion

5.1 Identity and Language

A three-generation pattern of language use is typical in ethnic minority communities in the United States whose heritage language is not English. First generation residents tend to be native speakers of the heritage language and speakers of English as a second language. Second generation residents tend to be bilingual. And third generation members of the community are often monolingual speakers of English (Macias 1989: 14). Since most first generation Mexican Americans in Lansing are from Texas and began learning English in primary school or earlier, this speech community shows an accelerated version of this pattern. All of the first generation respondents for this study speak Spanish as a native language, although several also reported learning English as a native language. Only about half of the second generation respondents report being fluent in Spanish (8 out of 15). And all six of the third generation respondents are monolingual English speakers. The disappearance of Spanish is a common complaint among older members of the community. Despite this loss, however, full accommodation to local Anglo dialect norms has not occurred.

As discussed in Chapter 1, several studies show that children acquire the language of their peers, not their parents (Chambers 1999, Eckert 1989). It is nevertheless the case that speech in minority communities often differs from local mainstream norms. Sometimes the difference is explained by the size and homogeneity of the ethnic community, such that the ethnic group itself supplies the peer group for the children (Fought 2003 in Los Angeles, Thomas 2001 in Texas). However, ethnic group differences in speech have also been found in areas where — as in Lansing — the group

being investigated does not make up a majority of the population, leaving identity or degree of contact as the simplest explanations of difference (Knack 1991 on a Jewish community in Grand Rapids; Jones 2003 on African Americans in Lansing). Evidence of the importance of identity to dialect also comes from research on other minority populations (Evans 2001).

A further dimension is added to this puzzle by findings from studies on adults showing that speech can change during adulthood. For example — as discussed in Section 3.1 — Knack (1991) found evidence of accommodation to ethnic group features by adult members of a Jewish community in Grand Rapids, Michigan, where the Jewish population made up only 4% of the total population, so that segregation from other varieties was not a factor in accommodation. Several members of the speech community who were native to Grand Rapids, but were 1) heavily involved in Jewish activities and 2) friends with one or more Jewish person from New York, appeared to have developed a raised /ɔ/ as adults. This feature is not local to Grand Rapids but was found by Labov (1966) in Jewish speakers in New York. A major contributing factor in situations like this appears to be ethnic pride.

Previous studies on second language acquisition and language maintenance in immigrant communities emphasize that resistance to linguistic assimilation can be a means by which to preserve cultural identity (Li 1982, Giles and Johnson 1987). As pointed out by Lee (2001: 177), this generalization may be extended to include ethnically distinct dialects of one language, as well.

Ethnic pride was readily apparent in nearly all of the respondents in the Lansing study. In the excerpt below, Loretta, a 40-year-old, middle class woman who moved to

Lansing at the age of 11, proudly comments on how connected her children — ages 14 and 16 — are to their identity as Mexican Americans.

> Interviewer: Do you think your kids [...] have a, sort of a sense of their, their history and culture as Mexican Americans?
>
> Loretta: Absolutely. They are very much into their culture and very much have, um, can relate to their identity. And there is times when they have to, you know, I mean they're still learning the, you know, Mexican American, Chicano, Latino thing, when to use that terminology, and... I'm working with my daughter, in particular, she's the younger one, but. My son is just so much into his culture. He knows his language well. You know, he knows his music well. And they both want to get into, like, mariachi and, um...mariachi, over at, they have that at, at [a local high school], so. Yeah.

When asked about how comfortable she feels as a Mexican American living in Lansing, Loretta says that she feels "fine, comfortable" and "[I] feel like I fit in [in Lansing]." She is not alone in this sentiment among those I interviewed — both young and old. Some speakers even mentioned that ethnic diversity is one of the things they like about living in Lansing and raising children there.

In the thoughts expressed by other respondents, however, ethnic pride appears to be mixed with a sense of social isolation from the surrounding Anglo community, especially when compared to the richly ethnic cultural life that is available in Texas cities such as Austin and Laredo or in Mexico itself. The following excerpts are exemplary of this attitude.

In the first excerpt below, Melissa, a 42-year-old, working class woman who moved to Michigan from San Antonio at the age of 10, talks about her desire to return to Texas.

> Umm, people are friendlier [in Texas]. Our kids love it down there...I've always, I've always wanted to go back. Even when my daddy moved us up here, I used to beg him to move us back (laughs) [...] It took me a long time to say "Yes, I'm from Michigan." I officially still call myself a Texan.

In the next example, Melinda, a 16-year-old, third generation, middle class speaker who is on her way to a Big Ten university says the following when asked about being Chicana, and if that is important to her:

> Well, it is a really big part of me and people—I guess, a lot of people don't understand that. And, it's kind of just like a blend, but um...It would be easier to grow up around other peoples who considered themselves Chicanos. Unlike most of the people I know. So—yeah that would work. But I know a great big deal of Chicanos that actually like—LIKE being Chicano, but there are some that really ruin it.
>
> [My family is] really involved in everything, like, Chicano. They have the Chicano advisory committee and all that other stuff. So, we know a lot of people. My mom grew up with a lot of people, that...So, I'm into the group. But here and there you find that, it's really, you can't really, like, communicate with anybody 'cause they don't understand about it, and there's not a lot of Chicanos. But if we get together, there, we can...I don't know how to explain it.

Melinda's pride in her heritage is mixed with a frustration that she cannot share it more with others and that there is a disconnect between this part of her world and her environment.

Although most of the younger respondents said that they have not experienced much — if any — discrimination, and the older speakers reported that the situation in Lansing has improved dramatically since they were children, several speakers did talk briefly about discrimination and prejudice, especially in school.

These comments about feeling different, wanting to move and remembering discrimination all suggest a lack of full connection to the surrounding local community. Even the respondents who feel comfortable with their identities as Michiganders and are

happy living in Lansing, may not identify with Anglo Michiganders. Evans et al (2000) found evidence that a lack of local identity is sometimes correlated with the presence of fewer local speech features. In this case, a lack of local Anglo identity, combined with the desire to preserve ethnic identity, may partially explain the maintenance of a Mexican American English that is distinct from the local Anglo standard in Lansing. Especially within a group whose linguistic history is a crucial part of what makes it unique, it would not be surprising for ethnic pride to manifest itself in language difference.

Detailed ethnographic research is needed to uncover more precise information about the non-linguistic forces that are motivating the dialect of this speech community. Such research may also uncover new social variables that are correlated with linguistic variation. Fought (1999) emphasizes the importance of being sensitive to the institutions and groups that define the members of a given speech community and, therefore, may govern variation in that community. Her research on gang members in Los Angeles, together with the work of Eckert (1989) on *jocks* and *burnouts* in a Detroit high school, makes it clear that different social forces are at work in different populations. My two years of fieldwork in Lansing has suggested that political, religious and educational divisions merit closer observation in the Mexican American community there, for example.

The fact that only minimal variation was found within the members of Lansing's settled Mexican American community, but that significant variation was found between young Mexican American women and young local Anglo women suggests the existence of a distinct speech community and a distinct variety of American English. Whether or

not there are aspects of this variety that are partially conditioned by the desire to preserve ethnic identity is an important question that requires further investigation.

A summary of the conclusions reached in this thesis is provided in the following section.

5.2 Concluding Remarks

This dissertation has attempted to provide a description of the nature of four English vowels as used in the Mexican American speech community of Lansing, Michigan. It is apparent that some assimilation to local mainstream norms is occurring across generations. However, assimilation is not yet complete, and the trajectory that this dialect will take as the Mexican American community continues to grow and become more well established is not clear.

Statistical results showed relatively little variation among respondents, indicating that change is not occurring rapidly. With regard to the variation that was found, age is the most significant factor, and /æ/ is the most variable vowel. In the speech of women under 45, /æ/ is pronounced with a significantly lower F1 (indicating a higher vowel) than in the speech of women over 45. Furthermore, the realization of /æ/ is at the same height in women under 45 as in a group of young Anglo women from the Detroit suburbs who served as a control. In young women under 25, this vowel has the same F2 position as these Anglo women, as well. These results suggest that young Mexican American women have assimilated completely to NCS /æ/, supporting previous findings that young women are the leaders of sound change.

Results for the other three vowels tested — /ɑ, ɔ, ɛ/ — reveal a different pattern of accommodation from that found in communities that acquired the NCS over time, through the *cascade model* of diffusion by which a sound change spreads from the urban areas where it began to progressively smaller cities and towns (Trudgill 1974, Callary 1975, Labov 2001: 285). According to this model, /æ/ fronts and raises first; then, /ɑ/ moves forward towards the spot vacated by /æ/; in the third step, /ɔ/ moves down and forward into the spot previously filled by /ɑ/. Only after these three changes have occurred does /ɛ/ appear as lowered towards /æ/, backed towards /ʌ/, or somewhere in between.

The Lansing Mexican American dialect differs in several ways. First, there is no indication of further change in progress in any of these three vowels, since younger speakers are not more advanced in these shifts than older speakers. However, it is not the case, either, that speakers have assimilated only to NCS /æ/ and have retained Texas speech otherwise. The pronunciations of both /ɛ/ and /æ/ appear to have been modified dramatically in some speakers, while the other vowels remain relatively unaltered, resulting in a different order of change than usually occurs in the NCS. More specifically, the finding that /æ/ and /ɛ/ have similar or identical first and second formant values — though they are not merged — in first generation residents of Lansing who arrived in Michigan after the age of puberty indicates perceptual confusion due to dialect contact. This result lends support to the hypothesis that order of accommodation to local norms by a newly arrived group need not follow the previously attested pattern.

Results from the analysis of phonetic conditioning did not show any unexpected patterns of coarticulation. The interesting result here was that all six young women under 25 who were native speakers of English and born in Michigan have an /æ/ that is dramatically raised in front of nasals. No other respondents showed significantly raised /æ/ in this environment. Since women under 25 were also the only group to collectively show assimilation to both the F1 and the F2 of local Anglo /æ/, in addition to the /æ/ off-gliding that is characteristic of the NCS, it can be concluded that this group has accommodated fully to NCS /æ/. Given that these native speakers are not also fully accommodated to the other aspects of the local NCS dialect, perhaps the most significant consequence of these findings is that partial accommodation to local norms may be the default among members of ethnic minority group speech communities.

5.3 Areas of Future Research

More research is still needed on ethnic minority speech communities. Among the limitations of this particular study is the fact that only the NCS vowels were examined. Many people still speak Spanish in Lansing, and in fact some only speak Spanish. It is, therefore, expected that Spanish still plays an important role in the speech of this community and may be reflected in some aspects of the phonology. The Spanish vowels /i, u, e, o/ are monophthongs, for example, unlike these same vowels in English. Further research on the consonants and vowels that are similar in Spanish and English may shed light on the processes of second language acquisition, dialect maintenance, and substrate influence from a heritage language.

Previous research has found that bilingualism has no effect on phonology in some cases (Fought 2003) but might in others, especially if both languages are not native languages (Flege 2003). Although many of the speakers interviewed for this study are bilingual, this issue was not addressed because the focus was on the emerging native speaker variety of English and the trend across generations is to lose the heritage language.

Two more issues for future research concern perception and attitudes. Do these speakers perceive the NCS accurately, since they are surrounded by it, despite the fact that they do not fully show it in their own speech? And, finally, what are the attitudes of others towards the speech of these speakers? Are they perceived as local? Is their ethnicity still identifiable by others, based only on their pronunciation? If so, what are the phonetic cues that trigger that perception? And what are the implications of these results for phonological theory, including theories about the relationship between production and perception?

These are only some of the areas that demand further attention. Research on language change, in general, and ethnic minority dialects, in particular, is still in its infancy in many ways.

APPENDICES

APPENDIX A: WORD LIST

Words used in the analysis in Chapter 3 (no prenasal /æ/ tokens)

1. past
2. cup
3. have
4. body
5. mop
6. ask
7. dust
8. hole
9. tip
10. bet
11. horse
12. block
13. oil
14. state
15. road
16. pull
17. pig
18. fed
19. chalk
20. awful
21. possible
22. stop
23. rag
24. laugh
25. toy
26. make
27. cabin
28. pot
29. has
30. good
31. sub
32. hit
33. pen
34. closet
35. gosh
36. hate
37. hope
38. duck
39. kid
40. mesh
41. gone
42. rock
43. brag
44. rack
45. jazz
46. bath
47. sleep
48. father
49. cash
50. mattress
51. boot
52. bun
53. bend
54. fog
55. lost
56. bead
57. foot
58. puff
59. tin
60. song
61. pause
62. logic
63. tom
64. dad
65. tab
66. meat
67. mess
68. Bob
69. black
70. pool
71. fist
72. step
73. tall
74. John
75. pill
76. food
77. fish
78. neck
79. dog
80. caught
81. doll
82. Saginaw
83. pal
84. pat
85. apple
86. bite

Words used in Chapter 3 Analysis (by vowel)

/æ/: apple, tab, cabin, bath, laugh, have, pat, mattress, dad, ask, past, has, jazz, pal, cash, rack, black, brag, Saginaw, rag (N = 20)

/ɛ/: pen, mesh, bet, mess, step, neck, bend, fed (N = 8)

/ɑ/: mop, stop, Bob, father, pot, body, possible, John, Tom, doll, logic, gosh, rock, block (N = 14)

/ɔ/: awful, caught, lost, pause, closet, gone, tall, chalk, dog, fog, song (N = 11)

/ʌ/: bun, puff, cup, sub, duck, dust (N = 6)

/ɪ/: tin, hit, kid, tip, pig, fist, fish, pill (N = 8)

Other vowels (N = 19):
boot, food, pool, good, foot, pull, hope, horse, hole, road, sleep, peel, meat, bead, hate, state, make, toy, oil

TOTAL: N = 86

Words used in Chapter 4 Analysis (includes pre-nasal /æ/ tokens)

The words *badge, nap, zap* and *mash* were not included in the wordlist read by some respondents. Therefore, they were also used only in the Chapter 4 analysis, which analyzed each speaker individually.

/æ/: apple, tab, cabin, bath, laugh, have, gamble, Sam, pat, mattress, dad, ask, past, has, jazz, Lansing, plant, pal, cash, rack, black, brag, Saginaw, rag, banker, badge, thank, gang, nap, zap, mash

TOTAL: N = 31

APPENDIX B: INDICES OF SOCIAL STATUS
(based on Warner 1960)

Status Ranking Instructions:

Occupation:

1 Lawyers, doctors, engineers, judges, architects, managers of large businesses
2 High school teachers, trained nurses, librarians, small business owners, accountants, large farm owners
3 Social workers, grade school teachers, optometrists, minor officials of business, bank clerks, auto sales, contractors
4 Small business managers, stenographers, mail clerks, most store clerks, factory foremen, private repairmen (e.g., plumbers)
5 Beauticians, carpenters, plumbers, etc... (employed by others), barbers, firemen, bartenders, restaurant cooks, tenant farmers
6 Semi-skilled workers, skilled worker assistants, watchmen, truck drivers, waitpersons (in small restaurants), small tenant farmers
7 Heavy laborers, janitors, newspaper delivery, odd-job persons, migrant workers

Housing:

1 Grand, ostentatious
2 Very good, attractive, roomy, landscaped
3 Good, only slightly larger than utilitarian demands, more conventional and less showy than the first two categories
4 Average, private one and a half to two story, nice lawns, some extra room, small well-cared for lawns
5 Fair, just enough room for needs, well-kept up but no extras
6 Poor, run-down, often too small for needs, not in shambles or beyond repair
7 Very poor, perhaps not even designed as housing, beyond repair, crowded

Neighborhood:

1 Very high — The best place to live in this area; known as the area of the 'well-to-do'
2 High — An area with an excellent reputation, low crime, good schools, large houses and yards
3 Above average — Not pretentious but nice, clean, tidy neighborhood
4 Average — Solid working class area; neat, not fancy but a nice place to live
5 Below average — Some run-down housing, close to industrial or other undesirable residence areas
6 Low — areas regarded as 'slums'
7 Very low — Tenement areas; shacks, lean-tos, 'squatters' areas

Education:

1	Graduate or professional school
2	College
3	High school
4	Some high school
5	Junior high school
6	Elementary school
7	Little or no schooling

Computation: Occupation x 4 + Education x 3 + Housing x 3 + Neighborhood x 2 = Score

Ratings:

12-17	Upper
18-22	Upper-Upper Middle
23-24	Upper Middle-Upper
25-33	Upper Middle
34-37	Upper Middle-Lower Middle
38-50	Lower Middle
51-53	Lower Middle-Upper Lower
54-62	Upper Lower
63-66	Upper Lower-Lower Lower
67-69	Lower Lower-Upper Lower
70-84	Lower Lower

High school students and non-working spouses have the same scores as the principal working member of the family (except as can be independently determined).

For this study, respondents were placed into one of only two socioeconomic status categories, according the following scale:

17-50 Middle Class
51-70 Working Class

Speakers falling outside this range were not included in the analysis.

APPENDIX C: INTERVIEW QUESTIONS

1. Where were you born? How long have you lived in this area? Have you moved to many places? (If yes) Where? How long did you stay there?

2. Where were your parents born?

3. What is your address? Do you (Does your family) rent or own a house or apartment? How many rooms does it have? What's your neighborhood like?

4. When did your family come to the US from Mexico? Where did they first settle? When did they move to Lansing?

5. Is English a native language for you? Do you speak Spanish? If yes, when do you use Spanish and when do you use English? Do your parents speak Spanish?

6. How did you learn English? Was it hard or easy? Do you think you sound different from other people in Lansing?

7. Do many people speak Spanish here? What's the main problem for speakers of Spanish in Lansing today?

8. Do you ever feel embarrassed about the way you talk? Do people ever make fun of your accent?

9. Do kids talk differently than adults, that you've noticed? How do they sound? Older people? Is there a range?

10. How old are you?

11. What are the names of the schools that you attended?

12. (Workers and professionals) What do you do for a living? Do you like working there? What is your title and position?

13. Students: What do you plan to do when you finish school? Do you plan to stay here after graduation?
Employees: What do you plan to do when you retire?

14. Network relations questions 1:
    A. Do your best or closest friends live in your neighborhood? Do you go to church? Which one? Do you have many friends from the church? Do most of your friends go to this church?

    B. Do you have any relatives who live in your neighborhood?

C. Do you know people who also work at your workplace from your neighborhood?

D. Do you have co-workers of the same sex as you who live in your neighborhood?

E. Do you spend time with your co-workers after work? How often?

15. Network relations questions 2:
What percentage of people from the following groups do you have as close friends and associates?

A. European Americans _____
B. African Americans _____
C. Arab Americans _____
D. Mexican Americans _____

16. What do you usually do when you have spare time?

17. Is this a good place to grow up? Why or why not?

18. Have you ever wanted to live somewhere else? Why? Where?

19. What are the best and worst things about living in this area?

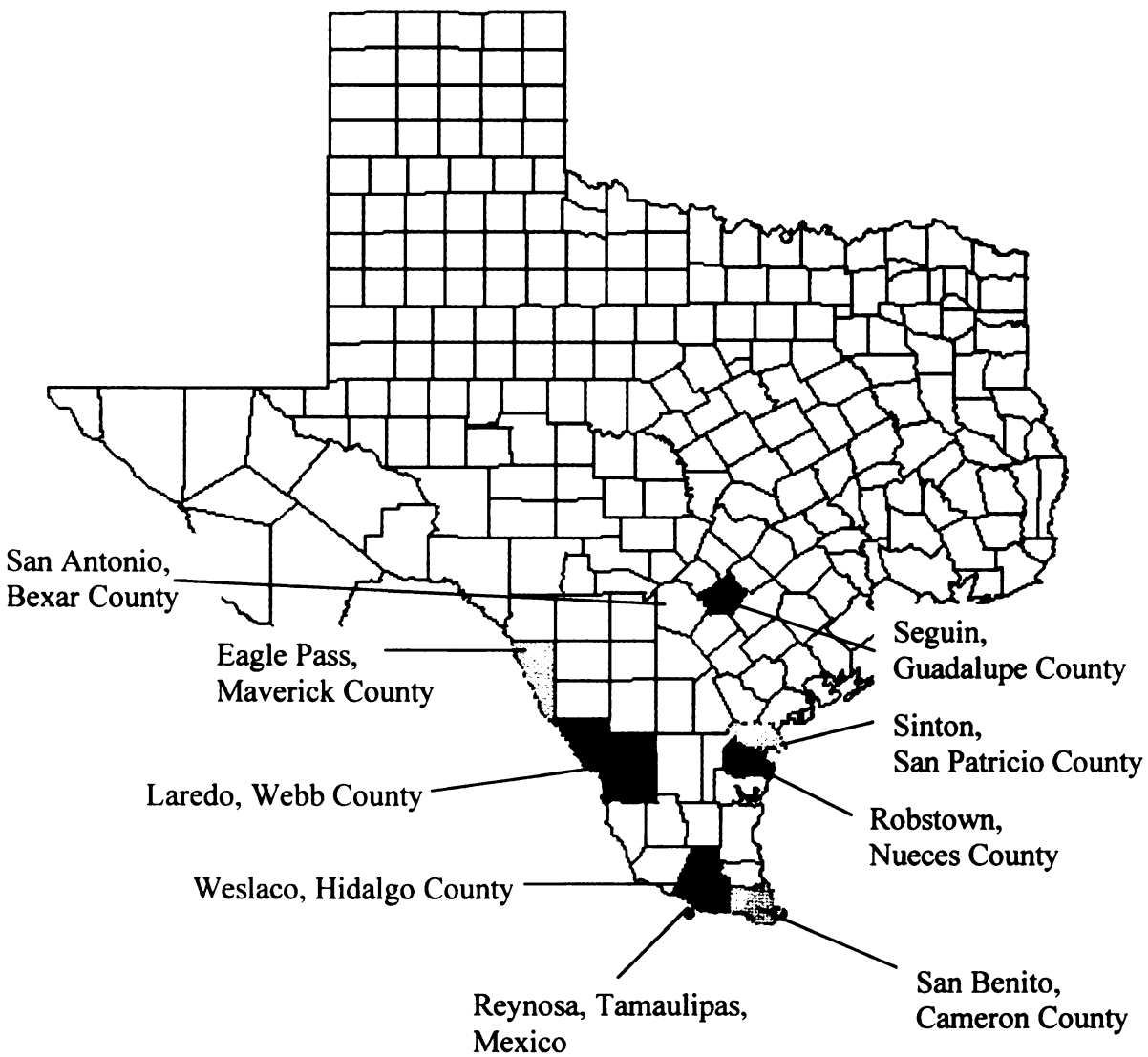
20. Talk about your heritage a bit. Do you feel proud to be Mexican American? What term do you use to describe yourself? As a Mexican American, how comfortable do you feel living in Lansing, Michigan?

21. Do you have any questions that you would like to ask concerning the interview?

Estimate of Use:
1. Listen to these three words. I will play them twice. Sometimes people pronounce words such as *man, banker* and *thank* with a different vowel. Have you heard this pronunciation? Does this sound normal? Do you say them this way? What percentage of the time?

2. Do you know people (in this area) who don't make a difference between 'ee' and 'i'? For example, they would say the words *lead* and *lid* the same way.

APPENDIX D: LOCATION OF RESPONDENTS' HOME CITIES/COUNTIES IN TEXAS AND HOME CITIES/STATES IN MEXICO



Cities further south in Mexico:

Fresnillo, Zacatecas
Mexico City (Distrito Federal)

The speaker whose vowel chart is adapted in Figure 2.5 and Figure 3.6 from Thomas (2001) is from San Antonio in Bexar County, Texas, just west of Guadalupe County

APPENDIX E: SUMMARY OF RESPONDENTS' LINGUISTIC BACKGROUNDS

	NES	ESL	OENG	OENG2	OESL
Men	10	2	2	2	1
Women	6	3	2	2	2

NES = born in Michigan or moved there by the age of 3; learned English as a first language; five of the sixteen are bilingual
ESL = born in Michigan; began learning English in primary school
OENG = not born in Michigan but moved there between the ages of 10 and 14; native speaker of English
OENG2 = not born in Michigan but moved there between the ages of 21 and 24; began learning English in primary school
OESL = not born in Michigan but moved there between the ages of 10 and 14, learned English in Michigan

NES (born in Michigan, native English speaker) = 16 speakers, 5 bilingual

Women (under 25)
- MelindaH, 16
- Emelia, 20 (bilingual)
- Judith, 21 (bilingual)
- LucyB, 14
- Solana, 22
- Estela, 17

Men (under 25)
- AndyM, 14
- RonaldB, 16

Women (25 and over)
- NONE

Men (25 and over)
- Ralph, 41
- Jose, 35
- Edmund, 45
- Walter, 71 (bilingual)
- Rodolfo, 27 (bilingual)
- Melito, 29
- Martin, 47 (bilingual)
- Jesse, 28

ESL (native to Michigan, learned English as a second language beginning in primary school)

Women
- SabinaH, 35
- Mabel, 45
- AnaT, 28 (reports that she does not speak Spanish now)

Men
- Rafael, 43
- Jack, 49

OENG (not born in Michigan, native English speaker, AOA in Michigan 14 or younger)

Women	Men
LorettaB, 40 (MI at 10)	Laurence, 41 (MI at 14)
Melissa, 42 (MI at 10)	Rene, 27 (MI at 10)

OENG2 (not born in Michigan, began English with primary school, AOA in MI ages 21-24)

Women	Men
Cynthia, 39 (MI at 21)	Gilberto, 54 (MI at 24)
SimonaH, 59 (MI at 24)	Terence, 56 (MI at 22)

OESL (not born in Michigan, learned English in Michigan)

Women	Men
Lola, 19 (MI at 10)	Isaiah, 27 (MI at 14)
Madeleine, 47 (MI at 12)	

APPENDIX F: PLOTS OF NORMALIZED MEAN FORMANT VALUES FOR ALL 32 RESPONDENTS

Note: Pre-nasal /ae/ tokens are excluded from charts. Vowel charts include data from only the words that were used in the analysis presented in Chapter 3.

Men's Charts

Figure 6.1: Andy, age 14, second generation

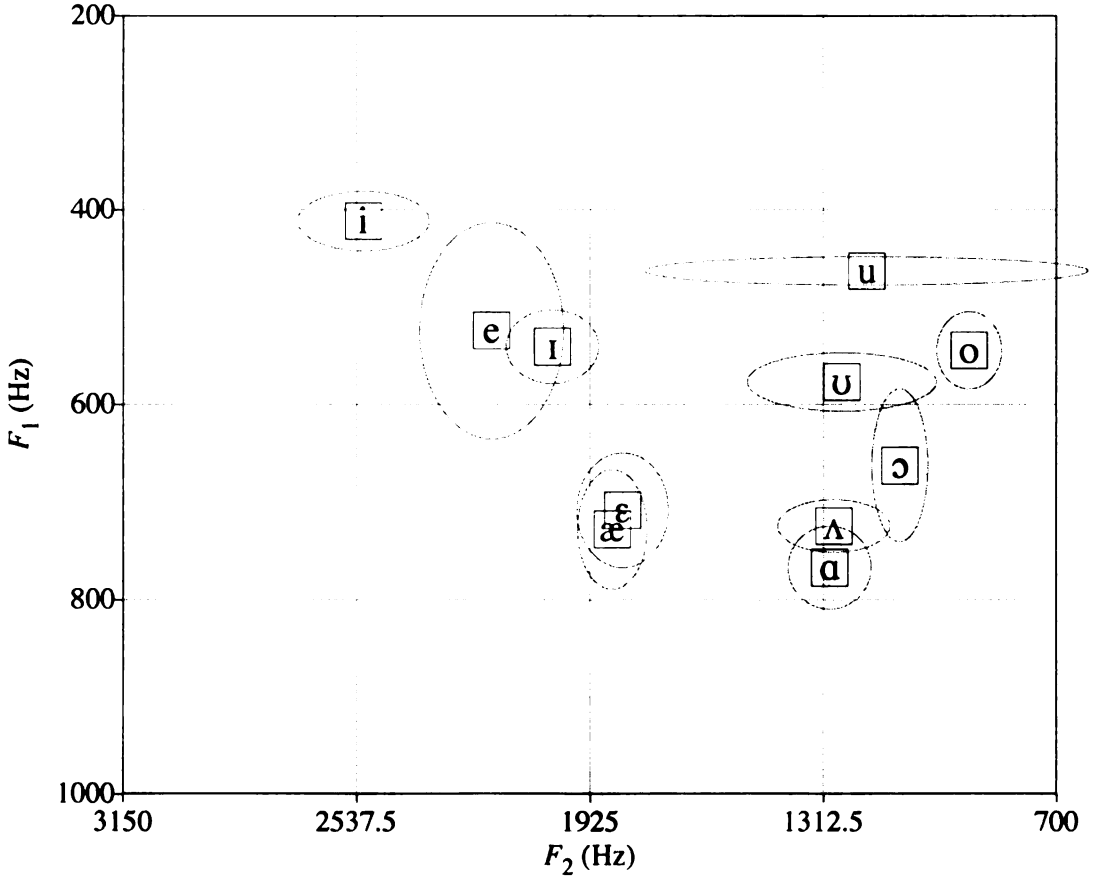


Figure 6.2: Ronald B, age 16, second generation

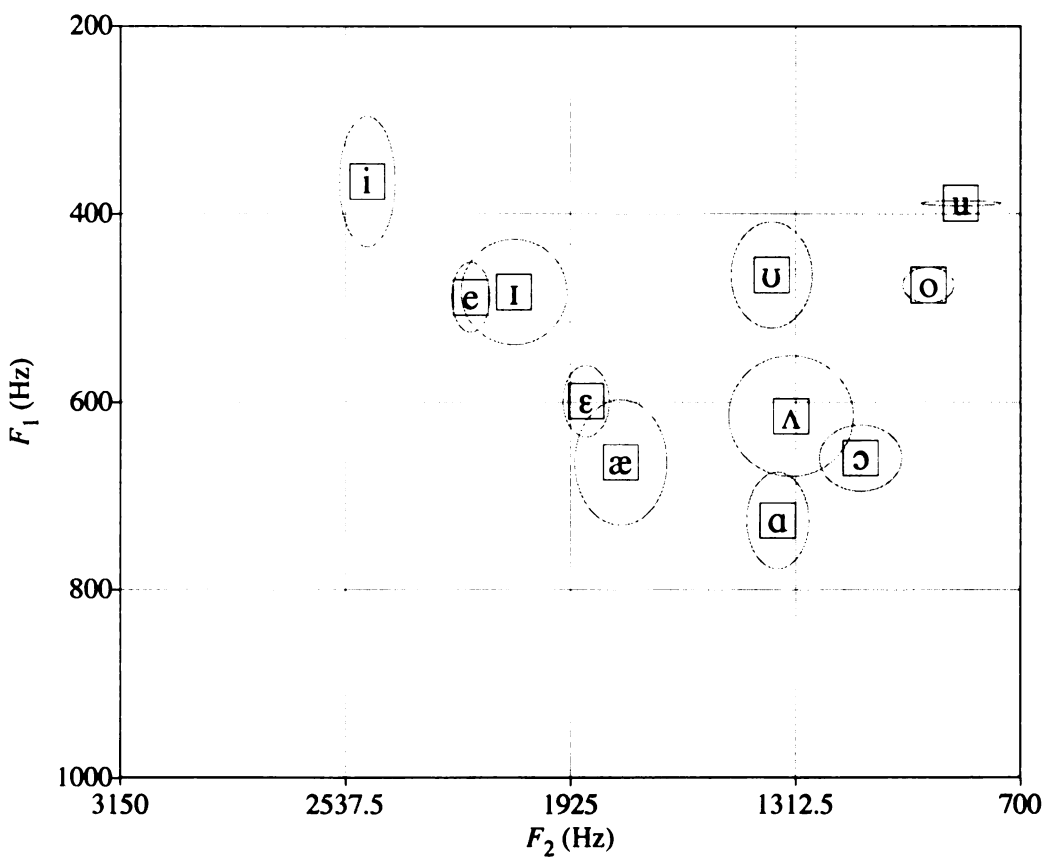


Figure 6.3: Isaiah, age 27, moved to Michigan from Mexico City at 14

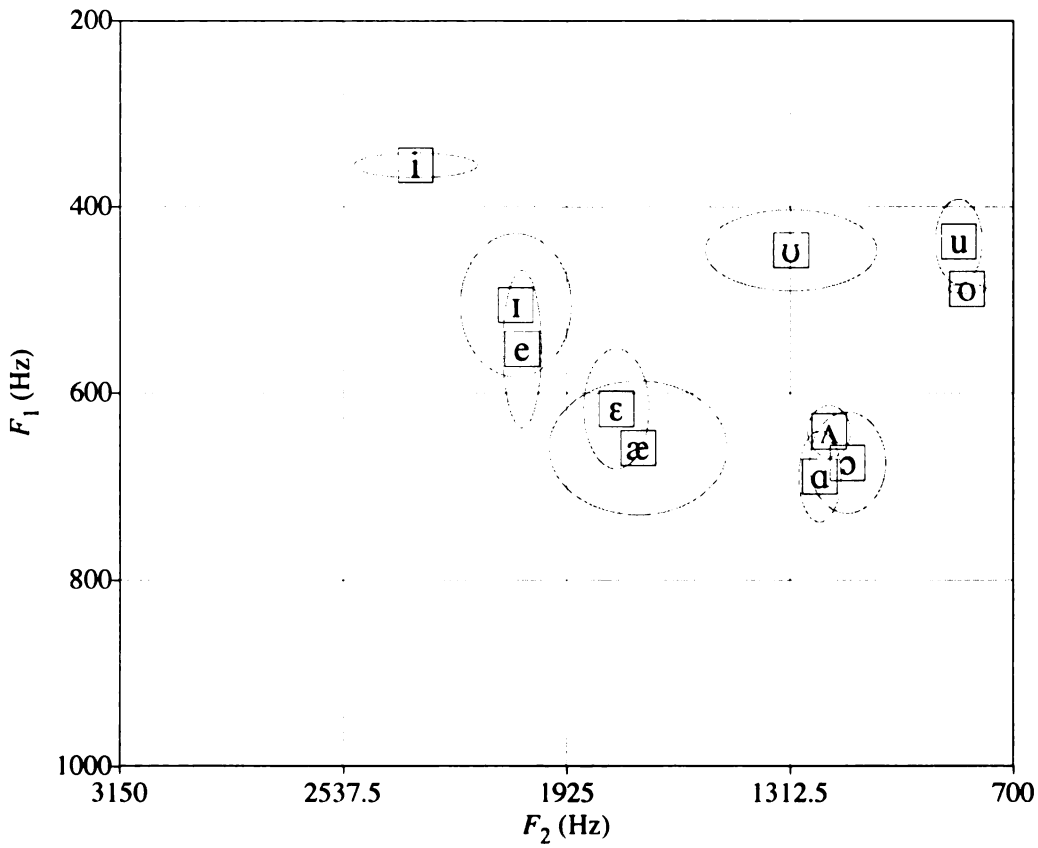


Figure 6.4: Rodolfo, age 27, second generation

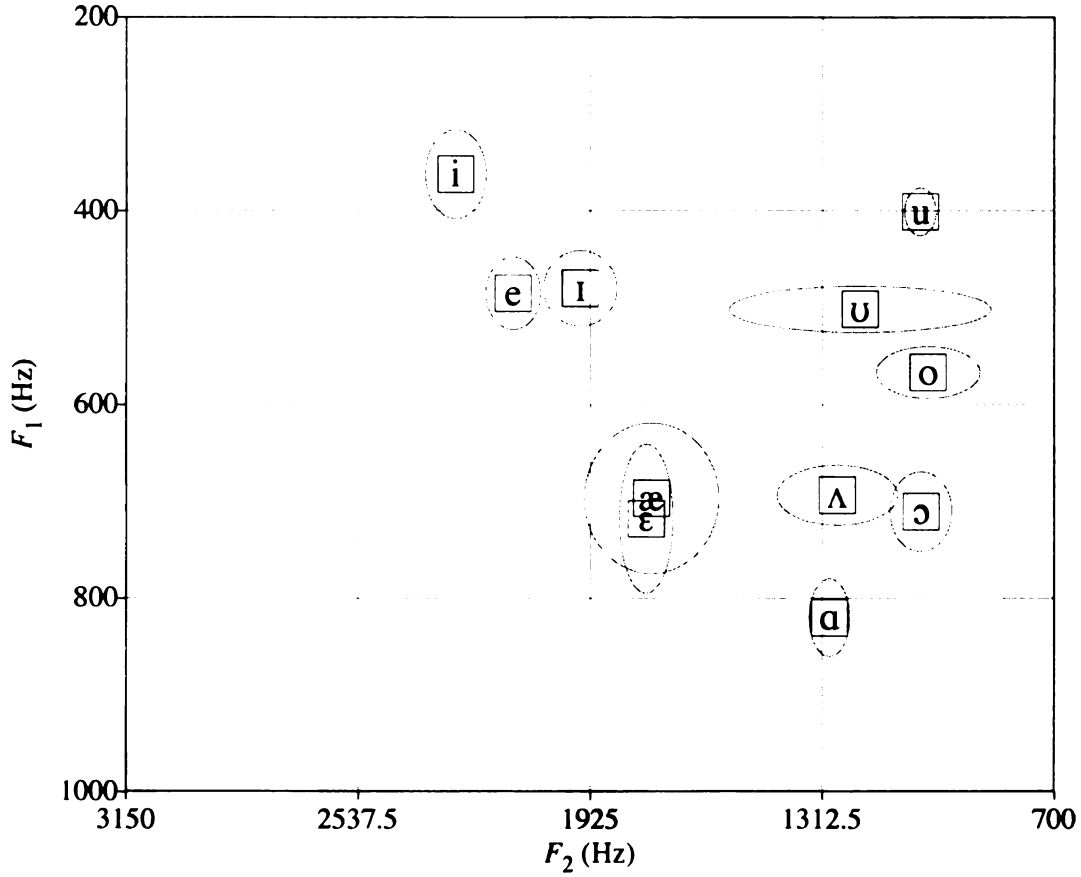


Figure 6.5: Rene, age 27, moved to Michigan from Weslaco, Texas, at 10

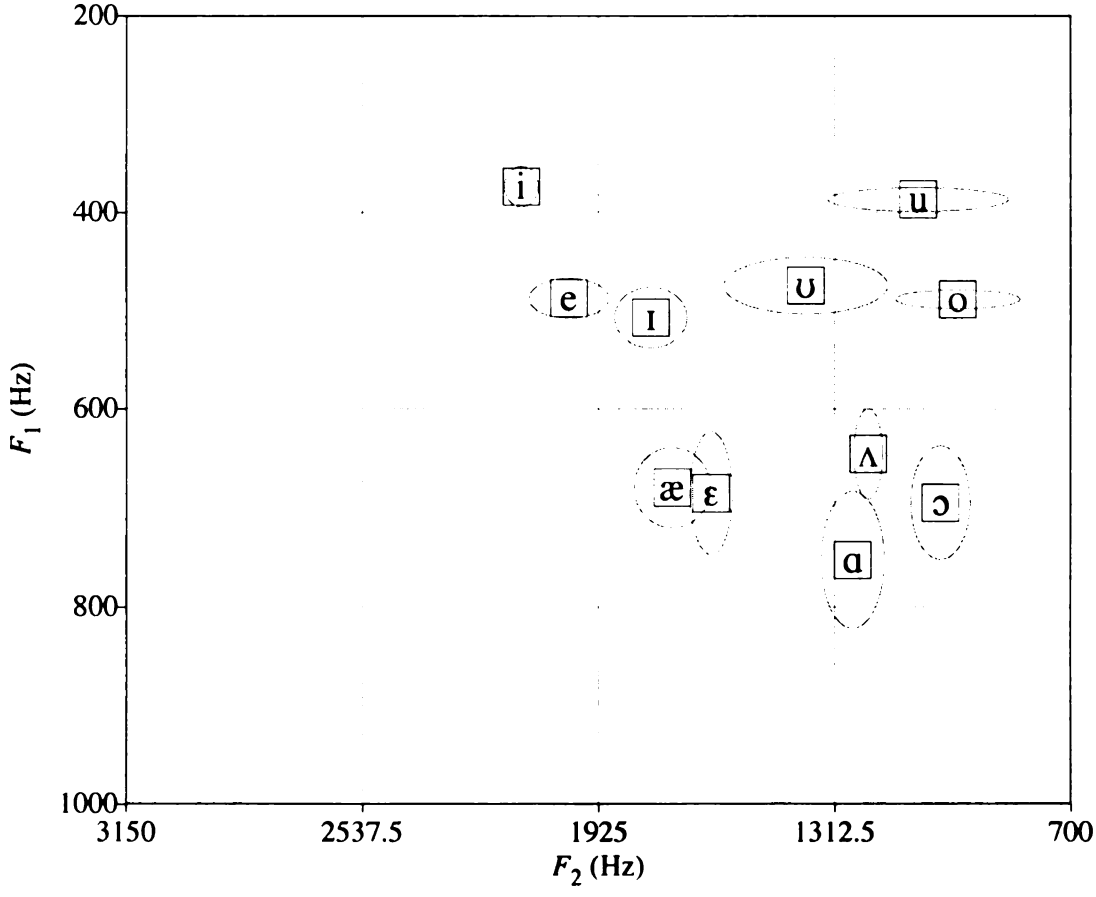


Figure 6.6: Jesse, age 28, third generation

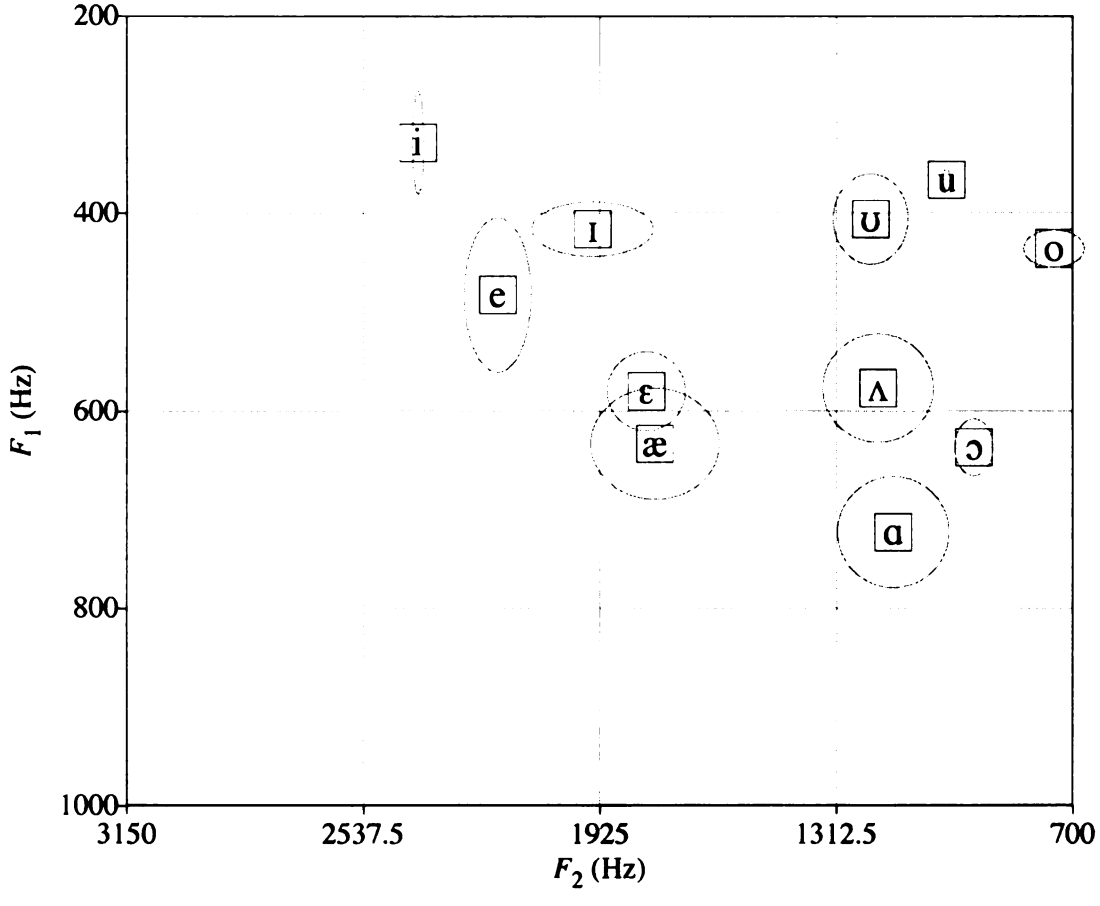


Figure 6.7: Melito, age 29, third generation

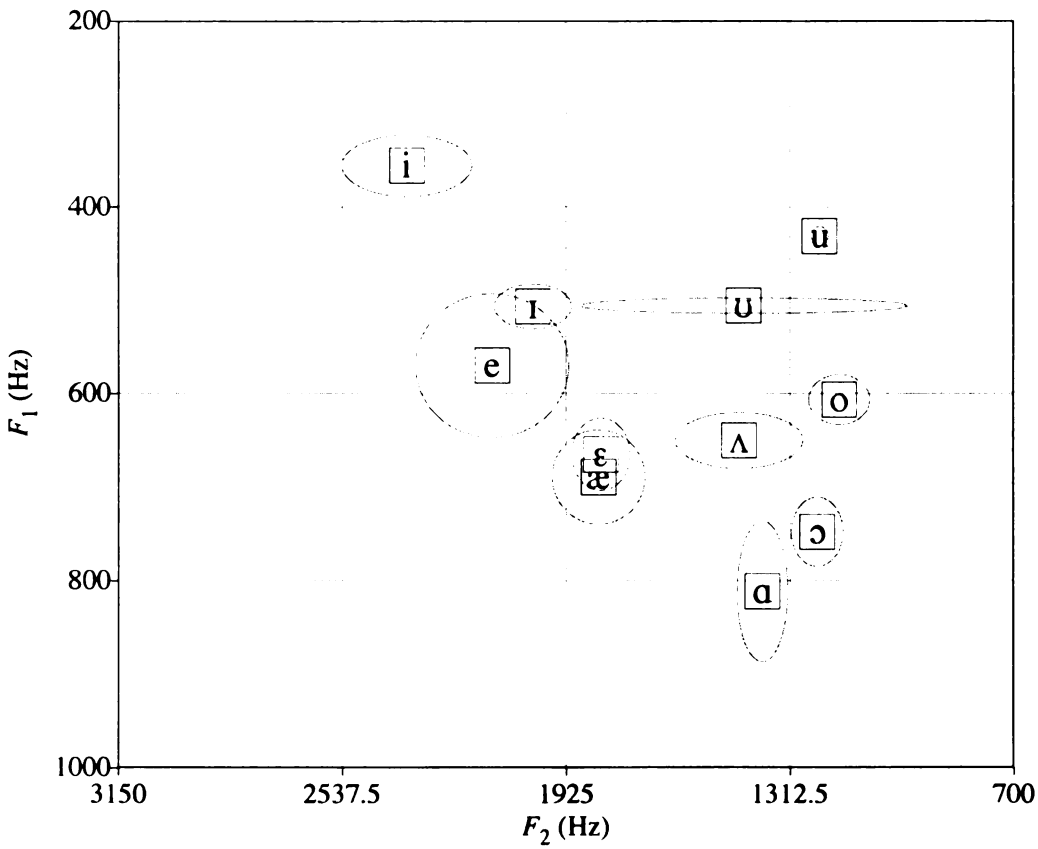


Figure 6.8: Jose, age 35, second generation

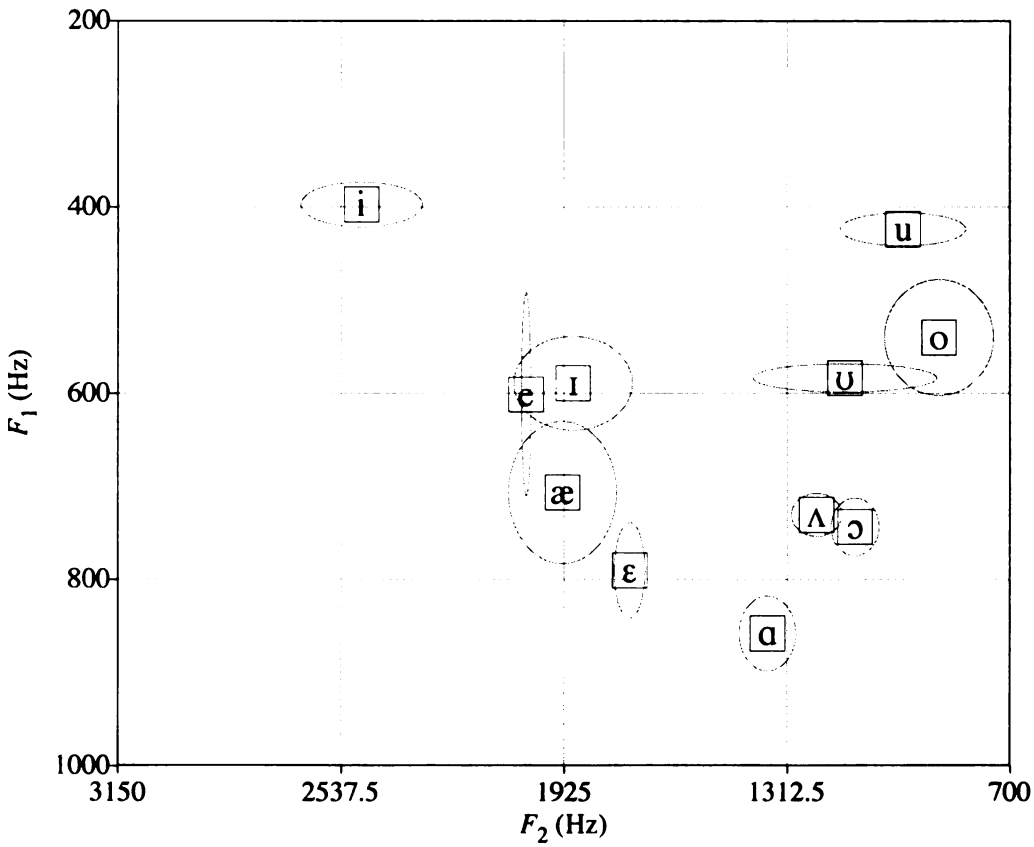


Figure 6.9: Ralph, age 41, second generation

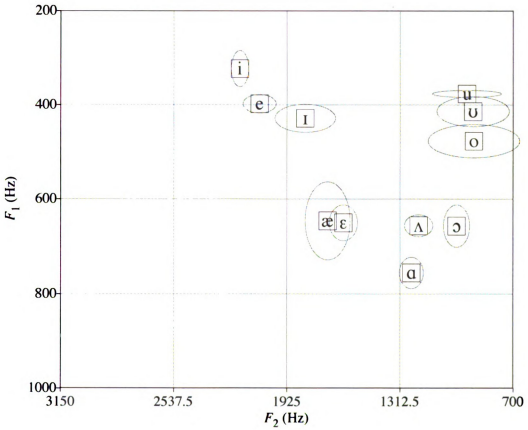


Figure 6.10: Laurence, age 41, moved to Michigan from San Benito, Texas, at 4

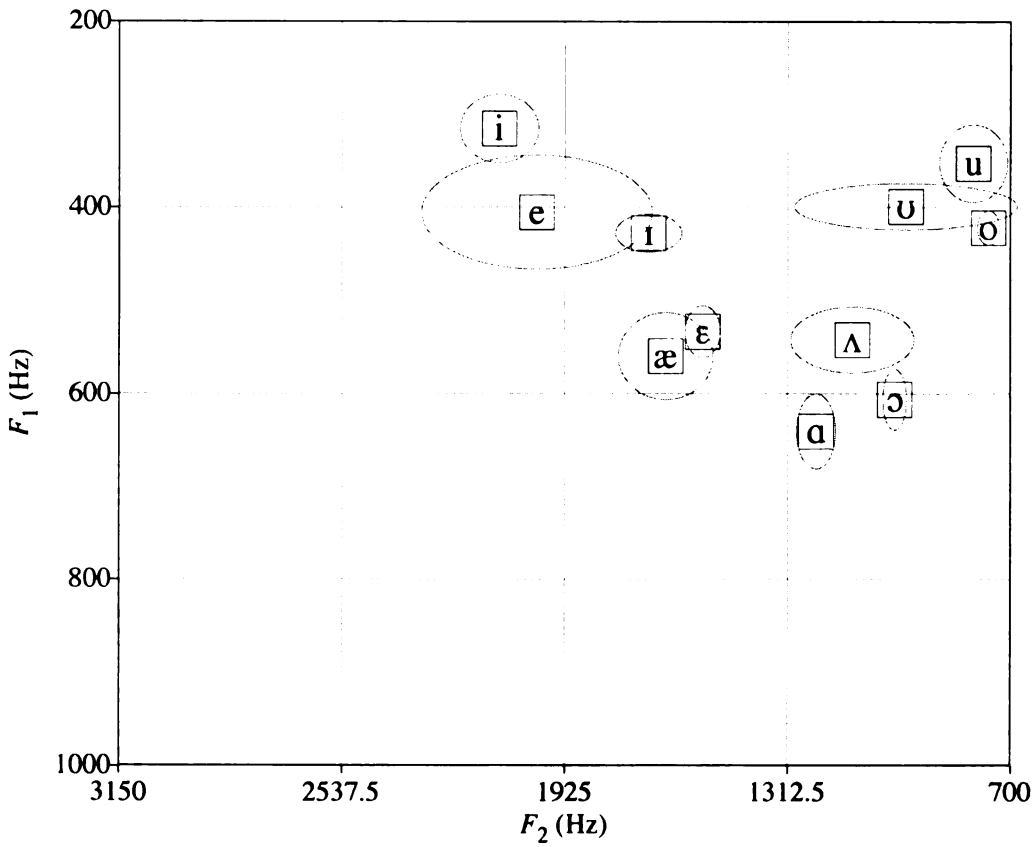


Figure 6.11: Rafael, age 43, second generation

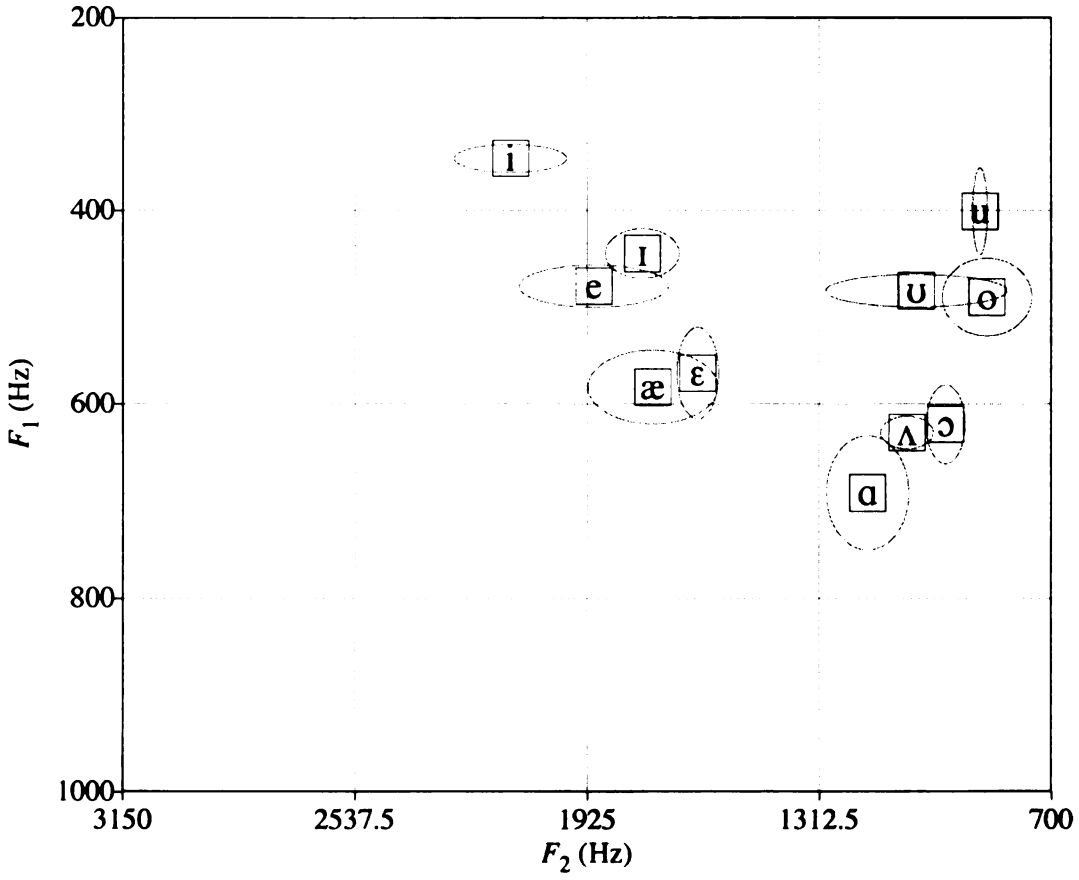


Figure 6.12: Edmund, age 45, second generation

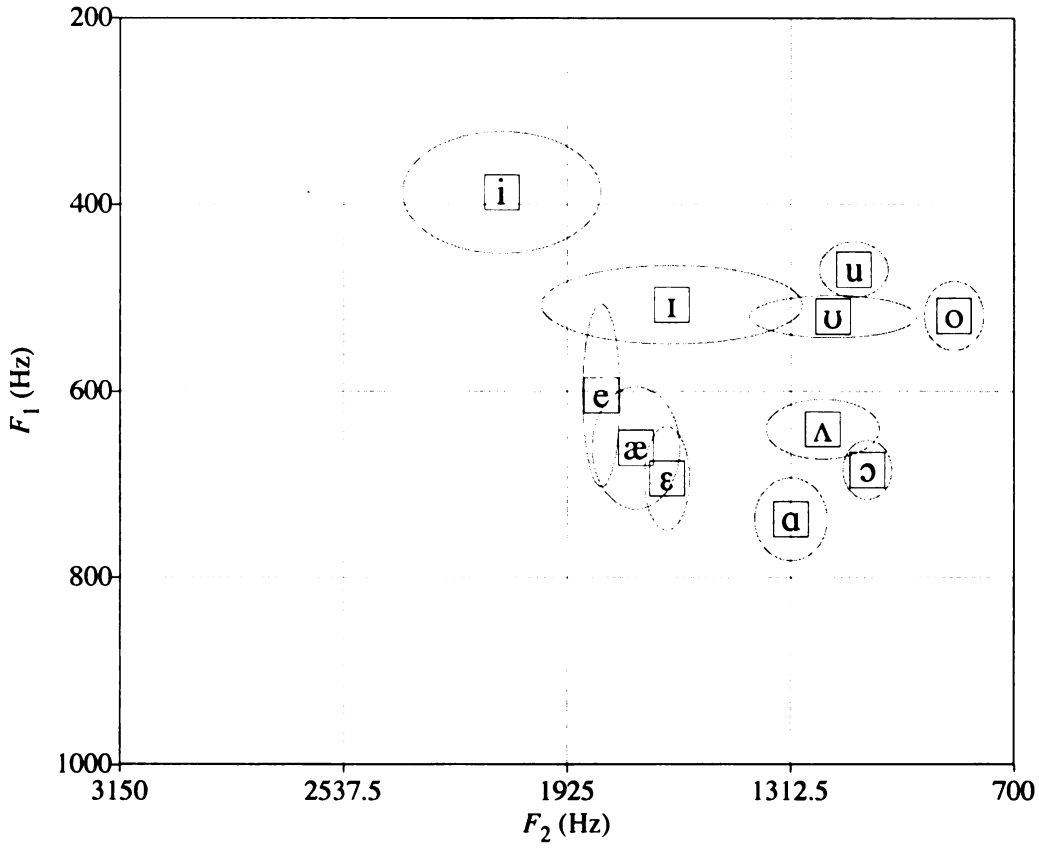


Figure 6.13: Martin, age 47, moved to Michigan from Sinton, Texas, at 1

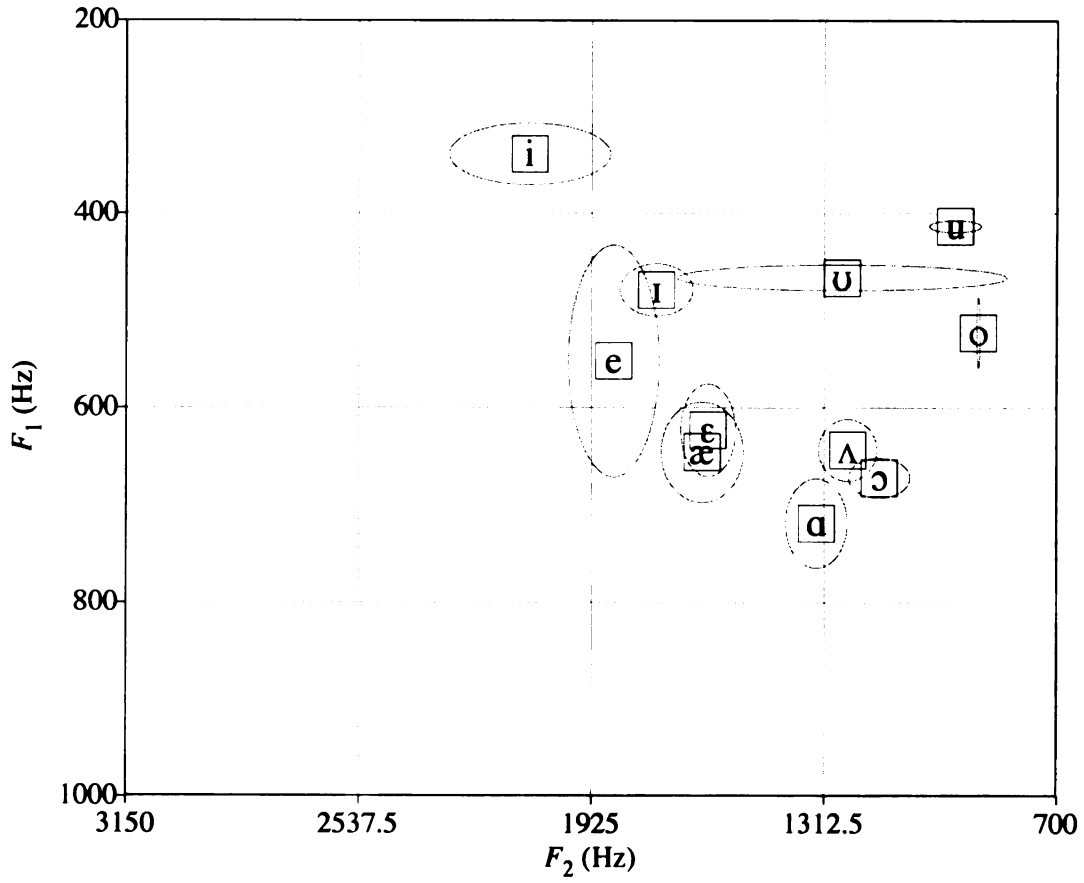


Figure 6.14: Jack, age 49, second generation

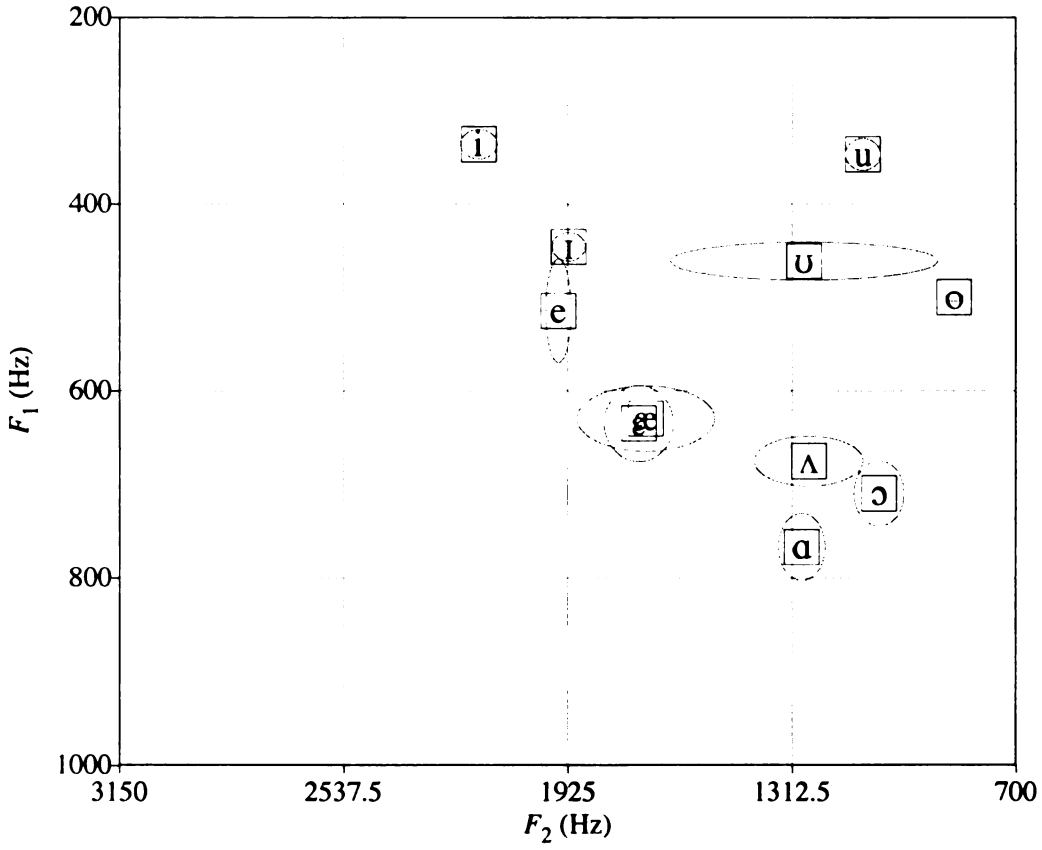


Figure 6.15: Gilberto, age 54, born in Fresnillo, Zacatecas, Mexico; moved to south Texas (area not specified) at 4, then to Michigan at 24

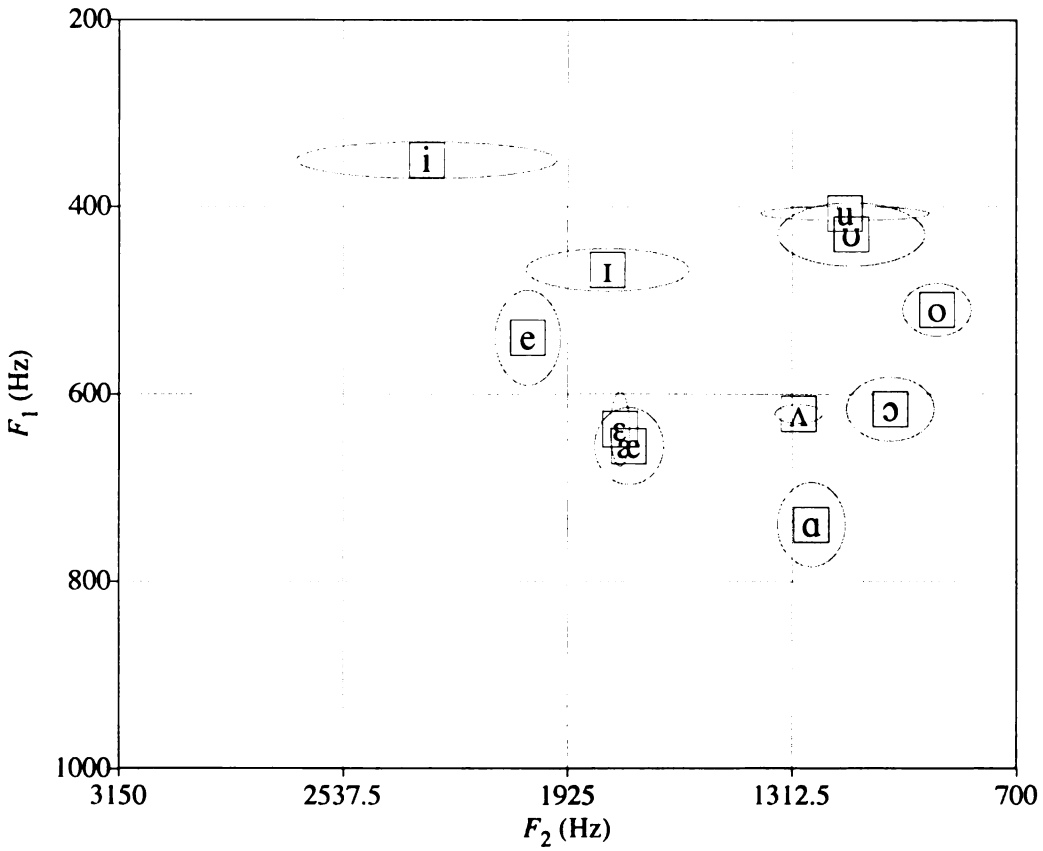


Figure 6.16: Terence, age 56, moved to Michigan from Seguin, Texas, at 22

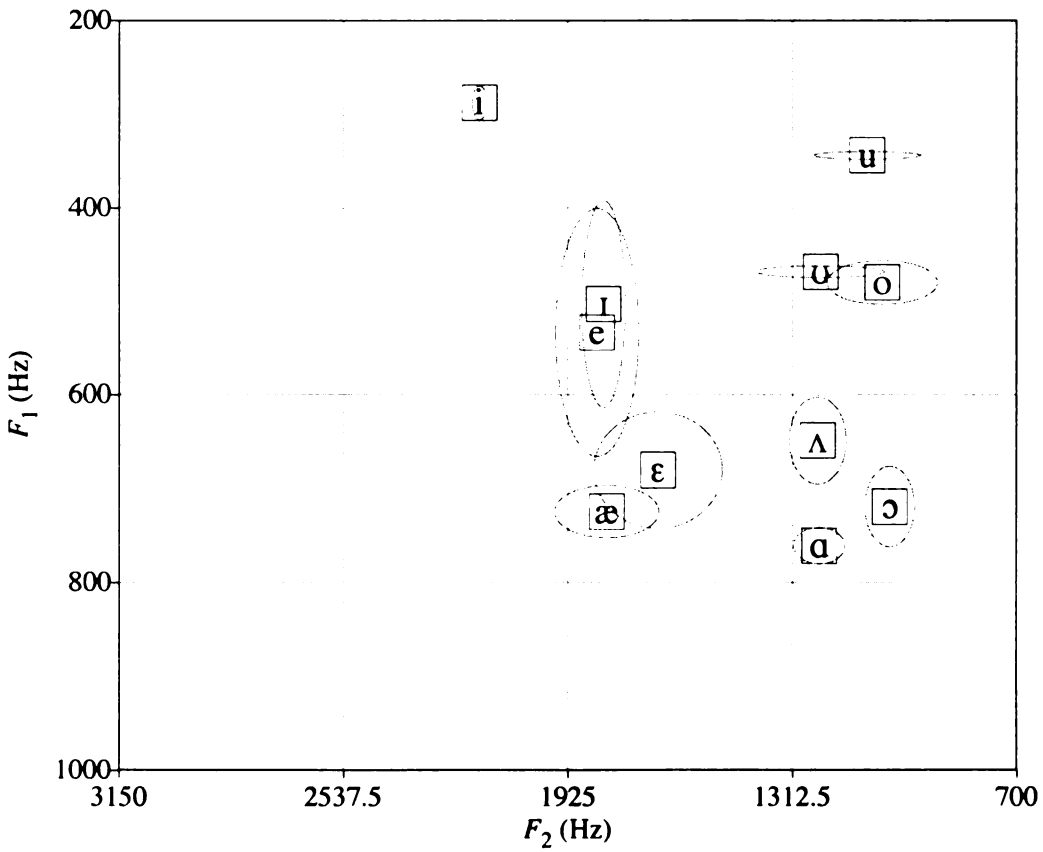
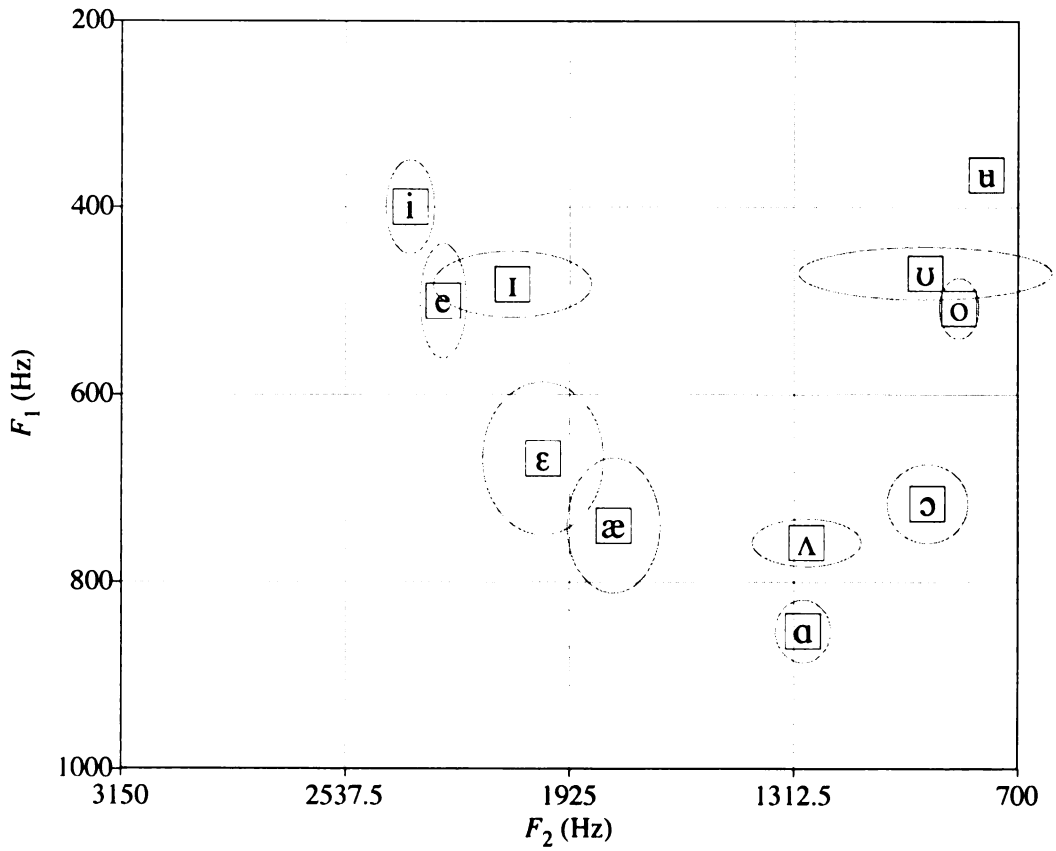


Figure 6.17: Walter, age 71, moved to Michigan from Eagle Pass, Texas, at 3



Women's Charts

Figure 6.18: Lucy B, age 14, second generation

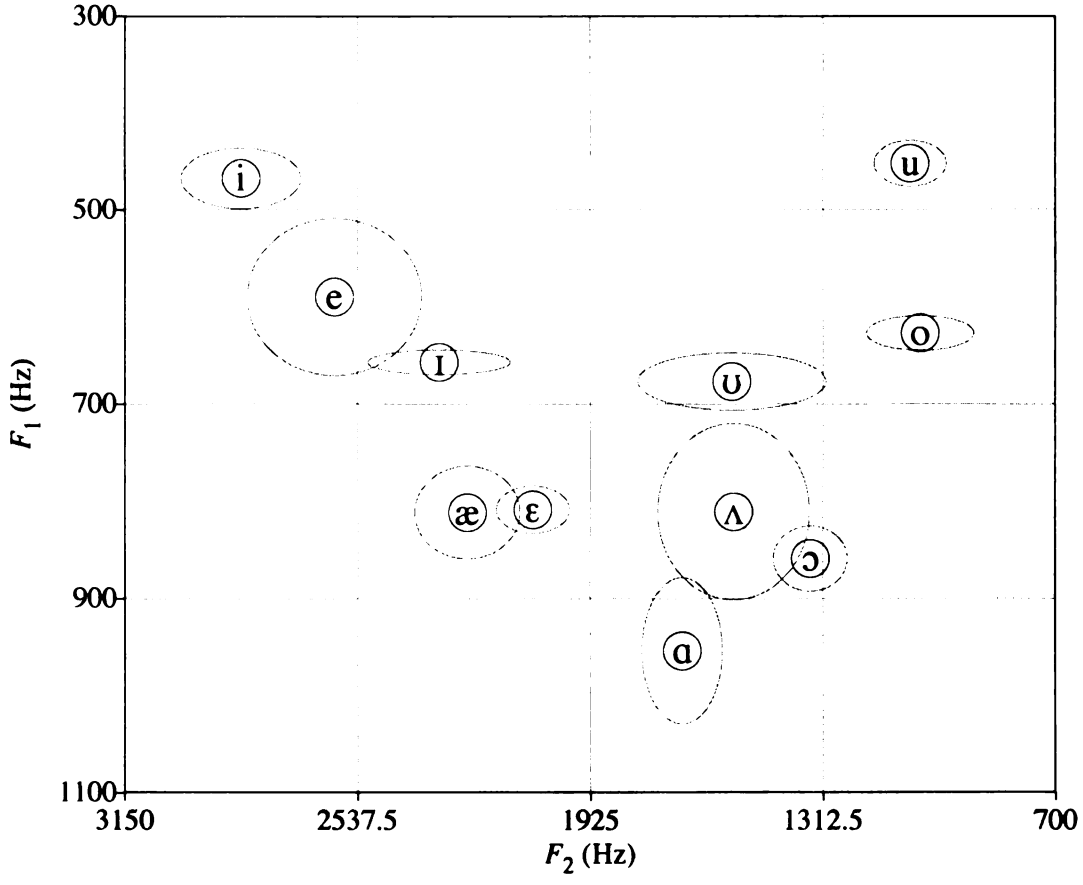


Figure 6.19: Melinda H, age 16, third generation

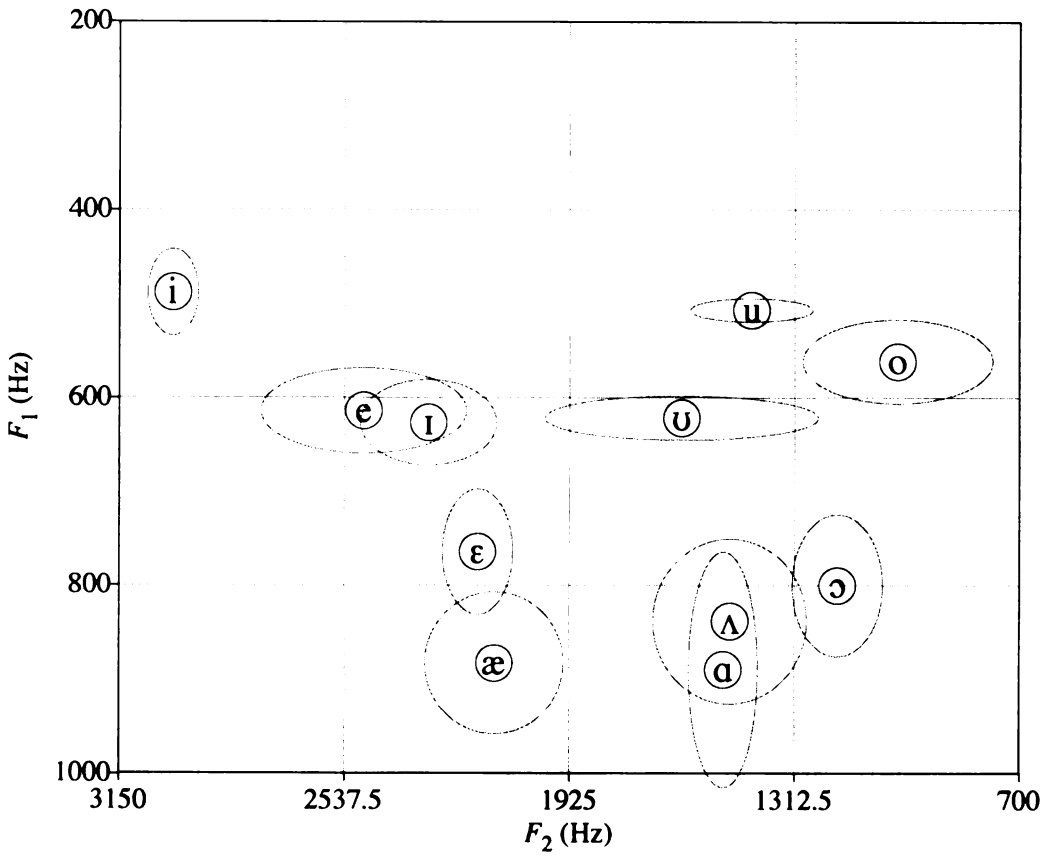


Figure 6.20: Estela, age 17, third generation

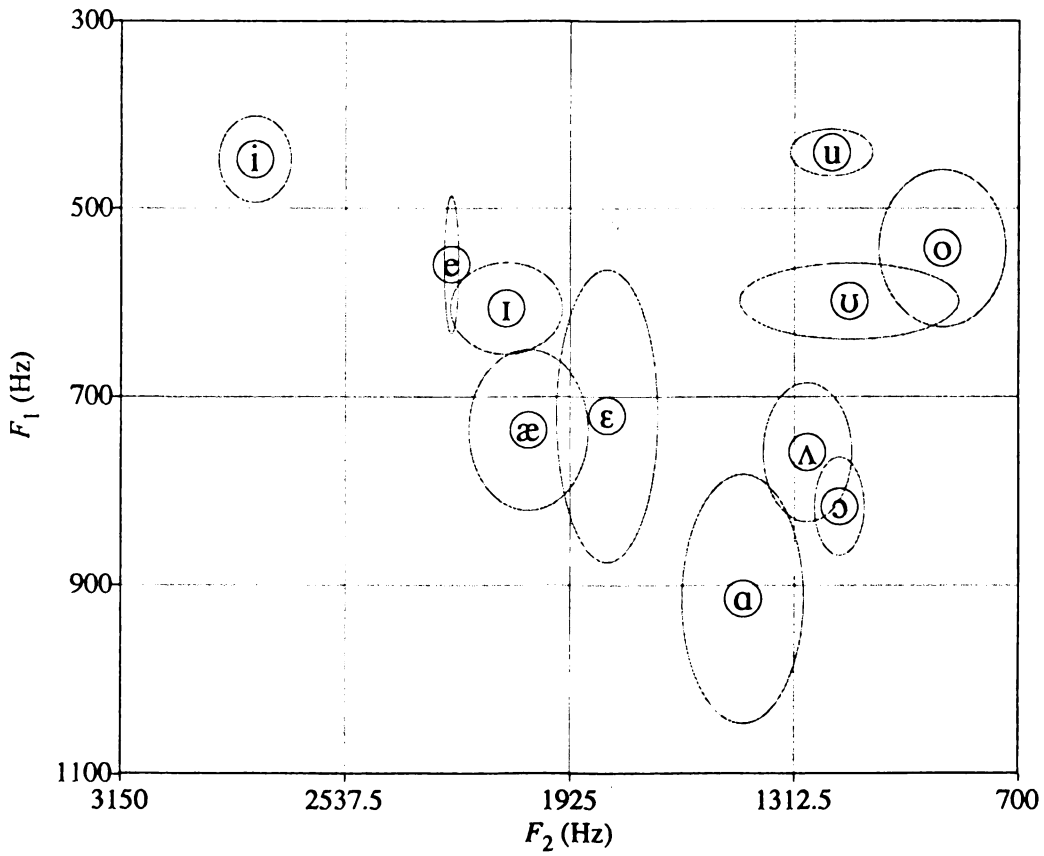


Figure 6.21: Lola, age 19, moved to Michigan from Mexico City at10

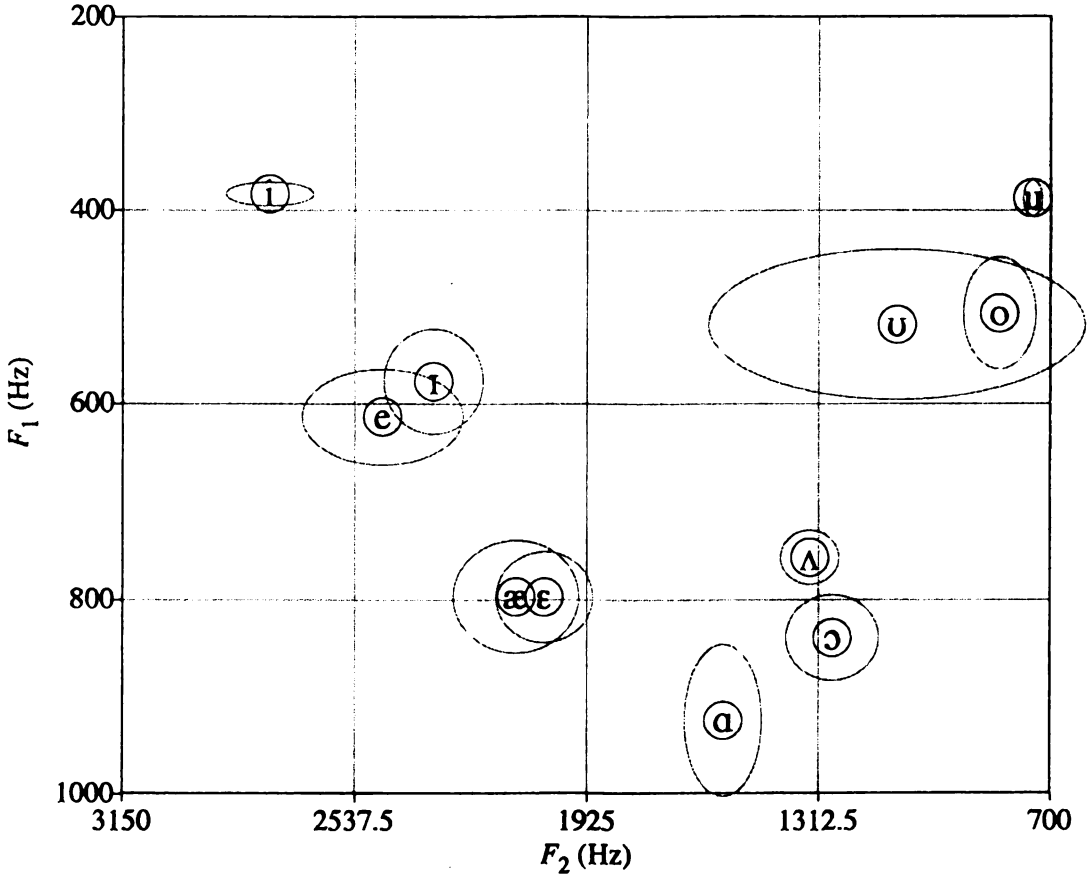


Figure 6.22: Emelia, age 20, second generation

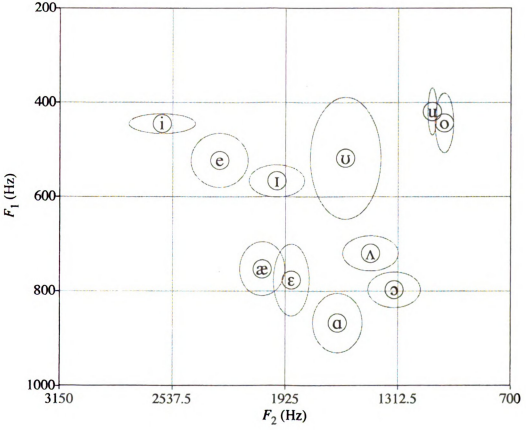


Figure 6.23: Judith, age 21, second generation

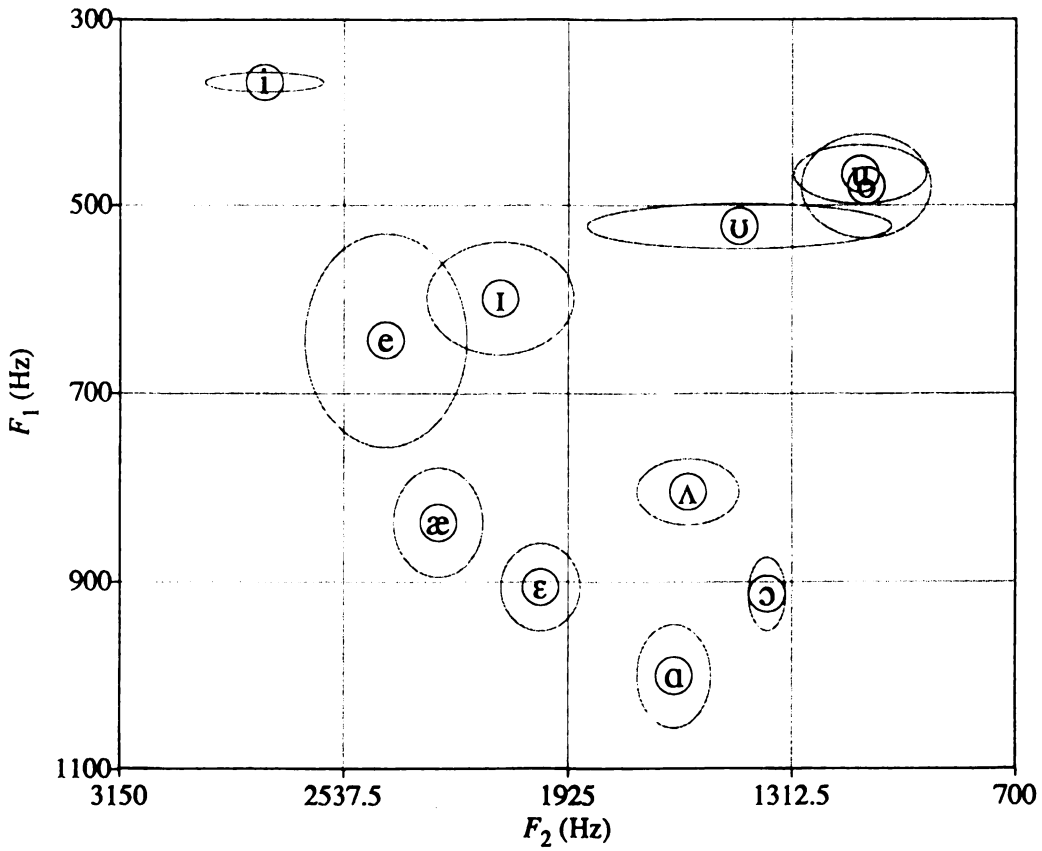


Figure 6.24: Solana T, age 22, third generation

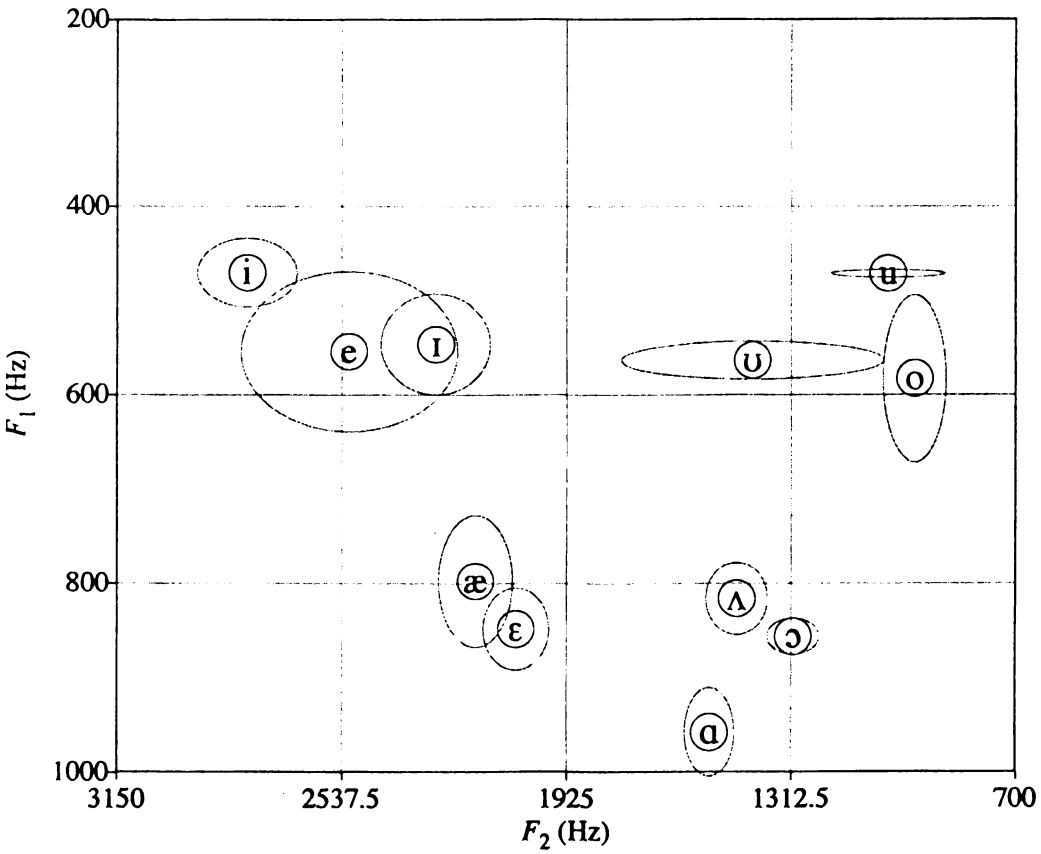


Figure 6.25: Ana, age 28, third generation

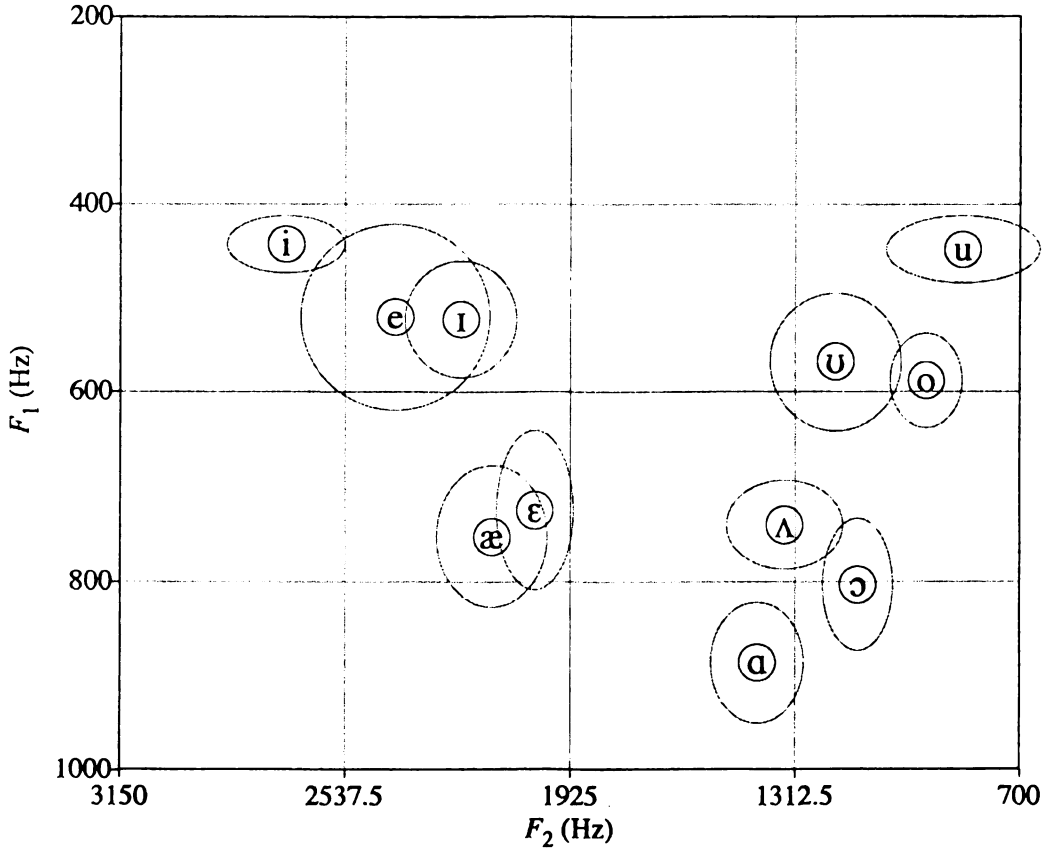


Figure 6.26: Sabina H, age 35, second generation

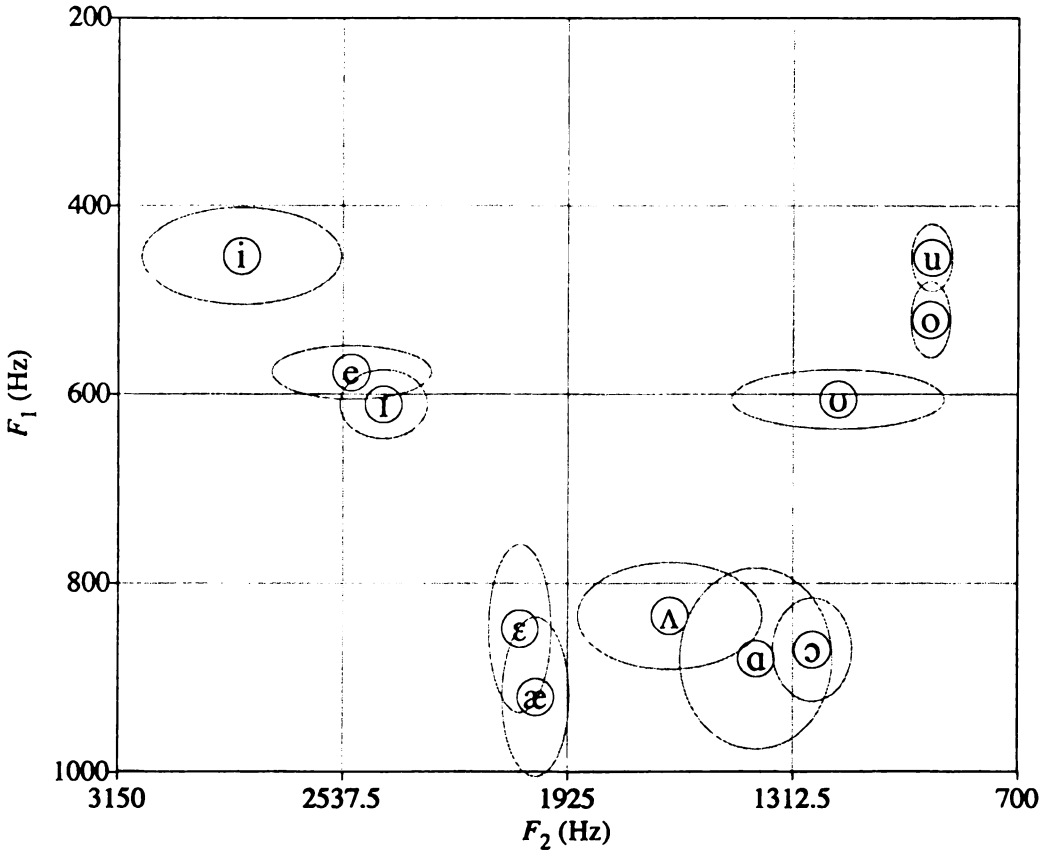


Figure 6.27: Cynthia, age 39, moved to Michigan from Robstown, Texas, at 21

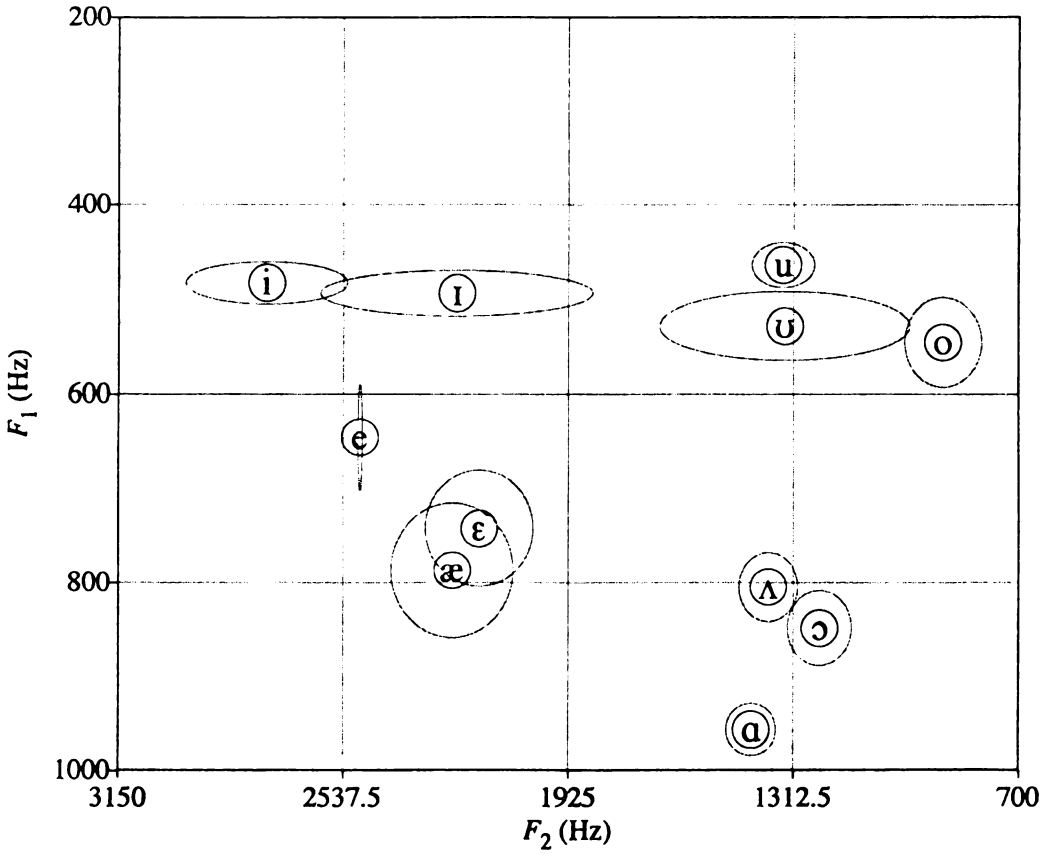


Figure 6.28: Loretta B, age 40, moved to Michigan from Seguin, Texas, at 10

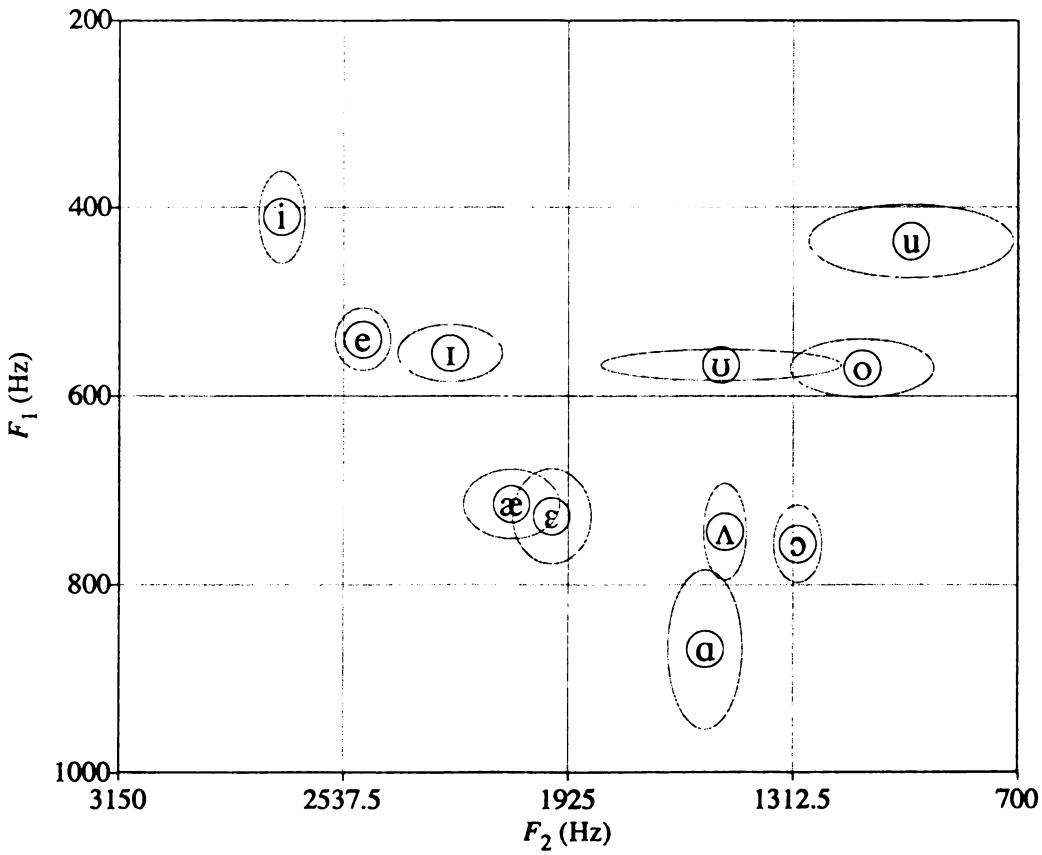


Figure 6.29: Melissa, age 42, moved to Michigan from San Antonio, Texas, at 10

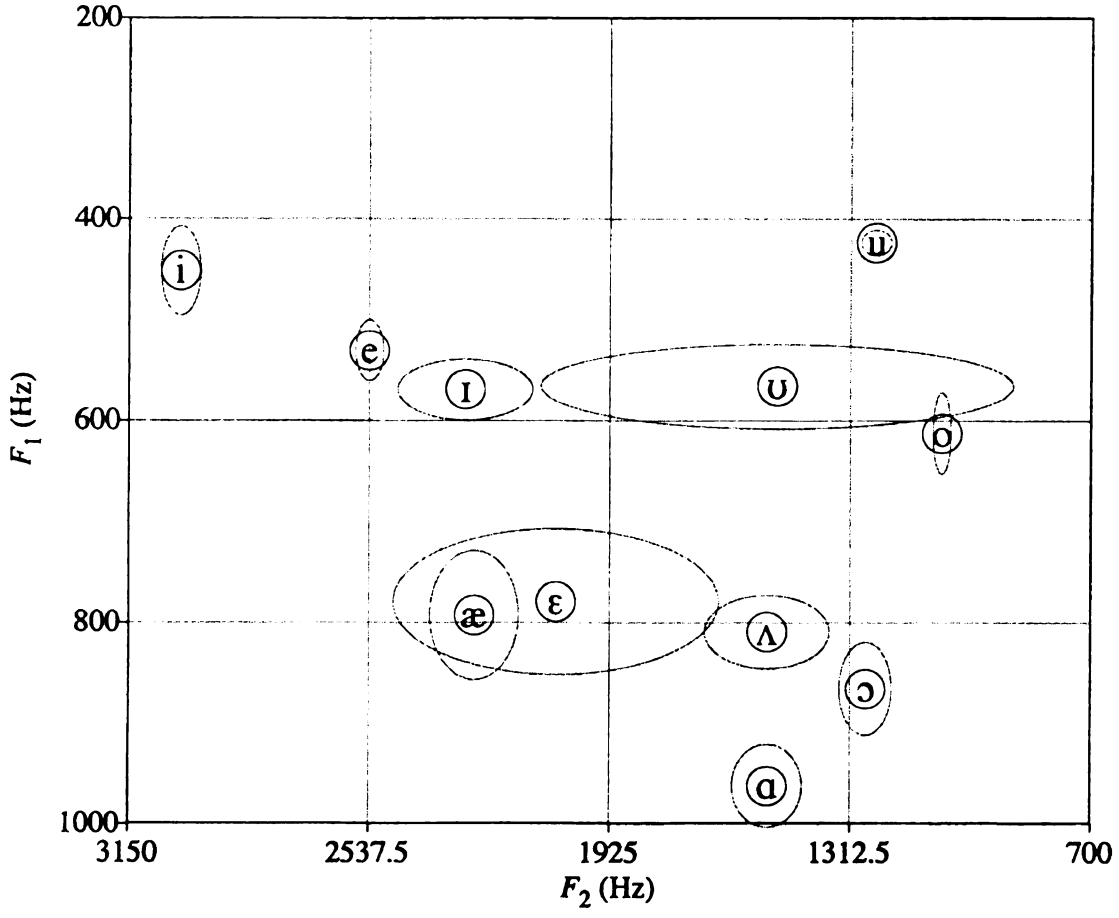


Figure 6.30: Mabel, age 45, second generation

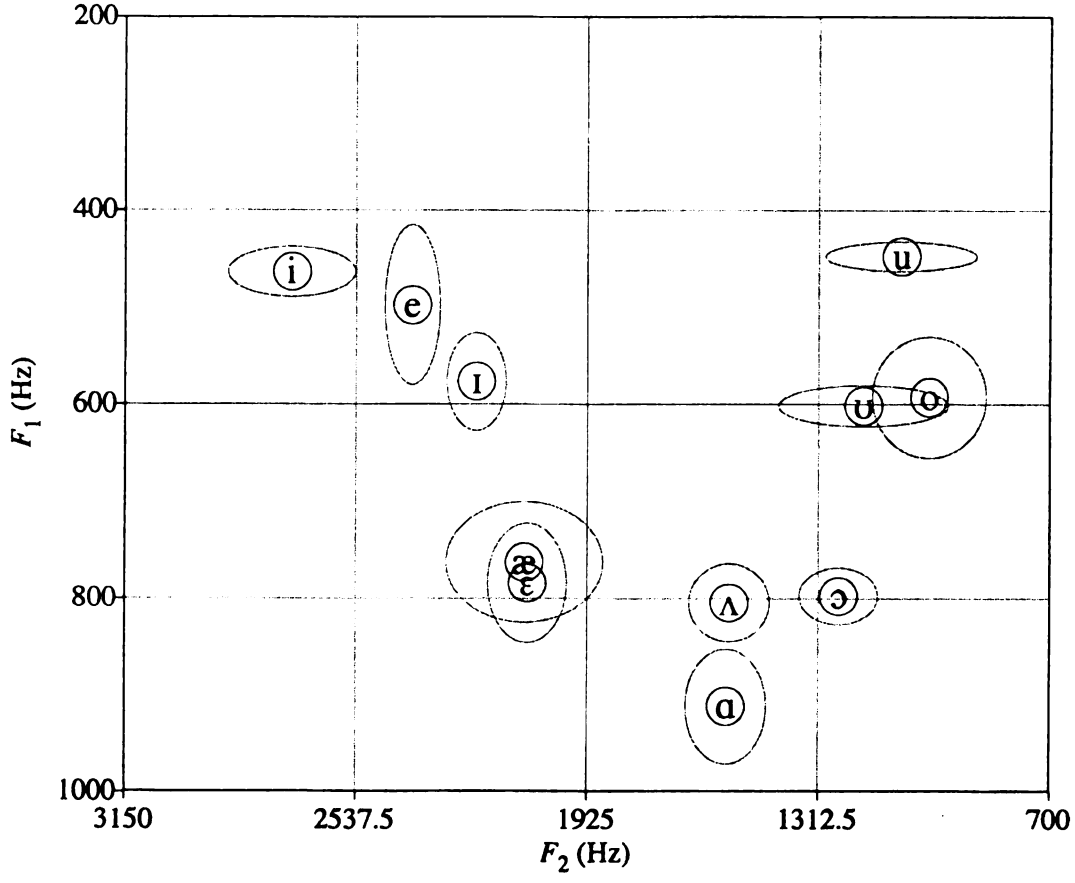


Figure 6.31: Madeleine, age 47, moved to Michigan from Reynosa, Tamaulipas, Mexico, at 12

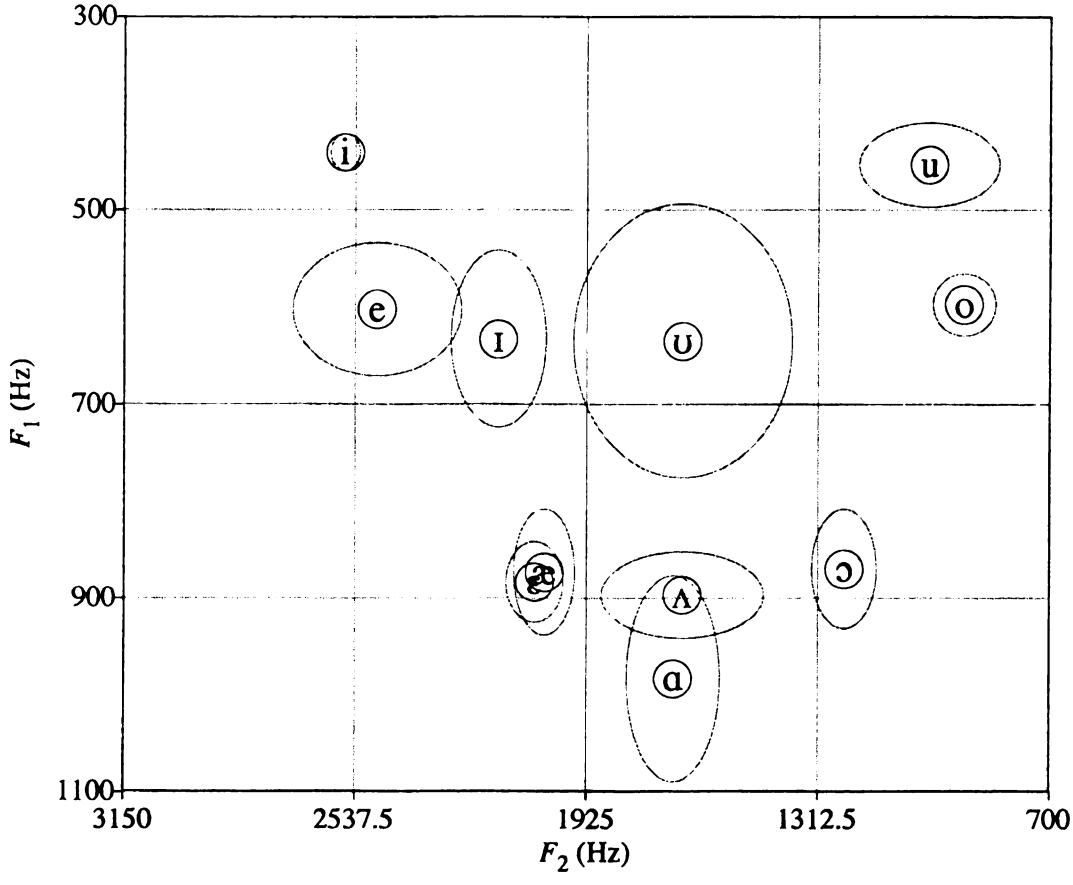
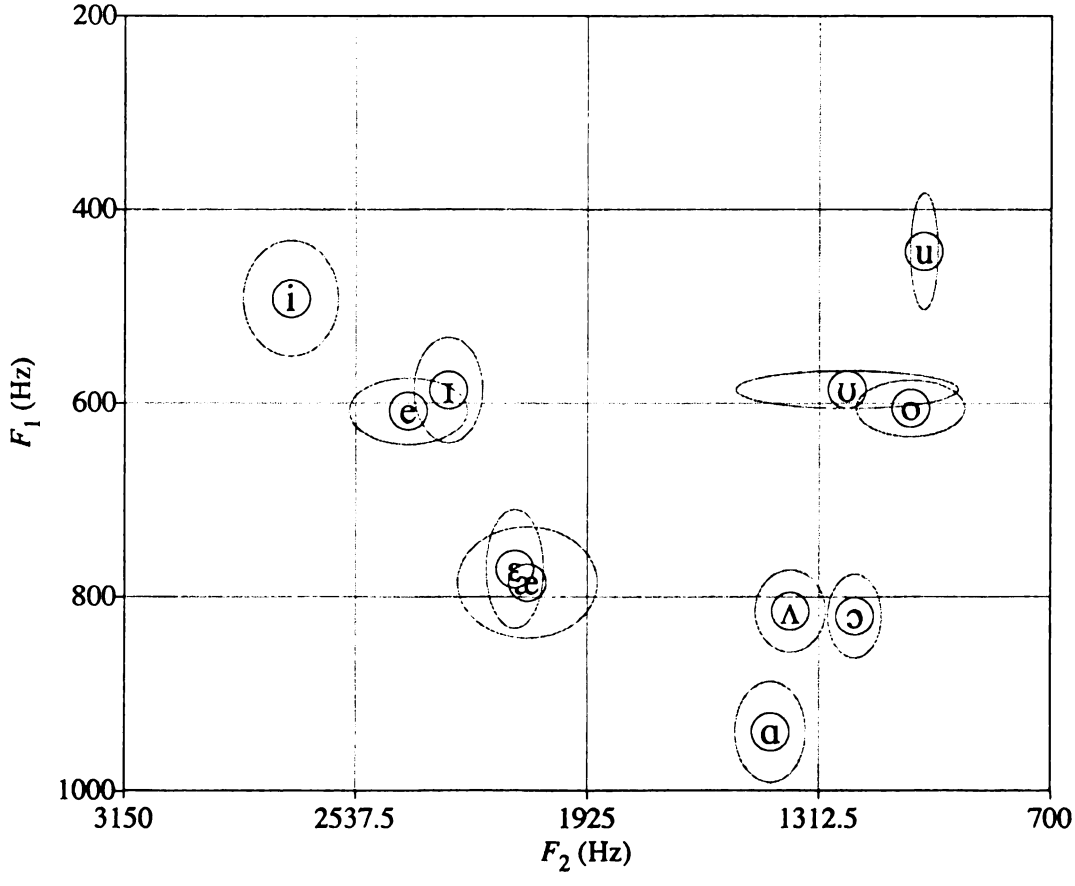


Figure 6.32: Simona H, age 59, moved to Michigan from Laredo, Texas, at 24



REFERENCES

REFERENCES

Adank, Patti, Roel Smits and Roeland van Hout. 2004. "A Comparison of Vowel Normalization Procedures for Language Variation Research." *The Journal of the Acoustical Society of America* 116, 5: 3099-3107.

Anderson, Bridget. 2002. "Dialect Leveling and /ai/ Monophthongization among African American Detroiters." *Journal of Sociolinguistics* 6: 86-98.

Anderson, Bridget and Lesley Milroy. 1999. "Southern Sound Changes in the Detroit AAVE Vowel System." Paper presented at the 28th annual conference on New Ways of Analyzing Variation (NWAV 28).

Alvarado, Rudolph and Sonya Alvarado. 2003. *Mexicans and Mexican Americans in Michigan.* Discovering the Peoples of Michigan series. East Lansing, MI: Michigan State University Press.

Ash, Sharon. 1999. "Word List Data and the Measurement of Sound Change." Paper presented at the 28th annual conference on New Ways of Analyzing Variation (NWAV 28).

Baugh, John. 1984. "Chicano English: The Anguish of Definition." In Ornstein-Galicia, 3-13.

Bailey, Guy and Natalie Maynor. 1987. "Decreolization?" *Language in Society* 16: 449-473.

Bayley, Robert. 1994. "Consonant Cluster Reduction in Tejano English." *Language Variation and Change* 6, 3: 303-326.

_____. 1997. "Variation in Tejano English: Evidence for Variable Lexical Phonology." In *Language Variety in the South Revisited.* Cynthia Bernstein, Thomas Nunnally and Robin Sabino (eds). Tuscaloosa: University of Alabama Press, 197-209.

_____. 1999. "Relativization Strategies in Mexican American English." *American Speech* 74, 2: 115-139.

Beddor, Pamela and Sarah Hawkins. 1990. "The Influence of Spectral Prominence on Perceived Vowel Quality." *The Journal of the Acoustical Society of America* 87, 6: 2684-2704.

Bernstein, Cynthia. 1993. "Measuring Social Causes of Phonological Variation in Texas." *American Speech* 68: 227-240.

Bradlow, Ann. 1995. "A Comparative Acoustic Study of English and Spanish Vowels." *The Journal of the Acoustical Society of America* 97, 3: 1916-1924.

Callary, Robert. 1975. "Phonological change and the development of an urban dialect in Illinois." *Language in Society* 4:155-170.

Carter, Phillip. 2004. *The emergence of Hispanic English in the Raleigh community: A sociophonetic analysis*. MA thesis. Raleigh, NC: North Carolina State University.

Chambers, J.K. 1992. "Dialect acquisition." *Language* 68: 673-705.

_____. 2002. "The Ethan Experience: Native Phonology in Immigrant Offspring." In *Investigating Change and Variation through Dialect Contact*. Lesley Milroy (ed.). *Sociolinguistics* 6: 117-130.

Denning, Keith. 1989. "Convergence with Divergence: A Sound Change in Vernacular Black English". *Language Variation and Change* 1, 2: 145-167.

Deser, Toni. 1991. *Dialect transmission: An analysis of vowels in six urban Detroit families*. Bloomington, IN: Indiana University Linguistics Club.

Doran, Amanda. 2001. *Language Use and Identity in a Bilingual Community: Re-examining the English of Mexican Americans*. PhD dissertation. University of Texas-Austin.

Eckert, Penelope. 1988. "Adolescent Social Structure and the Spread of Linguistic Change." *Language and Society* 17: 183-207.

_____. 1989. *Jocks and Burnouts: Social Identity in the High School*. New York: Teachers College Press.

Edwards, Walter. 1997. "The Variable Persistence of Southern Vernacular Sounds in the Speech of Inner-City Black Detroiters." In *Language Variation in the South Revisited*. Cynthia Bernstein, Thomas Nunnally and Robin Sabino (eds). Tuscaloosa: University of Alabama Press, 76-86.

Evans, Betsy E. 2001. *Dialect contact and the northern cities shift in Ypsilanti, Michigan*. Unpublished PhD dissertation. East Lansing, MI: Michigan State University.

Betsy Evans, Rika Ito, Jamila Jones, and Dennis R. Preston. 2000. "Change on top of change: Social and regional accommodation to the Northern Cities Chain Shift." H. Bennis, H. Ryckeboer and J. Stroop (eds). De Toekomst van de Variatielinguitiek (a special issue of Taal en Tongval to honor Dr. Jo Daan on her ninetieth birthday), 61-86.

Fasold, Ralph. 1969. "A sociolinguistic study of the pronunciation of three vowels in Detroit speech". Mimeographed.

Feagin, Crawford. 2003. "Vowel Shifting in the Southern States." In *English in the Southern United States*. Stephen Nagle and Sara Sanders (eds). Cambridge: Cambridge University Press, 126-40.

Flege, James, Ian MacKay and Diane Meador. 1999. "Native Italian Speakers' Perception and Production of English Vowels." *The Journal of the Acoustical Society of America* 105, 5: 2973-87.

Flege, James, Carlo Schirru and Ian MacKay. 2003. "Interaction Between the Native and Second Language Phonetic Subsystems." *Speech Communication* 40: 467-491.

Flege, James and Ian MacKay. 2004. "Perceiving Vowels in a Second Language." *Studies in Second language Acquisition* 26: 1-34.

Fox, Robert, James Flege and Murray Munro. 1995. "The Perception of English and Spanish Vowels by Native English and Spanish listeners: A Multidimensional Scaling Analysis." *The Journal of the Acoustical Society of America* 97, 4: 2540-51.

Fought, Carmen. 1999. "A majority sound change in a minority community: /u/-fronting in Chicano English. *Journal of Sociolinguistics* 3,1: 5-23.

_____ 2003. *Chicano English in Context*. New York: Palgrave Macmillan.

Frazer, Timothy. 1996. "Chicano English and Spanish Interference in the Midwestern United States." *American Speech* 71, 1: 72-85.

Fridland, Valerie. 2001. "The Social Dimension of the Southern Vowel Shift: Gender, Age, and Class." *Journal of Sociolinguistics* 5: 233-53.

_____ 2003. "Network Strength and the Realization of the Southern Vowel Shift Among African Americans in Memphis, Tennessee." *American Speech* 78, 1: 3-30.

Galindo, Delma Letticia. 1988. *Linguistic Influence and Variation on the English of Chicano Adolescents in Austin, Texas*. PhD dissertation. University of Texas-Austin.

Giles, Howard and Patricia Johnson. 1987. "Ethnolinguistic Identity Theory: A Social Psychological Approach to Language Maintenance." *International Journal of the Sociology of Language* 68: 69-99.

Godinez, Manuel, Jr. 1981. "An Acoustic Study of Mexican and Brazilian Portuguese Vowels." *Hispania* 64, 4: 594-600.

_____. 1984. "Chicano English Phonology: Norms vs. Interference Phenomena." In Ornstein-Galicia, 42-48.

Godinez, Manuel, Jr. and Ian Maddieson. 1985. "Vowel Differences Between Chicano and General Californian English?" *International Journal of the Sociology of Language* 53: 43-58.

Goodheart, Jill Christine. 2004. *I'm no Hoosier!: Evidence of the Northern Cities Shift in St. Louis, Missouri.* Unpublished masters thesis. East Lansing, MI: Michigan State University.

Gonzales, Maria Dolores. 1999. "Crossing Social and Cultural Borders: The Road to Language Hybridity." In *Speaking Chicana: Voice, Power, and Identity.* Delma Letticia Galindo and Maria Dolores Gonzalez (eds). Tucson, AZ: University of Arizona Press, 13-38.

Gordon, Matthew. 1997. "Urban Sound Change Beyond City Limits: The Spread of the Northern Cities Shift in Michigan". PhD Dissertation, University of Michigan.

_____. 2000. "Phonological Correlates of Ethnic Identity: Evidence or Divergence? *American Speech* 75,2: 115-136.

_____ 2001. *Small Town Values and Big-City Vowels: A Study of the Northern Cities Shift in Michigan.* Publication of the American Dialect Society 84. Durham, NC: Duke University Press.

Guion, Susan, James Flege and Jonathan Loftin. 2000. "The effect of L1 use on pronunciation in Quichua-Spanish bilinguals." *Journal of Phonetics* 28: 27-42.

Gumperz, John and Stephen Levinson (eds.). 1996. *Rethinking Linguistic Relativity.* Cambridge: Cambridge University Press.

Hagiwara, Robert. 1997. "Dialect variation and Formant Frequency: The American English Vowels Revisited." *The Journal of the Acoustical Society of America* 102,1: 655-658.

Hamilton, Westley. 1977. "Phonological Variations Observed in San Antonio, Texas." *Journal of the Linguistic Association of the Southwest* 2, 3-4: 83-93.

Hartford, Beverly. 1975. *The English of Mexican-American Adolescents in Gary, Indiana: A Sociolinguistic Description.* PhD Dissertation. University of Texas-Austin.

_____. 1978. "Phonological Differences in the English of Adolescent Female and Male Mexican-Americans. *International Journal of the Sociology of Language* 17: 55-64.

Hazen, Kirk. 2002. "Identity and Language Variation in a Rural Community". *Language* 78, 2: 240-257.

Henderson, Anita. 1995. "The short a pattern of Philadelphia among African American speakers". University of Pennsylvania Working Papers in Linguistics 3,1: 127-140. Philadelphia: Department of Linguistics, University of Pennsylvania.

Hernandez-Chavez, Eduardo, Andrew Cohen and Anthony Beltramo (eds). 1975. *El Lenguaje de los Chicanos*. Arlington, VA: Center for Applied Linguistics.

Herndobler, Robin. 1993. "Sound Change and Gender in a Working-Class Community". In *"Heartland" English: Variation and Change in the American Midwest.* Timothy Frazer (ed.). University of Alabama Press, 137-156.

Hillenbrand, James, Laura Getty, Michael Clark and Kimberlee Wheeler. 1995. "Acoustic Characteristics of American English Vowels." *The Journal of the Acoustical Society of America* 97, 5: 3099-3111.

Hillenbrand, James, Michael Clark and Terrance Nearey (2001). Effects of Consonant Environment on Vowel Formant Patterns. *The Journal of the Acoustical Society of America* 109, 2: 748-763.

Hinton, Leanne, Birch Moonwomon, Sue Bremner, Herb Luthin, Mary Van Clay, Jean Lerner and Hazel Corcoran. 1987. "It's not just the Valley Girls: A study of California English. In Jon Aske, Natasha Beery, Laura Michaels and Hana Filip (eds). *Proceedings of the Thirteenth Annual Meeting of the Berkeley Linguistics Society*. Berkeley, CA: Berkeley Linguistics Society, 117-127.

Hymes, Dell. 1974. *Foundations in Sociolinguistics: An Ethnographic Approach.* Philadelphia: University of Pennsylvania.

Ito, Rika. 1999. *Diffusion of Urban Sound Change in Rural Michigan: A Case of the Northern Cities Shift*. Unpublished PhD dissertation. East Lansing, MI: Michigan State University.

Jones, Jamila. 2003. *African Americans in Lansing and the Northern Cities Vowel Shift.* Unpublished PhD dissertation. East Lansing, MI: Michigan State University.

Kerswill, Paul and Ann Williams. 2000. "Creating a new town koine: Children and language change in Milton Keynes". *Language in Society* 29, 1: 65-115.

Kerswill, Paul and Susan Wright. 1990. "The Validity of Phonetic Transcription: Limitations of a Sociolinguistic Research Tool." *Language Variation and Change* 2: 255-75.

Kingston, J. 1991. "Integrating Articulations in the Perceptions of Vowel Height." *Phonetica* 48: 149-179.

Knack, Rebecca. 1991. "Ethnic Boundaries in Linguistic Variation." In *New Ways of Analyzing Sound Change*. Penelope Eckert (ed.). San Diego: Academic Press, 251-72.

Kuhl, Patricia. 1993. "Early Linguistic Experience and Phonetic Perception: Implications for Theories of Developmental Speech Perception." *Journal of Phonetics* 21: 125-139.

Labov, William. 1963. "The social motivation of a sound change." *Word* 19:273-309.

_____ 1966. *The Social Stratification of English in New York City*. Washington, D.C.: Center for Applied Linguistics.

_____ 1972. *Sociolinguistic Patterns*. Philadelphia: University of Pennsylvania Press.

_____ 1990. "The intersection of sex and social class in the course of linguistic change." *Language Variation and Change* 2:205-254.

_____ 1994. *Principles of Linguistic Change*. Vol. 1, *Internal Factors*. Language in Society 20. Oxford: Blackwell.

_____ 2001. *Principles of Linguistic Change*. Vol. 2, *Social Factors*. Language in Society 29. Oxford: Blackwell.

Labov, William, Paul Cohen, Clarence Robbins, and John Lewis. 1968. A Study of the Non-standard English of Negro and Puerto-Rican Speakers in New York City. Report no. 3288. Philadelphia: US Regional Survey.

Labov, William, Malcah Yaeger and Richard Steiner. 1972. *A Quantitative Study of Sound Change in Progress*. Philadelphia: U.S. Regional Survey.

Labov, William and Wendell Harris. 1986. "De Facto Segregation of Black and White Vernaculars". In *Diversity and Diachrony*. David Sankoff (ed.). Amsterdam: John Benjamins, 1-24.

Labov, William, Sharon Ash and Charles Boberg. 2005. *The Atlas of North American English*. Berlin: Mouton de Gruyter.

Ladefoged, Peter. 1993. *A Course in Phonetics*. Third Edition. Fort Worth, TX: Harcourt Brace.

LANCS. Linguistic Atlas of the North-Central States. 1977. Raven McDavid, Jr. and Richard Payne (eds.). Manuscript on Cultural Anthropology, series 38, nos. 200-208. Chicago: University of Chicago Press Microfilm.

Lecumberri, M. Luisa Garcia and Jasone Cenoz Iragui. 1997. "L2 Perception of English Vowels: Testing the Validity of Kuhl's Prototypes". *Revista Alicantina de Estudios Ingleses* 10: 55-68.

Lee, Hikyoung. 2000. *Korean Americans as Speakers of English: The Acquisition of General and Regional Features.* PhD Dissertation. University of Pennsylvania.

Li, Wen Lang. 1982. "The language Shift of Chinese-Americans." *International Journal of the Sociology of Language* 38: 109-124.

Majors, Tivoli. 2005. "Low Back Vowel Merger in Missouri Speech: Acoustic Description and Explanation." *American Speech* 80,2: 165-179.

Macias, Reynaldo. 1990. "Bilingualism, Language Contact, and Immigrant Languages." *Annual Review of Applied Linguistics* 10: 13-25.

McDavid, Raven, Jr. 1958. "The Dialects of American English." In *The Structure of American English.* W. Nelson Francis (ed.). New York: Ronald, 480-543.

McDowell, John and Susan McRae. 1972. "Differential response of the Class and Ethnic Components of the Austin Speech Community to Marked Phonological Variables." *Anthropological Linguistics* 14, 6: 228-239.

Mendoza-Denton, Norma. 1997. *Chicana/Mexicana Identity and Linguistic Variation: An Ethnographic and Sociolinguistic Study of Gang Affiliation in an Urban High School.* PhD dissertation. Palo Alto, CA: Stanford University.

_____. 1999. "Fighting Words: Latina Girls, Gangs, and Language Attitudes." In *Speaking Chicana: Voice, Power, and Identity.* Delma Letticia Galindo and Maria Dolores Gonzalez (eds). Tucson, AZ: University of Arizona Press, 39-56.

Metcalf, Allan. 1974. "The Study of California Chicano English." *International Journal of the Sociology of Language* 2: 53-58.

_____. 1979. *Chicano English.* Arlington, VA: Center for Applied Linguistics.

Milroy, James and John Harris. 1980. "When is a Merger not a Merger? The MEAT/MATE problem in a present-day English vernacular. *English World Wide* 1: 199-210.

Milroy, Lesley. 1987 [reprint edition 1989]. *Language and Social Networks. Second Edition.* Oxford: Blackwell.

Moriello, Rebecca. 2003. *"I'm feeksin' to move...": Hispanic English in Siler City, North Carolina.* MA thesis. Raleigh, NC: North Carolina State University.

Myhill, John and Wendell Harris. 1986. "The Use of the Verbal *–s* Inflection in Black English Vernacular." In *Diversity in Diachrony.* David Sankoff (ed.) Amsterdam: Benjamins, 25-32.

Newman, Michael. 2003. "New York City English." *Language Magazine* (August).

Ohala, John. 1981. "The Listener as a Source of Sound Change." In *Papers from the Parasession on Language and Behavior, Chicago Linguistic Society, May 1-2, 1981.* Carrie S. Masek, Roberta A. Hendrick and Mary Frances Miller (eds). Chicago: Chicago Linguistic Society.

Ornstein, Jacob and Paul Goodman. 1979. "Socio-Educational Correlates of Mexican-American Bilingualism." In *Sociolinguistic Studies in Language Contact: Methods and Cases.* William Francis Mackey and Jacob Ornstein (eds). Trends in Linguistics: Studies and Monographs 6. The Hague: Mouton, 393-421.

Ornstein-Galicia, Jacob (ed). 1984 [reprint edition 1988]. *Form and Function in Chicano English.* Rowley, MA: Newbury House.Patrick, Peter. 2002. "The Speech Community." In *The Handbook of Language Variation and Change.* Chambers, J.K., Peter Trudgill and Natalie Schilling-Estes (eds). Oxford: Blackwell, 573-597.

Patrick, Peter. 2002. "The Speech Community." In *The Handbook of Language Variation and Change.* J.K. Chambers, Peter Trudgill and Natalie Schilling-Estes (eds.). Oxford: Blackwell, 573-597.

Penalosa, Fernando. 1980. *Chicano Sociolinguistics: A Brief Introduction.* Long Beach, CA: California State University.

Penfield, Joyce and Jacob Ornstein-Galicia. 1985. *Chicano English: An Ethnic Contact Dialect.* Amsterdam: John Benjamins.

Peterson, Gordon and Harold Barney. 1952. "Control Methods Used in a Study of the Vowels." *The Journal of the Acoustical Society of America* 24, 2: 175-184.

Plichta, Bartłomiej. 2004. *Interdisciplinary Perspectives on the Northern Cities Chain Shift.* Unpublished PhD dissertation. East Lansing, MI: Michigan State University.

Poplack, Shana. 1978. "Dialect acquisition among Puerto Rican bilinguals." *Language in Society* 7: 89-103.

Preston, Dennis R. 2005. "Belle's Body Just Caught the Fit Gnat: The Perception of Northern Cities Shifted Vowels by Local Speakers." University of Pennsylvania Working Papers in Linguistics 11,2: 133-46. Philadelphia: Department of Linguistics, University of Pennsylvania.

Purnell, Thomas, Joseph Salmons and Dilara Tepeli. 2005. "German Substrate Effects in Wisconsin English: Evidence for Final Fortition." *American Speech* 80,2: 135-164.

Sankoff, Gillian. 2002 [reprint edition 2004]. "Linguistic Outcomes of Language Contact." In *The Handbook of Language Variation and Change*. Chambers, J.K., Peter Trudgill and Natalie Schilling-Estes (eds). Oxford: Blackwell, 638-668.

Santa Ana, Otto. 1991. *Phonetic Simplification Processes in the English of the Barrio.* PhD dissertation, University of Pennsylvania.

_____ 1993. "Chicano English and the Nature of the Chicano Language Setting." *Hispanic Journal of Behavioral Sciences* 15,1: 3-35.

_____ 1996. "Sonority and Syllable Structure in Chicano English." *Language Variation and Change* 8: 63-89.

Sawyer, Janet. 1973. "Social Aspects of Bilingualism in San Antonio, Texas." In *Varieties of Present-Day English.* Bailey, Richard and Jay Robinson (eds). New York: MacMillan, 226-233.

_____ 1975. Spanish-English Bilingualism in San Antonio, Texas. In *El Lenguaje de los Chicanos*. E. Hernandez-Chavez, A. Cohen and A. Beltramo (eds). Arlington, VA: Center for Applied Linguistics, 77-98. [Reprinted from G. G. Gilbert (ed). 1970. *Texas studies in Bilingualism: Spanish, French, German, Czech, Polish, Serbian and Norwegian in the Southwest.* Berlin: Walter de Gruyter, 18-41].

Schecter, Sandra and Robert Bayley. 2002. *Language as Cultural Practice: Mexicanos en el Norte*. Mahwah, NJ: Lawrence Erlbaum Associates.

Scovel, Thomas. 1995. "Differentiation, Recognition, and Identification in the Discrimination of Foreign Accents." In *Phonological Acquisition and Phonological Theory*. John Archibald (ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, 169-181.

Stevens, Kenneth. 1998. *Acoustic Phonetics*. Cambridge, MA: MIT Press.

Thomas, Erik. 2000. "Spectral Differences in /ai/ Offsets Conditioned by Voicing of the Following Consonant." *Journal of Phonetics* 28: 1-25.

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

Trudgill, Peter. 1974. "Linguistic Change and Diffusion: Description and Explanation in Sociolinguistic Dialect Geography." *Language in Society* 3: 215-246.

_____ 1986. *Dialects in Contact.* Oxford: Blackwell.

_____ 2004. *New Dialect Formation: The Inevitability of Colonial Englishes.* Edinburgh: Edinburgh University Press.

Tsuzaki, Stanley. 1971. *English Influences on Mexican Spanish in Detroit.* The Hague: Mouton.

U.S. Bureau of the Census. 2000. *Census 2000.* http://www.census.gov/ (accessed August 26, 2005).

Wald, Benji. 1984. "The Status of Chicano English as a Dialect of American English." In Ornstein-Galicia, 14-31.

Warner, W. Lloyd. 1960. *Social Class in America: A Manual of Procedure for the Measurement of Social Status.* New York: Harper.

Weinreich, Uriel, William Labov and Marvin Herzog. 1968. "Empirical Foundations for a Theory of Language Change." In *Directions for Historical Linguistics.* W. Lehmann and Y. Malkiel (eds). Austin: University of Texas Press, 97-195.

Wolfram, Walt. 1974. *A Sociolinguistic Study of Assimilation: Puerto Rican English in New York City.* Washington, D.C.: Center for Applied Linguistics.

Wolfram, Walt, Phillip Carter, and Rebecca Moriello. 2004. "Emerging Hispanic English: New Dialect Formation in the American South." *Journal of Sociolinguistics* 8:339-358.

Wright, J. 1986. "The Behavior of Nasalized Vowels in the Perceptual Vowel Space." In *Experimental Phonology.* John Ohala and Jeri Jaeger (eds). Orlando: Academic Press, 45-67.