REGIONAL VARIATION IN CHICANO ENGLISH:
INCIPIENT DIALECT FORMATION AMONG L1 AND L2 SPEAKERS
IN BENTON HARBOR, MI

By

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ABSTRACT

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This ethnographic investigation of the vowel system of Mexican Americans in

Southwest Michigan addresses several holes in the literature, including the lack of

research on Mexican Americans outside in the American South and the interaction of

their dialect with regional variation. Sociolinguistics has a long tradition of exploring

both the language use of political minorities and the regional variation of those who

considered among the mainstream population, but it often ignores interaction between

the two. This work addresses such interaction among Mexican Americans in Benton

Harbor, Michigan, a town which is 95% African American, in terms of both their

production and their perception of vowels. This population, composed mostly of

former migrant workers, is only beginning to form a community, but linguistic patterns

similar to Roeder's (2006) study of an established community of Mexican Americans in

Lansing, Michigan, are already emerging. Contrary to Labov's (1994) claims that groups

like Latinos do not participate in regional variation, the vocalic patterns of Mexican

Americans in Benton Harbor and Lansing demonstrate accommodation to the Northern

Cities Shift (NCS), a regional change found among whites in the Inland North. This

work also addresses claims about substrate Spanish effects in the vowel system,

showing several of the claims about confusion patterns might be overstated. Finally, it

addresses the social situation that is conditioning the developing dialect, addressing

racial tensions and patterns of movement that might contribute to these speakers'

partial adoption of the NCS as opposed to other available local norms.

ACKNOWLEDGEMENTS

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CHAPTER 1: INTRODUCTION

1.0 Purpose of the study

The quantitative sociolinguistic research paradigm is known for investigating sources of language variation and change that are both internal, i.e. linguistic; and external, i.e. social, as exemplified in the fist two volumes of Labov's *Principles of Linguistic Change*, subtitled *Internal factors* (1994) and *Social factors* (2001). Major advancements have been made in the understanding of linguistic changes under this paradigm, but some of the earlier assumptions, particularly within the social paradigm, deserve further consideration. For example, it was generally assumed that political minority groups like African Americans and Latinos did not participate in mainstream regional phonetic changes (cf Labov [1994], who cites his own 1966 work). Labov has since reversed this position, stating in Labov, Ash, and Boberg (2006) that "several studies have found sharp divisions within the Latino community in orientation towards the surrounding local white dialect, African-American English, and traditional Spanish-speaking culture (Poplack 1978; Fought 1999, 2003)" while admitting that his own work, which included only Latinos who were "integrated into the mainstream speech community," was not designed to address these issues (297). The main goal of this dissertation is to contribute to the understanding of these issues through an investigation of the sociophonetic accommodation to regional norms by Mexican Americans in Southwest Michigan, whose language patterns also reflect acoustic patterns of a common heritage language. A secondary goal is to contribute to the call to begin to investigate more mobile populations (e.g. Chambers 2002) and more ethnically diverse groups (e.g. Tillery, Bailey & Wikle 2004; Meyerhoff & Nagy 2008) than have typically been considered in sociolinguistic research.

Previous research in Michigan has shown that European American speakers, particularly those in large urban areas, are participating in a rotation of the vowel space known as the Northern Cities Shift (see Gordon 2001 for an extensive review of this research). African-American Michiganders are not thought to participate fully in the shift and are more likely to reflect a far more conservative vowel system (though see Jones 2003). Little research has been done on Mexican Americans in this region, but the collective results of Roeder (2006), Ocumpaugh and Roeder (2007), Konopka and Pierrehumbert (2008), and Preston, Ocumpaugh, and Roeder (2009) suggest that a regionally distinct version of Mexican American English may be emerging in at least some parts of the Inland North. This study will examine the vowel system of Mexican Americans in Benton Harbor, Michigan, where subjects, in addition to being influenced by the norms of the NCS, appear also to be trying to distance themselves from the predominantly African American population.

This social distance is reflected in the subjects' vowel-production patterns. Of the 20 speakers in the study, several show heavy influences of substrate Spanish effects, and many show evidence of contact with the Northern Cities shift. Only one speaker (Salina) shows a more conservative vowel pattern, and ethnographic research reveals that she is also the speaker with the most significant relationships with members of the African American population of Benton Harbor.

Also critical to the understanding of social influences on variation in linguistic production, particularly in a language contact situation, is a thorough understanding of what perceptions are shared among the members of the group being investigated. Though perception is a crucial component of comprehension, traditionally cited as critical to the definition of a speech community (e.g. Labov 1974), perceptual differences are less well

researched than those of production, probably because of the large number of variables that must be controlled in order to get valid results. In the current study, the results of a comprehension experiment will be presented, showing the degree to which these subjects are able to correctly identify vowels produced by advanced NCS speakers and comparing these results to that of Michiganders from other parts of the state and from other groups to determine whether their abilities mirror those in previous research (e.g. Preston 2005). As Chapter 8 will show, the error rates of Mexican Americans in Benton Harbor show differences comparable to other groups that have been presented with the same stimuli. Most respondents, even those most advanced in the shift, are judging these tokens based on a conservative English phonemic system. Like those in Preston (2005), they tend to use mainly preshift strategies. However, the Benton Harbor error rates are higher, and some notable differences between their error patterns and those of other ethnic groups suggest that their Spanish heritage and late arrival to the Northern Cities Shift are creating comprehension strategies that are probably unique to their particular linguistic background.

The remainder of this chapter is organized as follows. Section 1.1 briefly addresses the literature on Chicano English and varieties of other groups with non-English L1 ethnic backgrounds. It will introduce issues of interlanguage phenomena and documented instances of social and regional variation found in these varieties that will be more thoroughly discussed in Chapter 4. Section 1.2 will provide information about the location of this study, Benton Harbor, Michigan. Section 1.3 will touch on dialect contact issues, particularly those addressed by Trudgill (2004). Section 1.4 will offer an overview of the vowel systems that the subjects in this study are likely to have been in contact with, while Section 1.5 will briefly outline the methodological approaches used in this study and provide an overview of the demographic

characteristics of its subjects. Finally, Section 1.7 will outline the remaining chapters of this dissertation.

1.1 Chicano English research

Phonetic transfer effects in L2 acquisition are well documented, but as Boersma and Escuerdo (2008) point out, most research in this area fails to consider relevant dialect differences when modeling this accommodation. Probably because of the early emphasis on transfer effects, most research on Mexican-American or Chicano English has also ignored social and regional effects as a possible source of language variation patterns. These holes in the literature, which will be discussed thoroughly in Chapter 4, are some of the main motivators for the current study, which hopes to address both outcome and process differences between Mexican Americans in Benton Harbor and those in the mainstream white population who are most active in the Northern Cities shift.

1.2 Location of Benton Harbor and Berrien County

Berrien County is the southwestmost county in the state of Michigan, bordered by Lake Michigan to the west and Indiana to the south. To its north and east are Van Buren County and Cass County. As will be discussed in Chapter 2, there are two primary reasons that Mexican-American and other Latino groups are drawn to this area: (1) the availability of seasonal agricultural employment and (2) the presence of certain religious organizations (e.g. the Seventh Day Adventist Church) in the area.

Figure 1.1: Map of Benton Harbor in relation to the other major cities, including (1) Chicago, (2) South Bend, (3) Kalamazoo, (4) Lansing, (5) Saginaw, (6) Detroit, (7) Ann Arbor, (8) Toledo, and (9) Cleveland.
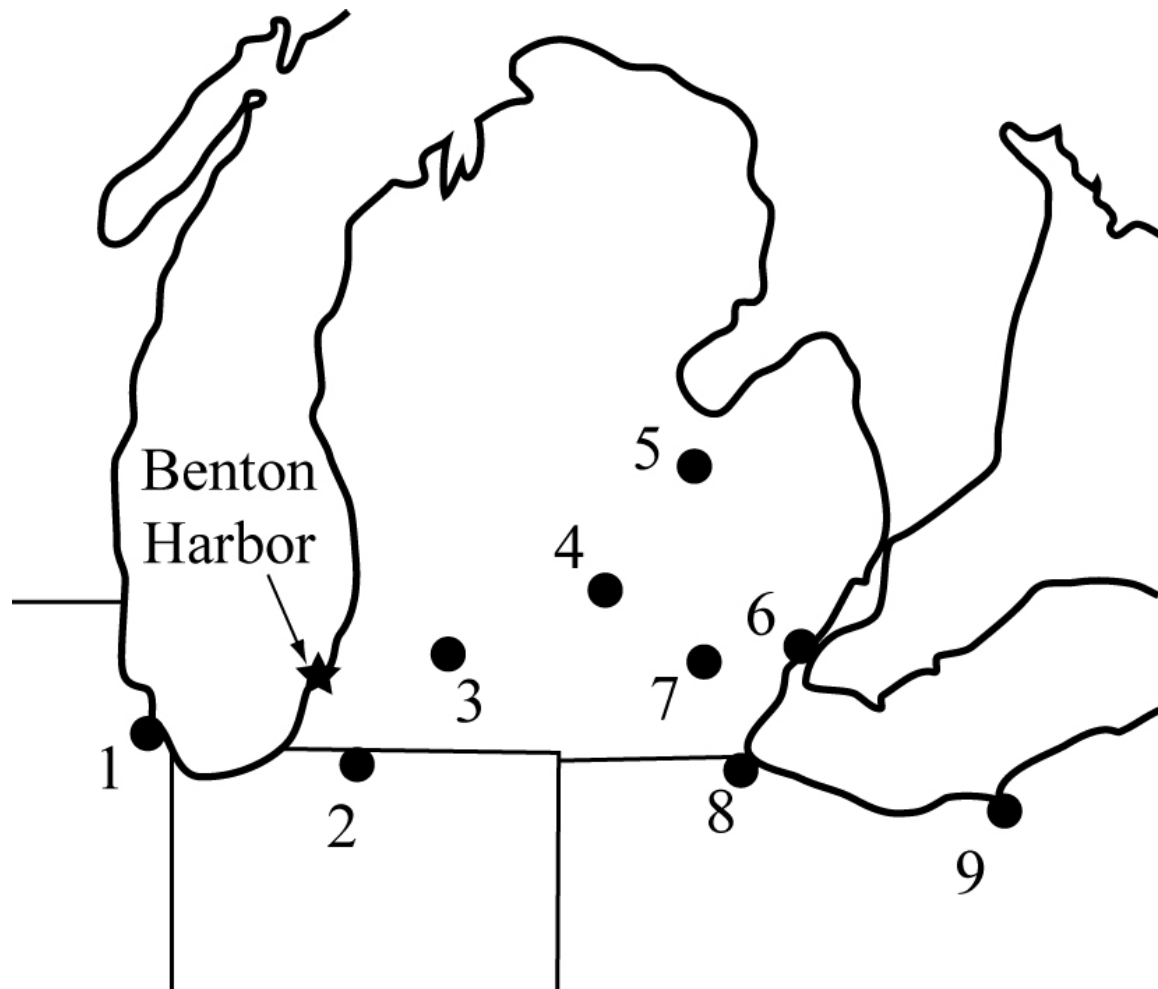
Figure 1.2: Map of Berrien County (including location of Benton Harbor

Lake Michigan

Bangor

Kalamazoo

Hartford

PawPaw

Watervliet

Benton Harbor
St. Joseph

Decator

Eue
Claire

Berrien
Springs

Dowagiac

Niles

Buchanan

Michigan

Indiana

Michigan City

South Bend
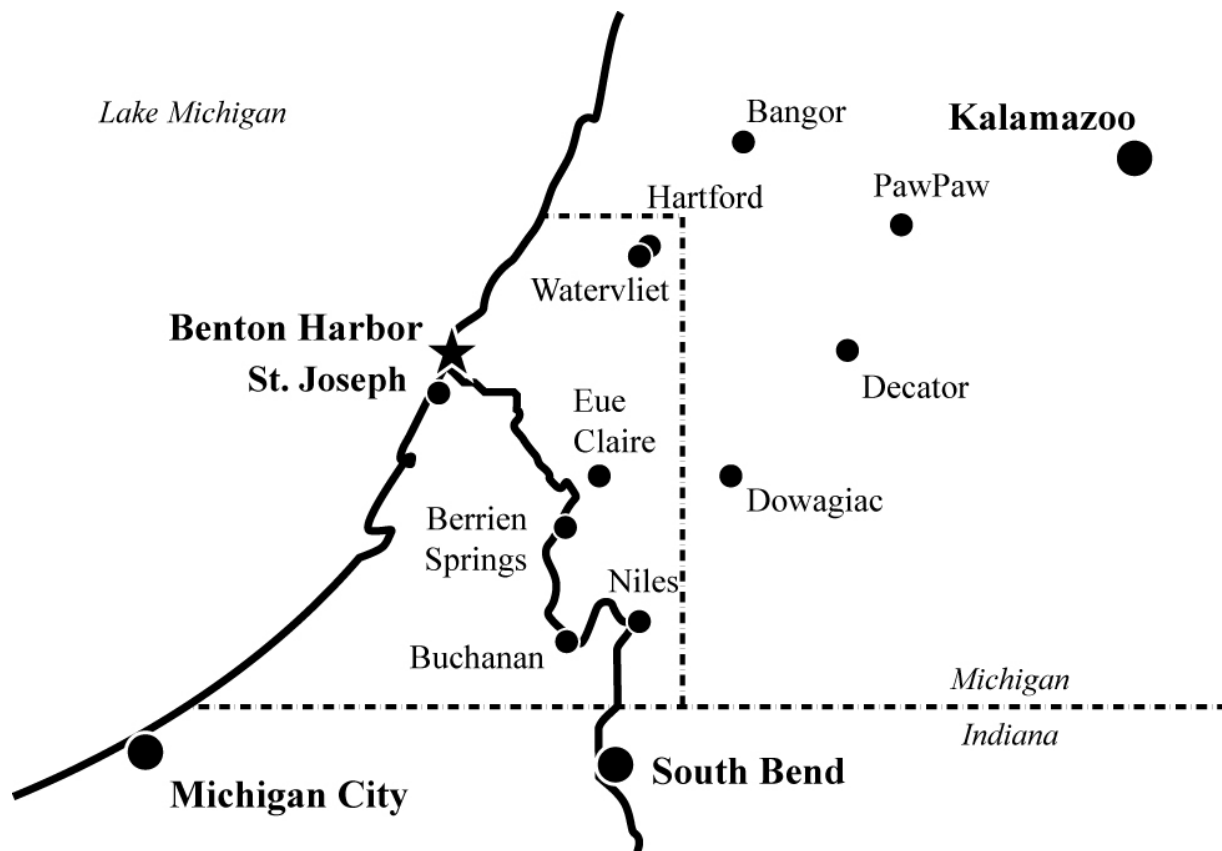
All of the subjects in this study either live or work in Benton Harbor, Michigan, where, it was initially thought, the large African-American population would insulate those with Mexican-Spanish linguistic heritage from the effects of the Northern Cities Shift (NCS) and possibly even be conducive to influence from African-American Vernacular English (AAVE). For reasons that will be more thoroughly discussed in Chapter 2, neither of these hypotheses turns out to be strictly true.

Instead, subjects in this study appear to show NCS-like effects similar to those found among Mexican Americans in Roeder's (2006) Lansing, Michigan study and Konopka and

Pierrehumbert's (2008) Chicago study. Probable social causes for this will be discussed in Chapter 2.

1.3 Dialect Contact: Giles and Trudgill

Three of the more influential researchers who have investigated accommodation in contact situations are Howard Giles, Jack Chambers, and Peter Trudgill. Giles, best known for his development of accommodation theory (e.g. Giles & Coupland 1991), which is now an integral part of sociolinguistic theory, suggests that contact is not sufficient cause for accommodation. Instead, convergence—linguistic movement towards the system of one's interlocutors—is most likely when there is a strong social bond between two people or groups, and divergence—movement away from such systems—is likely when there is tension. (This observation is also echoed in LePage & Tabouret-Keller [1985], whose work is more linguistically oriented than Giles.) Trudgill (e.g. 2004), on the other hand, echoes Labov's call to consider the principle of density, a mechanistic model that eschews the consideration of identity except as a last resort. Instead, Trudgill suggests that in certain situations (specifically in what he calls a *tabula rasa* situation—when dialects mix as part of a colonization process where there are no native speakers of the colonial language present as settlement begins) dialect contact is deterministic and inevitable (2004:83). That is, given enough information about the proportions of various demographic features and the linguistic variables that differ, the outcomes of a contact situation are predictable without consideration of forces such as identity and prestige. I will show that in the case of a low-status immigrant population, Trudgill's claim may not be strictly true. At the level of the individual, Giles' accommodation theory may be necessary to explain why certain demographic features affect one speaker and not another (cf Chapter 6). Likewise, on a group basis, prestige and identity are likely playing a

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large role in how the speakers in this study are choosing to set up their social networks (Chapter 2). However, as Chapter 5 will show, the trajectory of the changes underway in this community pattern similarly to Roeder's (2006) Mexican-American community in nearby Lansing, Michigan, suggesting that Trudgill's deterministic outcomes also deserve serious consideration, even though the Spanish-English contact situation of Mexican Americans in Southwest Michigan is not a *tabula rasa* example.

Trudgill's research is also important in outlining the types of accommodation processes that might be present in a contact situation, including those that eliminate features that are socially or linguistically marked (e.g. the processes of leveling and unmarking (2004:83)), those that create forms that were not present in any of the contributing dialects (e.g. interdialect development processes (2004:84)), those that relegate a competing variant to a new social, stylistic, or allophonic purpose (e.g. reallocation processes (2004:85)). Trudgill refers to these processes collectively as koineisation (2004:89), a process that may take place largely in the first generation of speakers, though his model deals with stages rather than generations. According to his definitions, new-dialect formation occurs only when focusing, "the process by means of which the new variety acquires norms and stability" (88), has taken place (typically in stage three). Before that, stage two exhibits extreme variability as children "are forced to react to the plethora of dialect forms with which they are surrounded" (101). This stage, more than any other, appears to be the best description of the contact situation in Benton Harbor.

Still, the Trudgillian model does not seem to address the issues of slow, ongoing migration such as that found in Benton Harbor. For example, there are not always clear-cut generational differences among speakers in a community that is being established by increasingly larger bursts of settlement out of the yearly migrant stream, and this settlement

pattern has created a large age range for generation 1.5—those who were not born in the area but were still children when they arrived. Mathematical modeling could be skewed by such large age brackets even in simpler dialect situations, but it is especially important to be sensitive to such problems in this community, since childhood plays such an important role in the formation of identity. In an ethnic group known for having a wide range of dialect options, the effects of real-time differences in the arrival of generation 1.5 might be substantial.

Given Trudgillian suggestions that stage two is likely to exhibit extreme variability in less chaotic migratory situations, several different demographic variables that potentially correlate with exposure to local variants arise, and they are discussed below in Section 1.5. Production results reported in this study indicate that correlations between these variables are weak but measurable, important because of (1) the small number of speakers surveyed, (2) the more complicated *tabula plenus* (full slate) contact situation in Benton Harbor, and (3) the developmental stage of this process, which, according to Trudgill, should be subject to extreme variability. However, the most important finding is the accommodation of these speakers to the Northern Cities Shift.

1.4 Possible Vowel-System Models

Santa Ana (1993) has suggested that the number of possible contact situations might be higher for those with a Spanish-heritage background than for those of other major American ethnic groups. This claim seems to be particularly true for those in Benton Harbor, where the second generation of the permanent Mexican-American population is largely still quite young. In addition to Mexican Spanish, they have been in contact with (1) conservative or mainstream varieties of English, (2) African-American Vernacular English, and (3) regional varieties spoken by white Americans, including those in Michigan. This section will provide vowel charts of

several of the language varieties that the Mexican-American community in Benton Harbor has likely been in contact with, providing brief descriptions of each.

Substrate Spanish influence is one of the most notable features of Latino-English varieties, often persisting as an ethnic identity marker in younger, monolingual generations long after the initial contact situation. In contrast with the large vowel system of English, the Spanish vowel system has only five phonemes, and evidence suggests that Spanish learners of English often struggle to form new categories. (Though, the exact mechanisms that cause this interference are somewhat controversial, as can be seen in the literature review of Chapter 4, which will include a discussion of researchers like Kuhl and Iverson [1995], Flege [1995], Flege & Mackay [2004], and Smith [2006]). Figure 1.3 shows a vowel system of two typical Mexican Spanish speakers.

Figure 1.3: Vowels in Tex-Mex Spanish
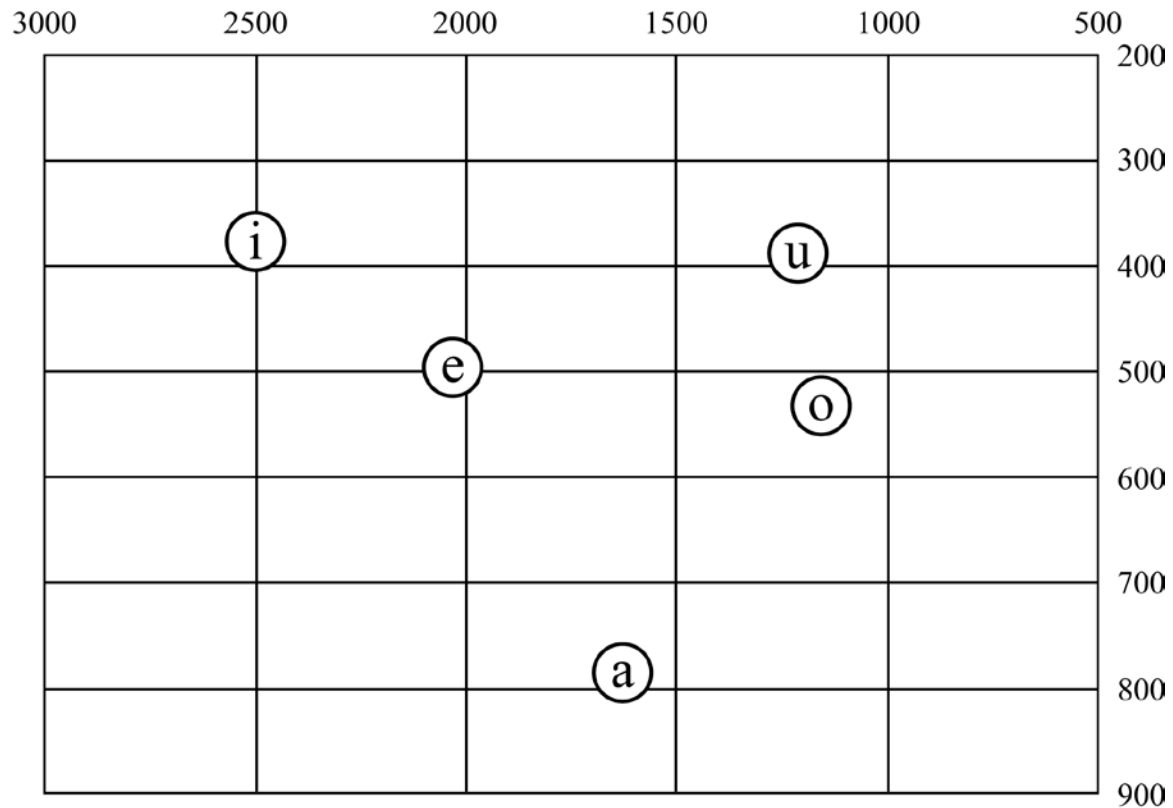
Studies of conservative English varieties are rarely referenced in acoustic, sociophonetic research. Instead, the standard is to rely on the results produced by Peterson and Barney (1952), which included speakers from a wide variety of linguistic backgrounds. This reliance is not (nor should it be) without controversy, since it does not represent any one dialect of American English (cf Hagiwara 1997). However, because (1) it is conventional to make reference to this vowel space and (2) those subjects in this study who are not originally from Michigan originate from a variety of different locations across the country, the Peterson and Barney vowel system will also be used as a reference in the current study. (In addition, Ito [1999] has shown that a system very much like P&B was the predominant system in parts of

rural Michigan before any influence of the NCS.) A normalized subset of the Peterson and &

Barney data is provided in Figure 1.4.

Figure 1.4: American English vowels as defined by Peterson and Barney (1952)
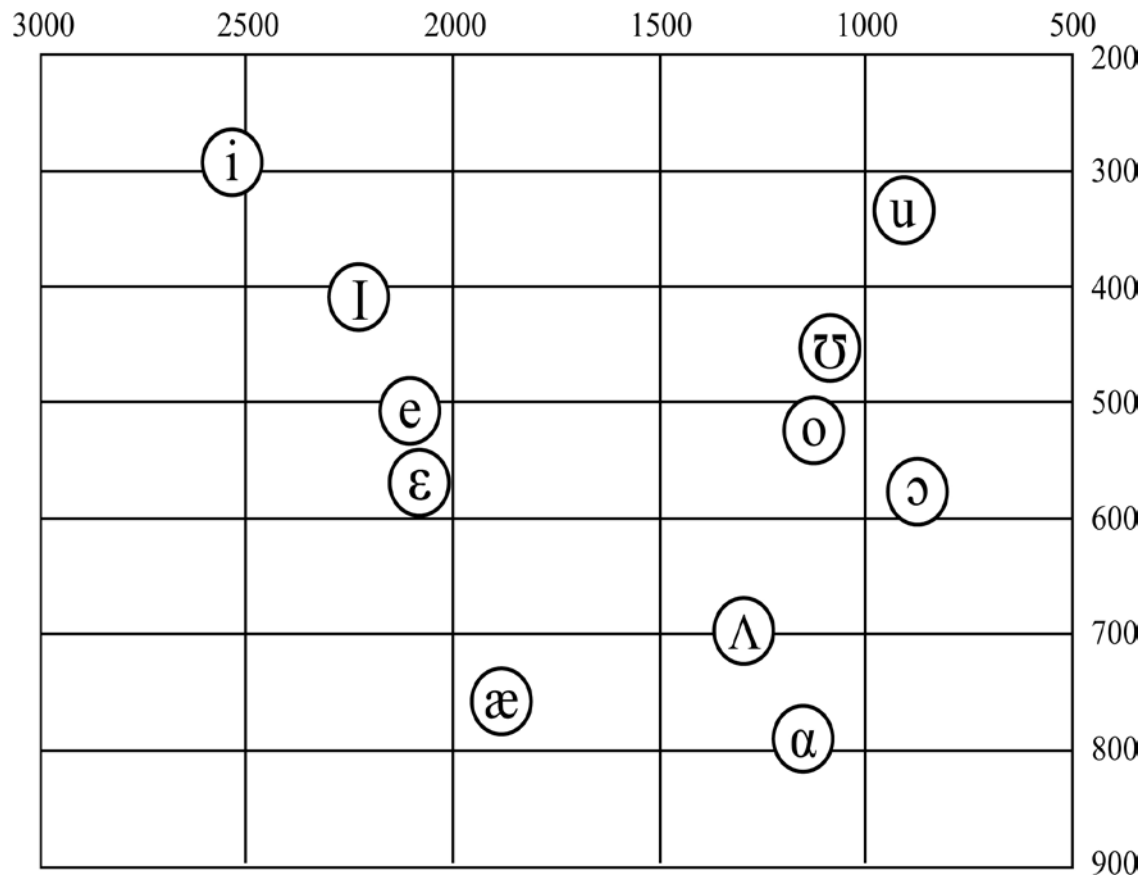
Sadly, acoustic studies of African Americans are also rarely found in the literature. Erik

Thomas' (2001) work includes some important exceptions, including one from Ohio, shown

below, but since accommodation to African-American norms appears to be unlikely among the

Mexican Americans in Benton Harbor, the assumption that their vowels are much like the

conservative (Peterson and Barney) system should suffice. Greater detail should be explored

in future research but is beyond the scope of the current investigation.

Figure 1.5: African American speaker from Columbus, Ohio (Thomas, 2001:177)
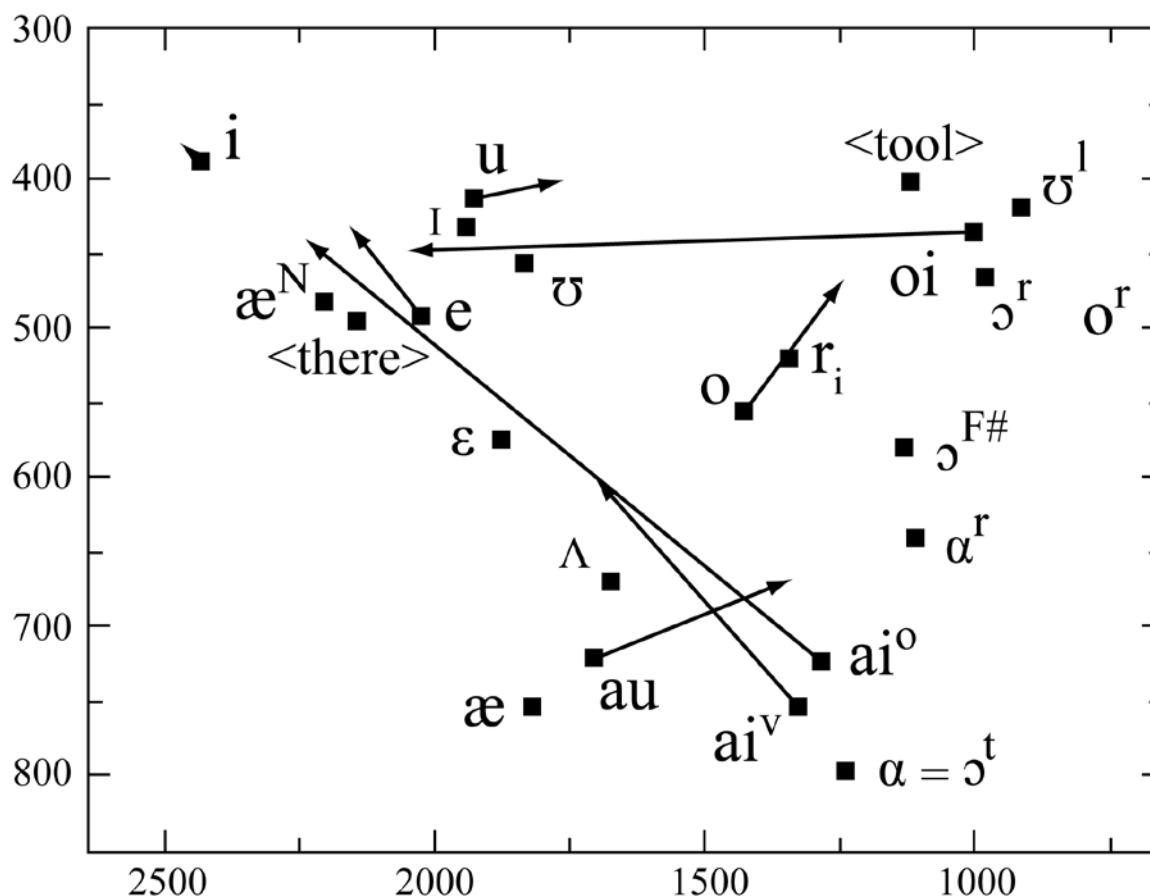
One variety that has been studied acoustically is the aforementioned Northern Cities Shift, first

identified by Fasold (1969), who noticed changes in /æ/, /ɑ/, and /ɔ/, and extensively studied

by other researchers (including Labov, e.g. 1994) in the decades since. It is thought to involve

the (1) fronting and raising of /æ/, (2) fronting of /ɑ/, (3) lowering, fronting, and unrounding

of /ɔ/, (4), backing and rounding of /ʌ/, (5) backing or lowering of /ɛ/, and (6) lowering of /ɪ/,

(Gordon 2001:16). This rotation is called a "chain shift" because there appears to be a causal

ordering of these changes in large cities in the Inland North, where it is robustly underway

despite its apparent status as a change from below—a Labovian term for a processes that

occurs below the level of consciousness. Figure 1.6 illustrates the vowel space of an advanced

NCS speaker.

Figure 1.6: Urban NCS Patterns (from Einhorn)
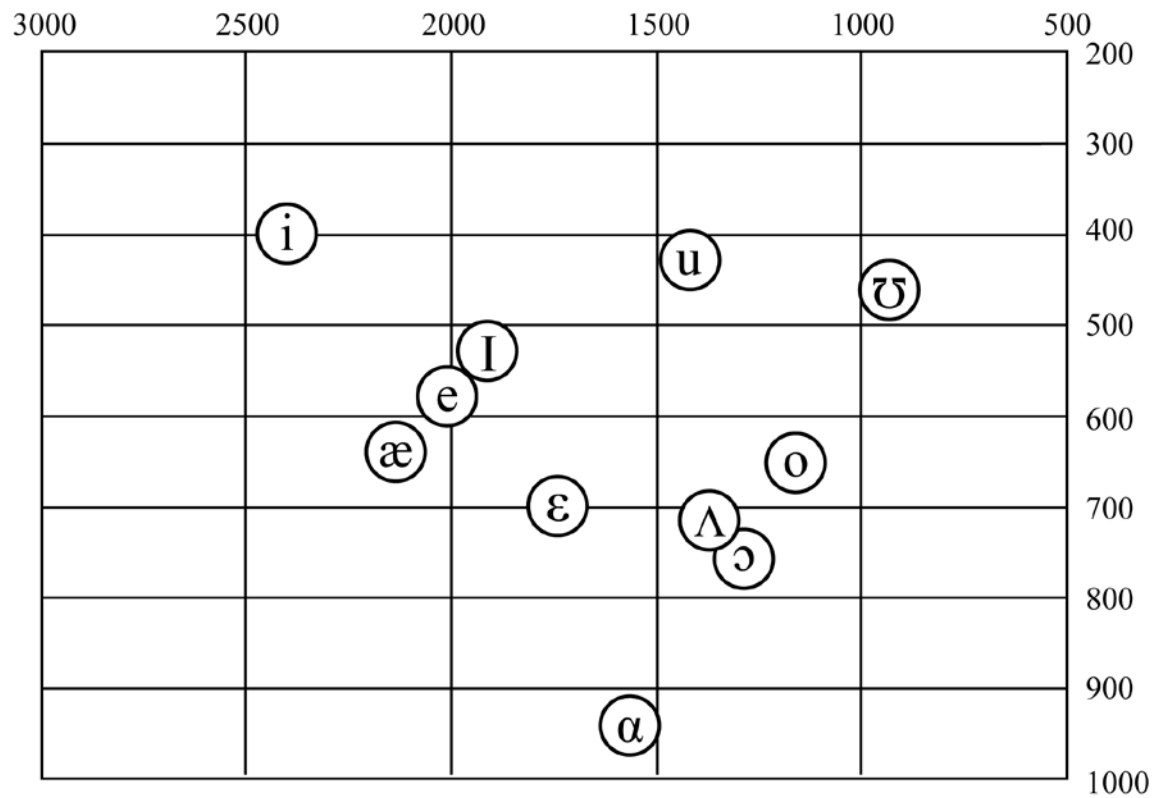
Figure 1.7: Typical ordering of the NCS
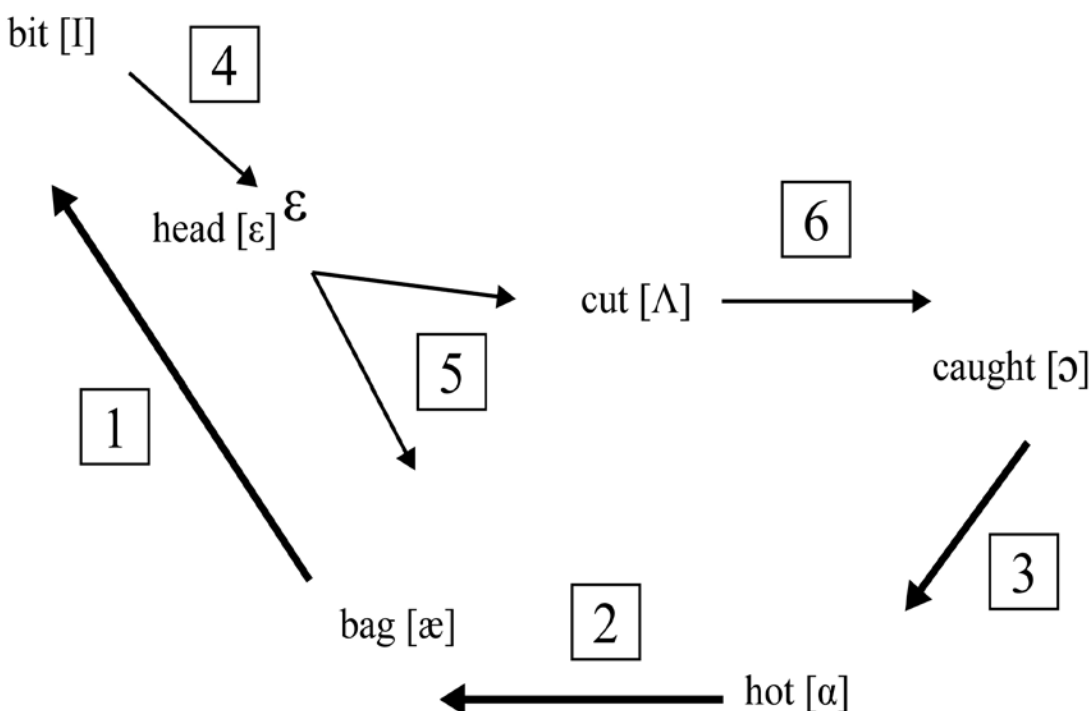
Though this change from below appears to follow natural, language-internal principles among the speakers in large urban areas of the Inland North (Labov 2001), it is not clear that the same pattern is followed among rural speakers as it spreads outward from these larger areas. Gordon (2001) suggests that relative size conditions the order in which smaller cities accommodate (e.g. Paw Paw, Michigan, which is larger than its neighboring cities, shows greater accommodation than Chelsea, Michigan, which is a suburb of Ann Arbor), but Ito (1999) indicates that the results of later accommodation in rural areas near Saginaw, Michigan, may not mirror those of larger urban areas, possibly because the later accommodation is happening as a result of a different contact experience than that found in more urban regions. Figure 1.8 shows a pattern typical of the rural speakers that Ito (1999) examined.

Figure 1.8: NCS Patterns in Gladwin, MI (NW of Saginaw) from Ito (1999:67)
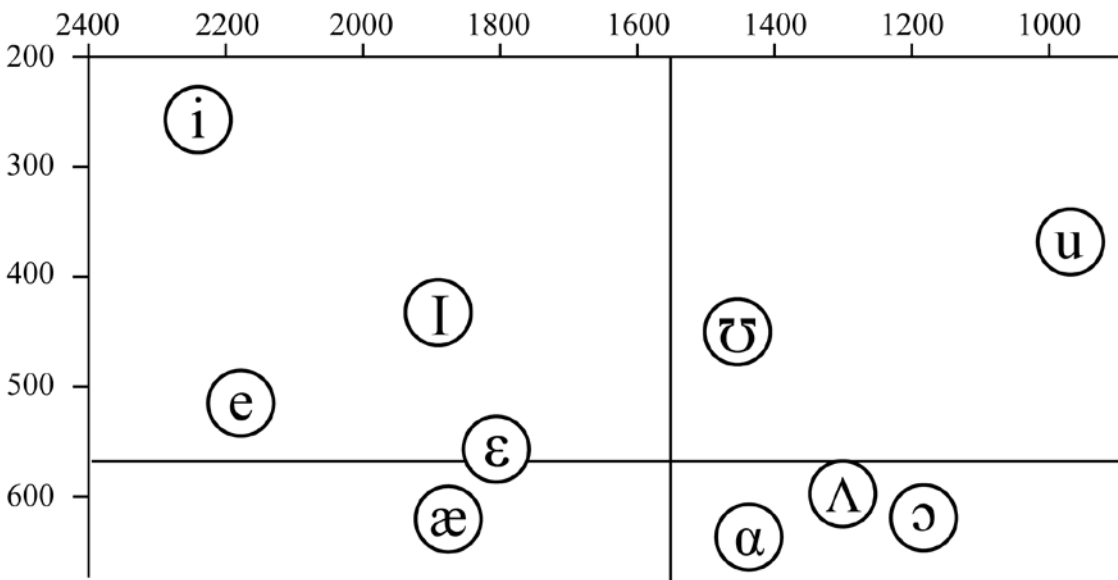
Finally, a comparison of Roeder (2006) and Konopka and Pierrehumert (2008) shows that Mexican Americans in large, urban areas of the Inland North follow very similar trajectories in their vowel systems that appear to be conditioned by contact with the NCS. Note that these vowel patterns, shown in Figures 1.9 and 1.10, are also quite similar to those found by Ito (1999), shown in Figure 1.8, suggesting that later accommodation to the NCS may be as important a factor as possible Spanish influences in the establishment of these patterns.

Figure 1.9: Mexican American Vowels in Lansing (Roeder 2006)
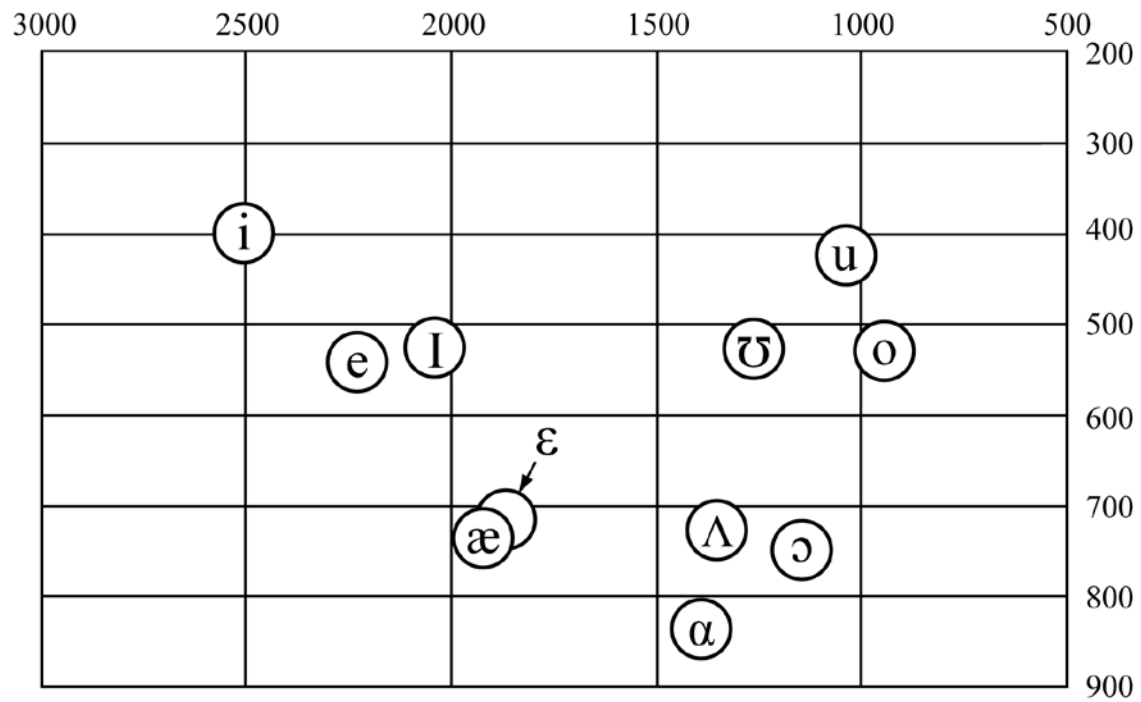
Figure 1.10: Mexican American Vowels in Chicago (Konopka & Pierrehumbert 2008)
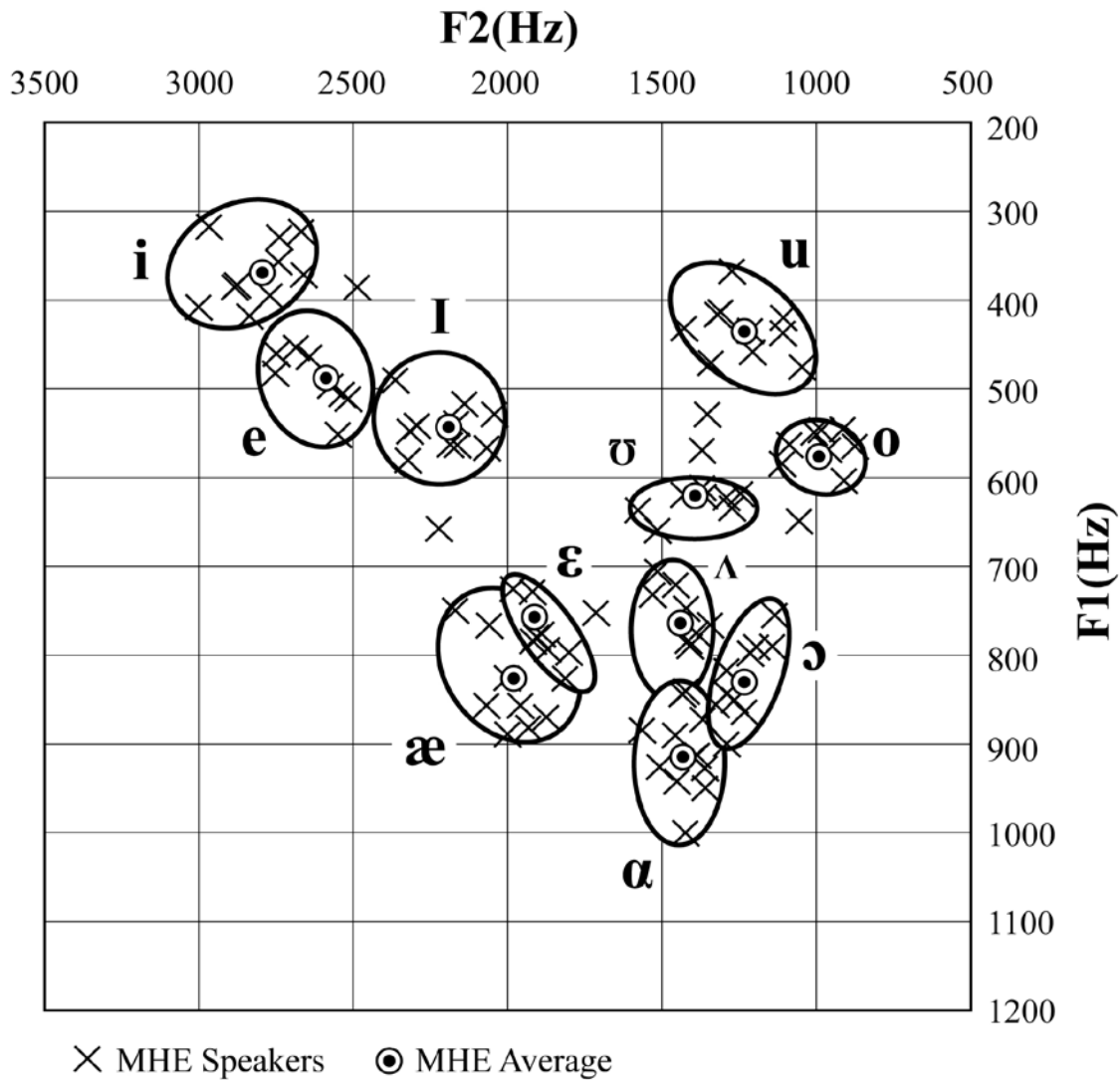
1.5 Methods and Subjects

The vowel systems of the subjects in this study will be studied from two different approaches: (1) a detailed sociophonetic examination of vowel productions and (2) a test of the respondents' ability to comprehend advanced NCS tokens. A more detailed account of the methods used in each approach will be provided in the chapters where these results are

presented (Chapters 5 and 6 for the production analysis and Chapter 8 for the comprehension experiment).

Twenty Mexican Americans were chosen for this study based on their ethnic heritage and ties to Benton Harbor. While this is a relatively small number, particularly in light of the large number of possible influences in the language setting, it accounts for a substantial portion of the English-speaking population of Mexican Americans in Benton Harbor, which, as mentioned above, was thought to have unique demographic characteristics that could be conducive to dialect patterns different even from those of Roeder (2006) in Lansing and Konopka and Pierrehumbert (2008) in Chicago. Instead, as this study will show, Mexican Americans in Southwest Michigan show a strong tendency toward a dialect that is very similar to others of the same ethnicity in the Inland North.

Subject demographics are presented below in Table 1.1, which is organized alphabetically by the pseudonym of each subject. As this table shows, speakers are well balanced for sex (10 male and 10 female subjects), but not necessarily for other demographic characteristics. For example, it was difficult to get reliable answers about the nativeness of each subject's English because, particularly among speakers who grew up in bilingual communities, many could not remember whether they had to learn English when they started school. The third variable in this study, English Acquisition Location, has an even split (10 who acquired English in the Inland North and 10 who acquired it elsewhere); other factors used in this study (length of residence [LOR], age of arrival in Southwest Michigan [AOA], and two different ethnic network scores based on Milroy's 1980 research [NW I + NW II = NW total]) are highly variable.

Table 1.1: Overview of subject demographics

Subject	Sex	ESL	EAL	Age	LOR	AOA	NW I	NW II	NW Tot
Bob	M	under10	Inland N	18	17	1	1	1	2
Carmen	F	under10	Inland N	26	21	5	3	0	3
Domingo	M	under10	elsewhere	72	40	32	5	4	9
Grace	F	under10	Inland N	43	37	6	1	0	1
Josie	F	under 10	elsewhere	52	5	47	5	1	5
Juan	M	over10	Inland N	36	8	28	1	0	1
Lacey	F	under 10	elsewhere	47	23	24	0	1	1
Melanie	F	under 10	Inland N	30	28	2	0	0	0
Michelle	F	under 10	elsewhere	30	10	20	5	3	8
Miguel	M	under 10	Inland N	25	12	13	3	0	3
Monica	F	under 10	elsewhere	30	5	25	4	1	5
Rita	F	over 10	Inland N	26	10	16	3	4	7
Roger	M	under10	Inland N	42	37	5	1	2	3
Roman	M	under 10	Inland N	24	21	3	0	0	0
Salina	F	under10	elsewhere	27	12	15	2	0	2
Salvador	M	under 10	elsewhere	28	17	11	0	0	0
Sancho	M	under 10	Inland N	26	26	0	1	0	1
Servando	M	under 10	elsewhere	27	1	26	3	4	7
Soliz	M	under 10	elsewhere	32	14	18	5	0	5
Sonya	F	under 10	elsewhere	26	16	10	3	5	8

Predictions about the effects of these social factors on the linguistic patterns of the subjects in this study are likely to be highly dependent upon the linguistic variable in question, particularly when it comes to production. Detailed predictions will be provided as each variable is discussed in the results chapters, but in general I will be interested in two major groupings of these variables. Factors like ESL and the two network scores should be the best predictors for patterns that reflect substrate Spanish influence, while factors like EAL, LOR, and AOA should help to quantify the amount of exposure that speakers have had to the NCS (cf Trudgill's call [2004:26-30] to investigate deterministic outcomes and Chambers' [2002:117] to investigate mobile communities).

1.6 Organization of the dissertation

The remainder of this dissertation is organized as follows. Chapter 2 situates the experiences of the subjects in this study in terms of the larger ethnographic history of Benton Harbor and Berrien County. It will set the stage for predictions about accommodation to language varieties used by other ethnicities in such language settings. Specifically, it will address the ethnolinguistic reasons why accommodation to the regional white norms appears to be favored over accommodation to the African-American norms that dominate the Benton Harbor language setting.

Chapter 3 reviews of the kinds of social models typically used in sociolinguistic research, including various interpretations of the speech community, network analysis, and communities of practice. Using evidence presented in Chapter 2, it will argue that the subjects in this study present problems for each of these models, particularly the traditional Labovian definition of the speech community. This information will be critical for understanding both the production and the comprehension data in this study.

Chapters 4-6 will address production. After a brief review of literature relevant to the production patterns of these subjects (including research on both ESL speakers and on relevant varieties of English) in Chapter 4, Chapters 5 and 6 will present the results from the production portion of this study. Chapter 5 will approach the data using demographic characteristics typical of studies using speech community and/or network models. Chapter 6 will provide a more individualistic approach to the analysis (i.e., the communities of practice model).

Chapters 7 and 8 will address comprehension data. Chapter 7 will ground this research in a review of relevant research on both (1) phonetic and (2) sociolinguistic perceptual

experiments. It will argue strenuously that social information must be accounted for in speech-perception models if further progress is going to be made in the field, and it will strongly endorse Boersma's stochastic model of perception. Chapter 8 will provide the results of the comprehension experiment conducted on the speakers in this study and compare their comprehension rates to those of other ethnic groups in Michigan. Analysis will suggest that both substrate Spanish influences and late arrival to the shift have conditioned some differences, but that Mexican Americans in Benton Harbor show general patterns that are similar to other Michigan groups.

Finally, Chapter 9 will conclude this dissertation with a proposal of how the stochastic perceptual system proposed by Boersma accounts for both the differences and the similarities between the subjects in the current study and those from previous research. It will echo the call of others that suggest that perceptual research is a critical component of understanding language variation and change, since the perceptual mechanisms that guide comprehension are likely to be largely responsible for the apparent regularity in production patterns. That is, these perceptual models help to advance Trudgill's mechanistic model of language variation and change, helping to explain why production patterns of Benton Harbor residents of Mexican-American descent reflect others, with whom they are not in contact, but with whom they share a common linguistic heritage and, currently, a remarkably similar linguistic environment.

CHAPTER 2: ETHNOGRAPHIC HISTORY OF BENTON HARBOR AND ITS LINGUISTIC
IMPLICATIONS

2.0 Introduction

In recent years, immigration and migration of Latinos to Southwest Michigan have

been driven by two primary forces: (1) participation in conservative Christian churches (e.g.

the Seventh Day Adventist church) and (2) seasonal agricultural fieldwork opportunities.

Current settlement patterns within the economically stressed city of Benton Harbor, however,

seem to be largely driven out of economic necessity. Latinos who move to the area encounter

a social network of intricate racial tensions, but often are not aware of the complexity of the

situation. This chapter will provide an ethnographic history of Benton Harbor and Berrien

County, including a short history of the economic development (based on agriculture and

tourism) and subsequent decline of Benton Harbor that has helped to intensify the race

relations problems in the area. It will examine the possible effects that such history has had

on the dialects of other ethnic groups in the area (European Americans and African

Americans), and will offer evidence about how current Latinos may be orienting themselves

towards such groups.

2.1 Local History through 1960

Early American settlement patterns of Southwest Michigan mirrored those of other

parts of the Inland North. Like other parts of the North, the population of the area remained

almost entirely European American until the first world war, when, as the Benton Harbor

library documented in a 2002 display about this era, African Americans migrated North to take

jobs in the industrial economy that were left vacant by men who had gone off to war. First-

hand reports in this display indicate that race relations in this time period were good, but

these reports are somewhat contradicted by other evidence from the same source (discussed below). As with many other places in the country, competition over post-war jobs helped to put race relations in the forefront in Berrien County.

By the 1920s, Benton Harbor was a major port on Lake Michigan. The Benton Harbor Fruit Market, the largest cash-to-grower fruit market in the world (http://www.bhfm.com/about-us), was well established, and the port simultaneously created important distribution opportunities for local farmers and helped to foster local tourism. Steam liners full of produce would leave Benton Harbor for Chicago every night (Pender 1915:12; Coolidge 1906:237), and steam liners full of tourists who were anxious to see the local attractions came in return (Coolidge 1906:237).

Thus, agriculture and tourism had a rare symbiotic relationship in the county, resulting in an extremely close relationship between Benton Harbor and Chicago. Even the infamous Al Capone was frequently drawn to Benton Harbor. Aside from the agriculture and the seaport, there were other tourist attractions. Some visitors came to the county for mineral baths, but others were drawn by tourist attractions created by a local religious group called The House of David.

Many locals refer to The House of David as a cult, and indeed, its members were asked to turn over all their assets to the church, live communally, and follow a very strict set of guidelines to show their devotion to God (Coolidge 1906:241). These guidelines included a vegetarian lifestyle—something that should not have been difficult to follow in Berrien County, which even today is referred to as part of the Fruit Belt of Michigan. However, other guidelines caused the group to stand out in more obvious ways. Men in the group were not allowed to cut their hair, for example, and they drew many onlookers.

Early on, the House of David was involved in local business ventures that were compatible with their strict devotional principles. They were instrumental in the development of the Benton Harbor Fruit Market, and they ran a small vegetarian restaurant; both were ventures that promoted their vegetarian lifestyle. However, as tourism to the area led to larger and larger crowds of onlookers, the leadership of the cult began to exploit the stares of gawking tourists through a number of other business ventures as well. For example, when crowds gathered near their compound, the group sold them ice cream cones. As word spread and more gawking tourists arrived, the House of David opened a small theme park (complete with roller coasters) and started their own, very competitive, minor league baseball team (the Jesus Boys). Both ventures helped to promote tourism from Chicago until leadership squabbles lead to a sharp decline of the House of David in 1927 (Mumford 2003).

The fall of the House of David was not the only cause for the decline of Benton Harbor. Much of its downfall had to do with the perceived threat of cultural differences and poverty. Benton Harbor had become a fairly cosmopolitan location for a town of its size. A neighborhood called "the flats" had developed in the central part of town, which was settled largely by African Americans and recent immigrant groups looking to escape the problems of Chicago. The local oral history project conducted by the Benton Harbor library in 2002 reports that residents of the flats felt very safe in what they saw as a tightly knit neighborhood, but residents of surrounding areas saw it as a slum. Like other parts of the country, Benton Harbor instituted "Urban Renewal" plans in the 1960s that effectively destroyed this neighborhood. Combined with the integration of schools and subsequent "white flight" to neighboring towns, Benton Harbor experienced a rapid economic decline. Within a couple of decades, Benton

Harbor went from being the sort of place where you would find Frank Lloyd Wright homes being built to being the sort of place where slum lords dominated the local real estate market.

2.2 1960s to present

Ethnographic research indicates that racial tensions between African Americans and European Americans have remained tense since the 1960s despite some of the best efforts by local religious groups who have peppered the town with small churches and outreach missions. However, as one African-American minister's wife explained, it has been hard to foster a sense of community among African-American children because of the perceptions people have of local African Americans and the lack of opportunities available to many of them.

The stark contrast between Benton Harbor and its sister city, St. Joseph, has garnered attention, particularly in light of recent events, which have reflected these racial tensions. In 1991, the body of a 16-year-old African-American boy from Benton Harbor was found in the river between the two cities, and theories about the cause of his death drew enough attention that a Wall Street journalist named Alex Kotlowitz spent five years researching it. Benton Harbor residents largely believed that the boy, Erik McGinnis, was killed for dating a white girl. St. Joseph residents were not so convinced. Kotlowitz reports that some believed he fell or dove in the river while trying to escape police; others hypothesized the he committed suicide. Kotlowitz's 1998 book, *The Other Side of the River,* drew no conclusions about what actually happened to Erik McGinnis. Instead, as one critic explained, "What Kotlowitz also did was dig until he'd exposed the underlying virus in race relations: nuances of ignorance that quietly multiply to gird suspicions and weight significant events with ingrained beliefs and experiences past" (Williams 1998).

Twelve years after McGinnis' death, as Kotlowitz arrived in Benton Harbor to promote a new edition of this book, a similar event touched off racial attentions again. In July 2003, a young African-American motorcyclist died in a crash after being chased by police. This time, national news organizations reported on resulting riots. However, in tales mirroring the confusion reported by Kotlowitz, ethnographic research indicates that non-African-American community members believe that this riot was carefully organized. A local artist who claims to be close friends with city officials reported that the riots were specifically orchestrated so that only abandoned buildings and homes were damaged by the fires set by rioters, though news reports indicate that at least two were still inhabited (All Things Considered 2003). Similarly, the national news reported that 150 extra law-enforcement officers were brought into quell crowds of 300 rioters (Prichard 2003), but a local European-American business owner reported that there was "only" an armored car. He said that he was not aware of the riots, which were taking place two blocks from his business, until a reporter came into his store to ask about them. When he learned of them, he and other local business owners printed "I had a riot in Benton Harbor" T-shirts, which they were still selling in 2006. My ethnographic research offered fewer opportunities to question local African Americans about this event, but when I did, they seemed far less amused by the situation.

2.3 Overview of the Experience of Latinos in Berrien County

Agriculture has been and continues to be the major draw for Latinos in the area. The 1960s also saw changes in the ethnic makeup of migrant workers. Founders of the migrant head-start programs in the area told me that at this time their clients were almost exclusively African American, but a few people of Mexican and South-American descent were beginning to migrate to the area as well. A small handful of Mexican-American families also began to settle

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permanently in Southwest Michigan, although ethnographic research suggests they were scattered across several counties. Latinos in the area now share a general knowledge of who these families are, but it is not clear that they were networked with one another at the time of their settlement here.

Currently, Latinos are not tightly networked with the African-American community in Berrien County, especially in Benton Harbor. Most Latinos who move into the area are not familiar with its complex social history, including the job losses experienced by African Americans when white soldiers returned home after World War I, the painful integration process, the process of Urban Renewal that destroyed many important African-American neighborhoods, or even the recent controversies surrounding the deaths of local African Americans.

Evidence suggests that this lack of understanding has fostered very negative opinions about African Americans among Latinos in Berrien County, as one fieldwork experience epitomizes. During a tour of Benton Harbor, two outreach members of a Spanish-speaking church explained that the public housing apartments were "the houses the government built for the black people." When I asked why the government was providing this housing, they answered briefly: "Because they used to be slaves." Other contacts sometimes suggested that African Americans were unwilling to work hard, a trend that runs counter to the work ethic that is a source of ethnic pride among many Latinos.

Regardless of the cause, ethnographic evidence suggests that most Latinos in the area have a negative orientation toward African Americans but a positive one toward European Americans. One Spanish-speaking informant referred to African Americans as *llantas*, a derogatory term that literally translates as 'tires.' Another informant, Carmen, told me that

her aunt was extremely upset that she was having a child with an African-American man because, the aunt said, it was inappropriate to have a child with someone from another culture. Carmen pointed out the irony of this advice: her aunt is from Mexico; her aunt's husband is a local European American.

A cursory glance at the sister cities reinforces the perceptions that many Latinos have formed about African Americans and European Americans. Benton Harbor is now more than 90 percent African American, with poor opportunities for education or employment. Rumors are that the real unemployment rate in the city is over 30 percent, a figure which is closely related to the speculated 60 percent drop-out rate in its high school.[1] The homes are quite dilapidated, and drug problems run rampant among their residents. Across the river, the situation is very different. St. Joseph is more than 90 percent European American, and its educational and economic circumstances are considerably less grim. Expensive homes line the coast, and the town is decorated with a new set of sculptures every summer to help draw in tourists (e.g. hand-painted carousel horses). It is no surprise that Latinos who are looking to settle out of the migration pattern to make a better life for their children are more interested in being associated with European Americans than African Americans.

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[1] These numbers are difficult to document, and do not necessarily reflect the numbers from the US Census Data given in Table 2.1. Discrepancies exist for a variety of reasons. For example, many of the unemployed in Benton Harbor do not maintain a residence for long periods of time. Actual figures are difficult to calculate with any transient population. Meanwhile, discussions with local community members indicated that local figures on the drop out rate may be unreliable due to a combination of the school district's desire to diminish the appearance of failure and new loopholes in the reporting required by No Child Left Behind.

Table 2.1 Educational and Economic Demographics of the Sister Cities

	Benton Harbor	St. Joseph
Total Population	11,182	8,789
% White	5.50%	90.30%
% Black or African American	92.40%	5.10%
Population 25 years and over	5,653	6,106
High school graduate or higher	60.50%	89.70%
Bachelors degree or higher	4.20%	32.30%
In Labor Force (16 years higher)	58.10%	62.60%
Median Household Income	$17,471	$37,032
Median Family Income	$19,250	$51,328
Per Capita Income	$8,965	$24,949
Families below poverty level	39.60%	4.30%
Individuals below poverty level	42.60%	6.60%

Evidence about the networking opportunities within the Latino community in Berrien County is still more complicated. Many Latinos are of Mexican or Mexican-American descent, but it appears that the need for migrant labor also draws many from places in Central America such as El Salvador and Guatemala. Meanwhile, local churches play host to an even broader range of nationalities. The Seventh Day Adventist (SDA) church boasts its flagship university in Berrien Springs (about 20 miles from Benton Harbor), and local SDA churches cater to multinational congregations. One SDA church, for example, has members from Argentina, Brazil, Chile, Mexico, the Dominican Republic, Puerto Rico, El Salvador, and the United States, to name a few. A large number of Spanish-speaking congregations (including those from SDA, Catholic, and Pentecostal churches) hire ministers from Puerto Rico to avoid immigration issues, but they are sometimes the only Puerto Ricans in the congregation.

Outside the church, employment choices are often dictated by ethnic loyalties as well. Many members of the first families to settle out in Berrien County and the surrounding region have taken it upon themselves to serve the community by taking jobs that offer social services

to migrants or more recent (settled) immigrants. Others have made similar overtures by creating workplaces that are hospitable to Spanish speakers. Those who are less well established often work in local canneries or in the handful of companies that cater (sometimes for less-than-ideal reasons) to Spanish speakers. On summer weekends, a couple of flea markets in neighboring areas offer the opportunity for many Latinos to interact with one another, and most seem to know where the Mexican grocery stores are located.

Networking appears to be strong among migrants and church members who share a Spanish-language heritage, but there is not a geographic locus for these social practices. For example, people drive as far as an hour and a half away to go to church. Many have friends or family in Chicago whom they regularly visit. Women from a Spanish-speaking church in Eau Claire seemed to enjoy shopping in South Bend, IN. The minister from another church lived in South Bend and commuted three times a week to provide Spanish services in Benton Harbor.

More notably, there do not appear to be any neighborhoods in Benton Harbor (or elsewhere in the county) where the majority of the population is Mexican or even Latino. A possible exception to this comes from the ethnographic observations of some of the less desirable trailer parks in Benton Harbor, where larger concentrations of Latinos are found even if they do not constitute a majority of the neighborhood. Latinos can often be found residing in these homes, but usually only temporarily since most of the trailers that the management company resells are beyond repair. In addition to being a temporary home for most of their residents, these areas are also not the sorts of places that foster close relationships among neighbors. Most Latinos live in these areas as a last resort and leave as soon as they are able.

2.4 Likely effects of ethnographic history on the dialect of local European Americans

As explained in Chapter 1, the Northern Cities Shift is a chain shift in the vowels of speakers in the Inland North that usually affects European Americans in urban areas. When the NCS spreads to the rural areas of the Inland North, it sometimes exhibits a different pattern than that found in larger cities (Ito 1999). Benton Harbor and the neighboring cities in the county are relatively small compared to cities like Buffalo, Chicago, or Detroit, where the shift is well documented; but no studies have been conducted on local European Americans in Berrien County, so it is difficult to say exactly how shifted these speakers might be. It seems likely that strong ties to Chicago and Benton Harbor's prominence as a cultural attraction for the region could have been conducive to an early appearance of the NCS since it was likely underway even before it was first noticed by Fasold in 1969.

Other research also supports this possibility. Population size strongly predicts the spread of NCS variables to a city, but as Gordon (2001) shows in his comparison of Paw Paw, Michigan, and Chelsea, Michigan, the size of a community may be more important when considered in terms of its relative size to others within the immediate surroundings than it is when considered in terms of its relative size to others within a larger region. Paw Paw speakers were shown to be more shifted than Chelsea speakers in most of the six variables active in the NCS, even though the two towns were roughly the same size. Gordon suggests that this is because Chelsea is very close to Ann Arbor, which greatly overshadows Chelsea in terms of relative size. Paw Paw, on the other hand, is close to Kalamazoo, which is considerably smaller than Ann Arbor. Thus, Paw Paw is larger relative to cities in its immediate region and, as its county seat, could be more important for the kinds of social networks that are conducive to the shift than Chelsea.

Gordon's (2001) research in Paw Paw strongly suggests that Latinos in Berrien County are likely to have come into contact with speakers of the Northern Cities Shift, if only in its infancy. In addition to acoustic analysis, the variables in his study were coded on a scale of 0-3 for further analysis. (Zero indicated the no evidence of shifting, and 3 indicated an example of the most extreme versions of the NCS.) While the average indices for the Paw Paw speakers were generally under one, they were significantly higher than the Chelsea speakers, who were undoubtedly in contact with the NCS. Given the fact that Paw Paw is only 30 miles from Benton Harbor and the Latino population in this area is highly mobile, it seems unlikely that they would have been insulated from contact with the NCS.

Furthermore, if a city's relative prominence within the immediate region is as important as Gordon's research suggests it might be, evidence of early indicators of the shift in Paw Paw suggests that we should find the shift in a more advanced state in parts of Berrien County. Paw Paw is relatively small compared to Benton Harbor and several of the other more prominent towns in Berrien County (e.g. St. Joseph, Berrien Springs, or Niles), and these cities probably play a larger role than Paw Paw in the kinds of social networking opportunities that are important to the shift. For example, St. Joseph, which is 90 percent European American, continues to cater to the tourist industry, and Berrien Springs is host to the flagship university of the Seventh Day Adventist Church. Thus, they offer important networking opportunities for locals to come into contact with people from regions where the NCS is more advanced and to aid its development and spread among European Americans within Berrien County.

2.5 Likely effects of ethnographic history on the dialect of local African Americans

Even if local European Americans have accommodated to the Northern Cities Shift, it seems unlikely that African Americans have followed suit. Many Labovian researchers have

suggested that African Americans are not participating in the large-scale vowel rotations that occur regionally among European Americans (e.g. Labov 1994, 2001; Bailey & Thomas 1998; Thomas 2001). These claims have received criticism in more recent work (e.g. Jones 2003; Anderson 2003; Gordon 2001), but accommodation appears to be more likely among middle-class African Americans who are more integrated into European American social networks; and even then, this accommodation appears to be limited (Jones 2003).

A number of social factors in Benton Harbor would serve to effectively block accommodation to this regional pattern, including the widespread suspicion that local African Americans and European Americans hold of one another (documented extensively by Kotlowitz, but also encountered during my fieldwork). This suspicion compounds the lack of social networking opportunities available to encourage interaction between the two racial groups, including educational and employment opportunities for African Americans from Benton Harbor. Such opportunities are critical for the spread of the Northern Cities Shift, the use of which has sometimes been found to depend on the *linguistic marketplace*. (See Gordon [2001], who found the shift to be more robust among people in the workforce than among those who were slightly younger, even though the typical pattern for the shift is that it becomes more advanced with every coming generation.)

Instead, African Americans are likely to have maintained a linguistic system that includes typical AAVE features. Some anecdotal evidence of this comes from participant observation. A grandchild of one my Mexican-American informants was found to appropriately use *habitual be* in several casual conversations. This child was born in Benton Harbor and attends a local elementary school. Although he was too young to be interviewed for this project, these conversations provide evidence that such AAVE features exist in Benton

Harbor and are pervasive enough to spread into speech of non-African Americans who are in regular contact with the African-American community. (He would not have acquired *habitual be* from either of his parents, who denied socializing with African Americans during their interviews.) Combined with other impressionistic data gathered during fieldwork (albeit in an unscientific manner), the evidence of such a marked variable suggests that a relatively conservative vowel system persists among African Americans in Benton Harbor as well.

2.6 Discussion

Extensive discussion of the effects of such a social history on the linguistic systems of incoming Latinos awaits further evidence, but a few observations deserve review. It appears that most Latinos, including those who have the most access to education (those who are citizens and those who have come for religious reasons rather than as agricultural laborers) are uninformed about the complicated history of racial tensions between African Americans and European Americans—especially as it pertains to a local history. As a consequence, many assume, without considering any mitigating factors, that African Americans are unwilling to work. This assumption more than any other appears to make integration into the African-American community incompatible with the local Latino identity, since even those who have never worked in the fields appear to draw a strong sense of ethnic pride from the work ethic of those who do.

Some Latinos questioned during fieldwork were more aware of the history of racism in this country that has led to communities like Benton Harbor. For example, those who came from the Valley region of Texas often reported personal experiences of racism, including a few subjects who remembered receiving corporal punishment for the use of Spanish on the school playground. However, even those who were aware of racism still assumed that it is worse in

the South. In some cases, the fact that many Latinos continue to work despite such racism appears to have made them even less sympathetic to African Americans. It seems possible that such attitudes could dissipate among younger Latinos, particularly those who grow up in Benton Harbor and share common experiences with African-American peers. However, as long as the migrant population continues to bring new people to the area, this cycle could reinforce more negative attitudes toward African Americans.

Reactions to European Americans are more mixed—even when considering a single informant. One woman from Texas appeared to bond with me during an interview, admitting that she usually did not trust white people because her father had abandoned her family to be with a white woman. Still, she said she rarely went to Spanish church services because, she said, whom you worshiped with should not matter.

More broadly, it appears that the Seventh Day Adventists are more comfortable integrating with European Americans than churchgoers of other denominations that I encountered, probably for a combination of reasons. First, many have had extensive involvement with European-American outreach ministers whom they have encountered both in Benton Harbor and abroad. Second, in the congregations in which most of the fieldwork was conducted, the vast majority of their regular members were foreign-born people who were in the country legally. Thus, they had fewer fears about problems with immigration issues and were more likely to want to participate in church outreach programs that would cross ethnic lines. My impression is that Latinos from Texas were more suspicious of European Americans than people who were born abroad, even if they were affiliated with a church that had extensive contact with European Americans. Probably, family histories (which include experiences with the sort of racism that Mexican Americans have encountered in schools in

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the Valley region of Texas, for example) have made them less optimistic about cross-ethnic relationships.

If researchers like Trudgill and Chambers are correct, we should expect most Latinos to actively avoid accommodation to African-American norms, but predictions about their accommodation to European-American linguistic systems are more problematic. Adult Latinos in Berrien County are certainly more likely to have social networks that include European Americans, but contact is not always a sufficient predictor of change, particularly when predictions are specific to a limited number of linguistic variables (e.g. the vowels). Researchers like Anderson (2003) have argued that "vowel changes are internally constrained but subject to ideological intervention." Since the Northern Cities Shift is both unmarked and (likely) in its infancy in Southwest Michigan, Latinos are unlikely to notice it or consider it be "bad English," factors which would allow them to actively block their participation in the NCS. However, if certain vocalic features were associated with ethnic solidarity, then accommodation to the NCS could increase the perception that one is assimilating to the European Americans. This situation could cause some speakers to actively distance themselves from European-American norms.

Currently, the Latino community in Berrien County is neither socially nor linguistically homogenous, so it is unclear which prediction will hold true. A discussion of the kinds of social models that are typically used in sociolinguistics could help us to understand the mechanisms involved in blocking or conditioning such accommodation by Mexican Americans in Benton Harbor. This discussion follows in the next chapter.

CHAPTER 3: THE RELEVANCE OF SOCIAL MODELS OF LINGUISTIC CHANGE

3.1 Introduction

The social structure of Benton Harbor's migrants and former migrants is not one that easily fits into available sociolinguistic models. Since the founding of the field of sociolinguistics, researchers have struggled with how best to model social aspects of language variation and how to determine what constitutes a speech community. While many of the more widely used models provide insight into the linguistic varieties found in Benton Harbor's Mexican-American residents, none is sufficient. These models include Labov's conception of the speech community and various adaptations thereof, Eckert and McConnel-Ginet's conception of communities of practice, Milroy and Milroy's conception of social networks, and Santa Ana's language setting model.

The key to understanding the problems with the various models is understanding the nature of the object of investigation. In the preface of his 1966 New York City study, Labov is quite clear about the object of his investigation, saying that he has resisted the term *sociolinguistics* because it opens the door to descriptive studies which are not tied to linguistic theory. Implicit in his rejection of this is an interest in understanding what aspects of internalized linguistic structure are shared across the speakers he investigates—even if there is considerable variation in how that structure manifests itself. To the degree that social factors influence such variation, he believes them to be an integral part of the linguistic study.

Unfortunately, there is no way to directly test the internalized linguistic structure of subjects so that it can be compared to that of other speakers with whom these subjects come in contact. However, three reflections of this structure can be tested:

(1) shared production habits (which may or may not reflect shared internalized
      structure, e.g. Kerswill 1995),
(2) shared (linguistic) perception (the ability to distinguish forms in a system, e.g.
Preston 2005), and
(3) shared social evaluations of linguistic variables (judgments about the value and
meaning of specific linguistic variables, e.g. Plichta & Preston 2005 or Santa Ana &
Parodi 1998).

Analysis of these linguistic factors can be related to social characteristics of linguistic subjects

such as (1) shared nonlinguistic habits or characteristics (like participation in certain religious

practices as in Fishman [1965], Knack [1991], Milroy and Gordon [2003:112-114], Milroy [1987]

or, more classically, socioeconomic status) or (2) shared interactional patterns (e.g.

participation in speech communities, communities of practice, or shared social networks). At

the intersection of linguistic and social facts are two further questions that researchers need to

address when explaining social variation: (1) the nativeness of the speakers under

investigation, and (2) the degree of agency they display in any variation they exhibit.

Regrettably, these several factors are not always treated carefully and distinctly in the

literature (see Patrick 2002 for a thorough discussion of this problem as it relates to various

speech-community models). This chapter will explore how some of these factors have been

accounted for in paradigmatic versions of the speech community, network modeling,

communities of practice, and the language-setting model, evaluating each model's

appropriateness to the linguistic situation of the subjects included in the current study.

3.2 Labov's (1996) speech-community model

One of the most common models for relating speakers to larger linguistic systems is the

paradigm of the speech community, and the classical conception of this model is Labov's (1966)

analysis of New York City. This model prioritizes the study of the language of the group over

that of the individual, based on the premise that the "language of individuals cannot be

understood without knowledge of the community of which they are members" (Labov 1966:5).

It further prioritizes the subjective evaluation of speech forms over actual productions, noting

that socially distinct groups "living in close contact are participating in rapid linguistic

changes which lead to an increased diversity, rather than uniformity" in their production, but

that the "subjective evaluations of native New Yorkers show a remarkable uniformity, in sharp

contrast to the wide range of responses from speakers who were raised in other regions"

(Labov 1966:6). Evidence for this claim includes his finding that all New Yorkers shift toward

more r-full productions when pressed to communicate more "carefully," regardless of their

affiliation with groups that may variably delete /r/ regularly in casual speech.

The evaluation of the socially salient r-variable remains a canonical example of such a

norm, although Labov (1966:6) does imply that evaluation may operate below the level of

consciousness as he explains that the various groups that constitute the New York City speech

community are defined by their differences.

> For a working class New Yorker, the social significance of the speech forms that
> he or she uses, in so far as they contain the variables in question, is that they are
> not the forms used by middle class speakers, and not the forms used by upper
> middle class speakers. The existence of these contrasting units within the
> system presupposes the acquaintance of speakers with the habits of other
> speakers. Without necessarily making any conscious choice, they identify
> themselves in every utterance by distinguishing themselves from other
> speakers who use contrasting forms.

Based on negative definition (linguistic traits that differ, as opposed to those they share), the

production variation across socially significant groups within New York City is unproblematic

for the claim that New York City is a speech community, because it can be systematically

accounted for. "It is a long-standing axiom of structural linguistics that a system is essentially

a set of differences," Labov explains, drawing an analogy between the groups in New York who

form a system of productive differences within a community to Saussurian phonemes, which

are similarly defined by qualities that they do not share, rather than those which they have in common. Thus, his decision to unite people who differ significantly into a single system is grounded within linguistic theory.

Application of this definition, however, is not unproblematic. A common criticism is that it is not clear how many evaluative norms speakers must share in order to be considered a speech community, particularly since these norms may be operating below the level of consciousness. (Again, see Patrick 2002 for a broad discussion of such claims.) For example, if the speech community can be defined by production differences, it may be possible to assume that all speakers of Latin-American descent in Berrien County form a speech community based on the self-recognition that they are different from other racial groups and the reflected recognition of other local ethnic groups that these speakers all come from a Spanish background. That is, since both the Latinos and the other ethnicities recognize Latinos as – white, +Spanish (background), they are sharing the necessary social evaluations to be considered a speech community. Ethnographic evidence suggests that in the case of Berrien County, a +Spanish identity could be solidified by a shared connection to migrant labor practices as well as participation in Spanish church services and other social activities. Yet, sociological research has shown that Latino groups are at least somewhat more likely to identify themselves by their nationality than a shared Latin-American heritage (Brodie et al 2002). Since Latino members of this speech community exhibit considerable variation in their national identities, it is not clear that +/-Spanish is necessarily sufficient for describing these participants within the system. Other linguistic features (e.g. +/- Caribbean) could also be in play within the subcategorization of Latinos. Yet, it is not clear how such subcategorizations

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interact with the larger model of the Benton Harbor speech community if other ethnicities (European Americans and African Americans) are incapable of recognizing such patterns.

Also relevant to the case of Benton Harbor is the question of residency and nativeness, which Labov (1966) avoids by excluding immigrant populations from the study and focusing on long-term residents. However, as long as the Mexican Americans in Benton Harbor continue to maintain ties with the migrant population in the county, such questions are unavoidable. If a community forms seasonally with speakers who have similar language backgrounds and thus can be negatively defined as "other" by the local residents, what norms must they share (both externally and internally) to be considered part of the larger local speech community? It is not clear how much contact one has to have to be considered part of the community and whether that contact has to be year round if migrants continue to return year after year. Possibly, the process of "settling out" would make membership in the larger speech community more legitimate; but if so, it is not clear how long one must be settled before legitimacy becomes unquestionable or how acquainted the individual members of the community have to be with the linguistic differentials of the local social system. If parts of the Latino community are excluded based on their lack of acquaintance with the norms of other ethnic groups, what does that say about the membership of those who do interact with the local speech community and have internalized some of the local norms? If social characteristics are given prominent standing in this model, could the shared practices of Berrien County Latinos (participation in local Spanish churches, affiliation with farm-related work, and use of local ethnic commercial ventures like grocery stores and flea markets) be sufficient unto themselves for the shared behavioral and interactional requirements needed to define a speech community? Patrick's (2002) careful analysis of the construction and criticism of the speech-community model

suggests that it is important that linguistic definitions alone not be used to define a speech community, in order to avoid circularity and to ensure that analysis is used to define the speech community rather than simply allowing the construct to be assumed when convenient. He advocates that the speech community be defined as "a socially based unit of linguistic analysis," suggesting that social categories need to be defined before linguistic analysis, but still cautions that "notions of competence, nativeness, and language boundaries" must be addressed (576-577). Such notions are also not trivial in a situation like that of the Mexican Americans in Benton Harbor, whose families may share a common heritage language and who may occupy roles of similar status in the wider community, but whose personal linguistic experiences (including those within the local speech community) may vary widely.

Another common criticism of Labovian sociolinguistics is that speaker categorizations are imposed on the community. For example, even if researchers are meticulous in their categorization of socioeconomic status, categorizations of working class or middle class may not relevant in every community. Especially in the cases where someone is upwardly mobile or actively networked with members of another racial, ethnic, or class-based group, such categorizations may be inappropriate. Such findings have led Labov and Harris (1986) and others to argue that speech community categorizations must be supplemented with the social history of its individuals, which Jones (2003:35) summarizes as "the kinds of social experiences that people have had in dealing with members of other groups, and the way that they have used language in their life."

3.3 Santa Ana and Parodi's (1998) model of the speech community

One serious reworking of the speech-community model includes the Santa Ana and Parodi (1998) proposal for a nested hierarchy of speech-community fields based on social-

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evaluation judgments gathered in their fieldwork in rural Mexico. Using role-playing

exercises and other ethnographic methods, this research elicited evaluative statements of

linguistic variables that were considered (a) stigmatized, (b) nonstigmatized but regional, or

(c) standard. Santa Ana and Parodi claim that these elicitation tasks result in four nested

speech communities that "reflect increasingly expanding fields of interaction that individuals

maintain with pertinent others in the social environment" in much the same way that Milroy's

network analysis might. Figure 3.1 shows the schematic of this typology; Table 3.1 shows

whether the subjects included in each level of the typology recognize that the appropriate use

of such variables "affects the way in which others evaluate and place a speaker in the social

hierarchy" (35). Those with a more restricted network (Field I) are far less likely to recognize

social evaluations than those with a wider social network (Field IV).

Figure 3.1: Illustration of Santa Ana's Language-Setting Model
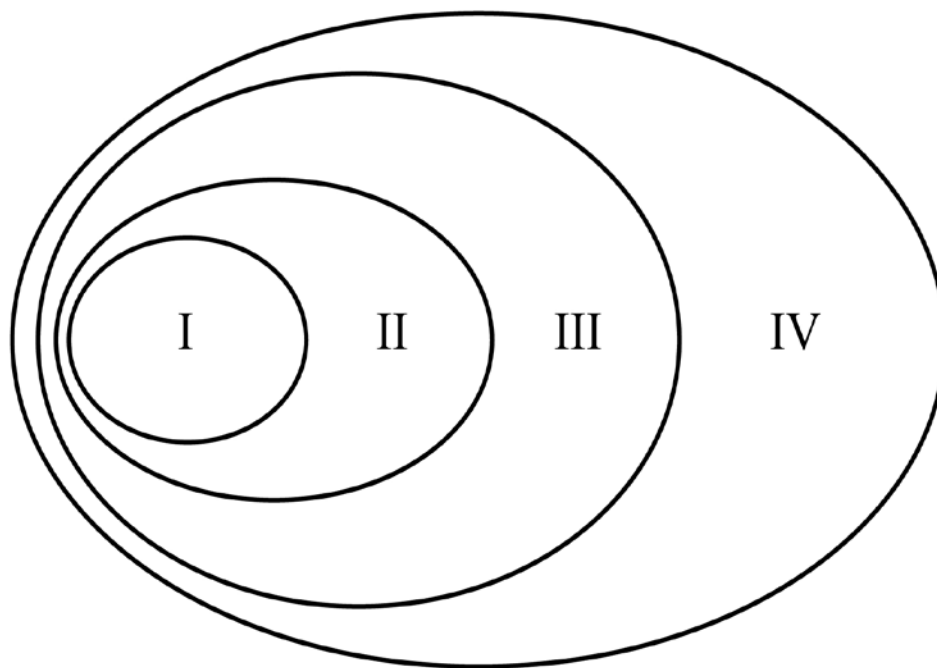
Table 3.1 Santa Ana's Binary Model of the Language Setting

	Stigma	Regional	Standard
I. Locale	–	–	–
II. Vicinity	+	–	–
III. District	+	+	+

While the authors state that production norms are captured in this model, they appear to be secondary. The authors concede that "it is insufficient that knowledge of the social hierarchy exists; for individuals, the social hierarchy must be pertinent to the way they conduct their daily lives" (34).

The primacy of the social evaluations appears to rest in the assumption that "an individual's recognition of the values of specific, socially marked linguistic features precedes productive control" (41), but such assumptions, by the authors' own admissions, may be unwarranted. Describing the members of Field I, they say:

> The absence of recognition of social symbolism of the wider fields does not mean that these speakers cannot distinguish phonemes or make phonetic distinctions, nor that they are completely unaware of regional accents. They may acknowledge some variation in speech; however, they are indifferent to the social judgments that are linked to such variation by other speakers. (38)

Such an admission suggests that apathy, not lack of recognition, could be the real impetus for these results. It is likely that speakers who live in relatively restricted networks (e.g. the Field I members) are less likely to come in contact with such stigmatization, but membership in such a network also insulates them from the relevance of such stigmatization—even if they are aware that it is happening. Since the authors themselves describe the Field I members as linguistically secure, one should not dismiss the idea that these speakers choose to reject such evaluations because they are only incidental to their everyday activities, not because they are

entirely unaware of them; such a possibility poses an important question about the agency involved in social evaluations.

The language-setting model also fails to address the possibility of norms within the Field I community that are not recognized in larger venues. If Field I participants exhibit variation in production, it is likely that there is social meaning attached to those variables that may or may not be recognized by speakers in Fields II-IV. Such evaluations may not be limited to the good/bad distinction that Santa Ana and Parodi investigate. For example, both African Americans and European Americans understand that the social evaluation of *habitual be* is negative, but European Americans do not understand that it is used to indicate aspect. Within the context of Berrien County, this highlights the question already posed above. If Latin Americans recognize linguistic differences among themselves, can we include less perceptive European Americans in their speech community? The narrowed scope of the model presented by Santa Ana and Parodi is good in that it puts an emphasis on the evaluative criteria for which Labov advocated primacy and because it isolates one kind of variable. Yet it is not clear that a +/- "socially good" evaluation should be the only criterion for a speech community, particularly when a marginalized group is the object of study, since it does impose external evaluations that could be irrelevant for at least some of the members of that group.

Even more problematic is the representation of evaluative criteria in the nested schematic shown in Figure 1. For example, Field I speakers do not share any evaluative norms with the speakers in IV and therefore should not be enveloped by them in the diagram if the diagram is intended to represent a typology of speech communities based on the social evaluations outlined in Table 1. Based on Table 1, the speech communities of Field I and Field IV speakers would be completely distinct. What they are actually describing perfectly models

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Labov's conception of the speech community: one that parallels a system of phonemes that are defined as much by their differences as by their similarities.

3.4 Milroy's social network analysis

Milroy (1980) is credited with establishing the use of social networks to explain language variation and change. Citing Mitchell (1986) in her later work, she explains that:

> A fundamental postulate of network analysis is that individuals create personal communities which provide a meaningful framework for solving the problems of daily life….These personal communities are constituted by interpersonal ties of different types and strengths, and structural relationships between links can vary. (Milroy 2002:550)

By quantifying the relationships between individuals in a society, Milroy hopes to explain which kinds of networks (systems of relationships) are most conducive to language change.

The model consists of the following relationships. *First order network ties* are those which link one person with others with whom he or she directly interacts. *Second order network ties* link that person indirectly with others in the network. Strong ties connect friends and family, while weak ties connect acquaintances (Milroy 2002:550). *High density networks* occur when there is considerable interactional overlap within the community (e.g. speakers' friends interact with their family and everybody works at the same company). In *low density networks*, people with whom a speaker comes in contact may never even meet one another, but they at least do not interact regularly. Figures 3.2 and 3.3 illustrate idealized versions of such networks.

Figure 3.2: Illustration of a High-Density Network

1st order zone 2nd order zone
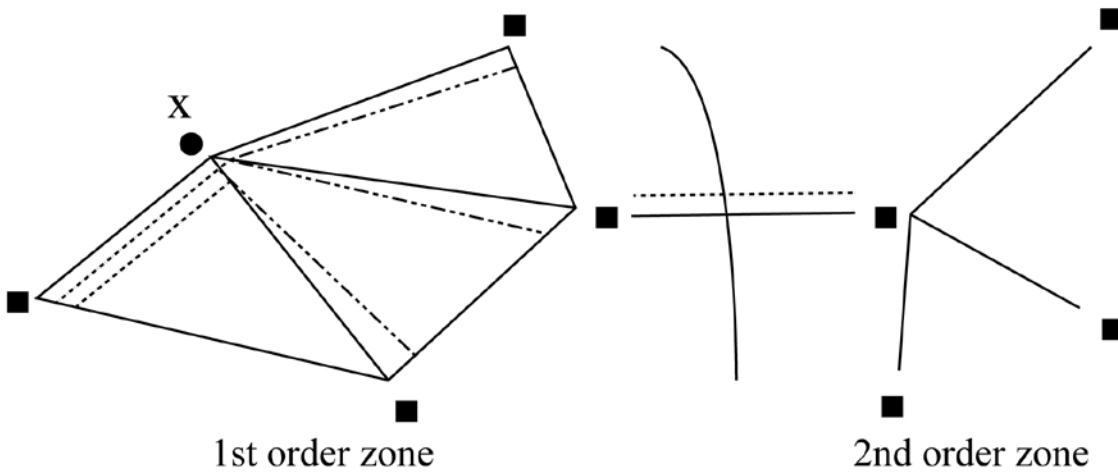
Figure 3.3: Illustration of a Low Density Network
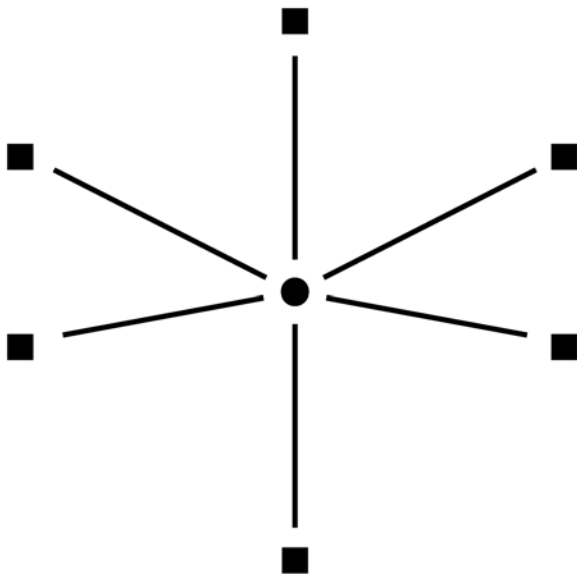
Unfortunately, researchers do not always have the luxury (or option) of the kind of observation required to fully document the network relationships of all members of a community. For this reason, Milroy developed the *Network Strength Score* based on five indicators of an "individual's level of integration into the local community" (Milroy 1987:140-141):

1. Membership of a high-density, territorially based cluster.
2. Having substantial ties of kinship in the neighborhood (more than one household, in addition to his[sic] own nuclear family.
3. Working at the same place as at least *two* others from the same area.
4. The same place of work as at least two others of the same sex from the area.
5. Voluntary association with workmates in leisure hours. This applies in practice only when conditions three and four are satisfied.

Milroy selected such variables because they (a) were "recoverable from data collected in the field and easily verifiable" and (b) reflected "the conditions which have repeatedly been found important in a wide range of network studies, in predicting the extent to which normative pressures are applied by the local community" (1987:141).

Evidence seems to suggest that the following patterns emerge when such connections are compared: "networks constituted chiefly of strong (dense and multiplex) ties support localized linguistic norms, resisting pressures to adopt competing external norms. By the same token, if these ties weaken conditions favorable to language change are produced" (Milroy 2002:550).

However, Milroy encourages researchers to adapt the method appropriately to the conditions of their own studies.

Other researchers have supplemented the basic relationships outlined in Milroy's research with concepts that are important to the current project. Milardo (1988) suggests that *exchange networks* be used to define friendships and familial relationships when these relationships appear to significantly shape the person's identity. For example, inseparable sisters who regularly consult one another for advice and support as opposed to sisters who may see each other regularly but who are not particularly close friends as adults. Milardo also recommends the use of *interactive networks* to label the relationships one has regularly (even over a long period of time) but which are not dependent on "material or symbolic resources,"

such as service encounters. Finally, Li (1994) proposes a relationship particularly relevant to the current research program, that of *passive ties*. As Milroy (2002) explains, documenting this kind of relationship is especially important when studying migrant or mobile individuals because "passive ties entail an absence of regular contact, but are valued by ego as a source of influence and moral support" (551).

In the current study, the five questions in Milroy's *Network-Strength Scale* were modified so that they were specific to a network of others with the same ethnicity (e.g. more than one Latino household in the neighborhood, etc.). And, as Chapter 5 will show, based on these questions, the Mexican Americans in Benton Harbor do not share a dense, multiplex network.

Because Milroy's *Network-Strength Scale* (much like Labov's original conception of a speech community) shows a strong bias toward communities with a geographic center, it fails to capture important characteristics of the Benton Harbor Mexican-American community. Benton Harbor is not a community that fosters a territorially based network, particularly in the neighborhoods where the subjects in the current study were able to afford housing. A community consensus is that the only places where there is a dense population of Latinos in Benton Harbor are in a handful of trailer parks that are not particularly desirable. One informant reported that before she moved out of one of the trailer parks where many Latinos live, she slept with a frying pan on one side of her bed and her cell phone on the other. She was not even comfortable allowing her children to sleep in another room. When Latinos are able to move out of the trailer parks, they often move into more rural areas or other small towns in Berrien County, in part because of an affinity for a rural lifestyle that may be related to experiences in fieldwork and in part because of a latent fear that some have of the African-American population in Benton Harbor.

Moreover, the traditions of the Latino community that exists in Berrien County are not conducive to a territorially based network. Although none of the subjects in this study are currently migrating, most did so through their childhood. Many only "settled out" in Berrien County as teenagers, and most continue to exhibit an identity that is strongly tied to migrant farm work—even years later. Thus, evidence suggests that many are not even looking for a territorially based network once they have settled out. It is not uncommon for Latino residents to travel over an hour away for Spanish church services in neighboring counties or two hours away to South Bend to shop or visit friends. Chicago was also a frequent destination, since a few informants had lived there before moving to Berrien County. Many who worked in vocations that supported migrant labor (e.g. those who worked in the migrant Head Start daycare) would travel as far as New England or Florida to aid fellow church members who had migrated away for the off-season. This extraterritorial behavior extended to residential practices as well. Occasionally I would return to find that an informant had moved to another city in Berrien County, even if I had only been gone for a couple of weeks.

Even as these facts negate the possibility of a territorially based network, they establish the basis for an ethnically based network that extends even beyond state lines. They suggest that a full account of linguistic influences of the yearlong Mexican-American residents of Benton Harbor needs to include those Latinos who only reside there seasonally, even if such an account is beyond the scope of the current investigation. Complicating this finding, however, is the possibility of informants who might integrate into one of the two major ethnic groups in the area: African Americans and European Americans. The possibility of this will be discussed below in section 3.5.

3.5 Santa Ana's (1993) Chicano language setting

Santa Ana's *language-setting model* was designed specifically to model dialect contact situations of people with a second language background. In his own words, "in the case of Chicanos, the language setting should include monolingual Spanish and English as well as bilingual speakers, and the non-Chicanos with whom Chicanos come in contact. Specifically, this model should account for the full range of English and Spanish dialects (1993:5).

However, the model presented in this study does not appear to be a model for accounting for how linguistic change spreads through a community (e.g. network theory) so much as a model that allows Chicano English speakers to be treated as a unit despite class, educational, and geographically conditioned heterogeneity in their speech.

In large part, the article proposing the language-setting model is a polemical piece about the flaws of previous research on Chicano speakers. While providing some much justified criticism of those who have argued that Chicano English cannot be a dialect, it does little to model the actual differences that might be found among speakers with the disparate language-setting characteristics described above. The weakness of this model is illustrated through Santa Ana's descriptions of speech community and the language of Chicanos. He uses ideas found in social-network theory and speech-community models to describe general situations:

> During each person's language acquisition period, the social network, that is to say the circle of people with whom one personally identifies though face-to-face daily contact, is the effective socialization unit....The collective result of this localized socialization process is the speech community, which is defined by shared patterns of use and interpretation of linguistic variables.

Yet, he does not model social networks or speech communities in his analysis. Instead, he bases his characterization of the language of Chicanos on a single social fact:

> Rather than a regionally unique collage of unrelated linguistic varieties, the language and dialect contact situation of Chicanos can be best considered as a coherent phenomenon, encompassing regional variation, monolingulaism in two languages and shades of bilingualism. *The basis of its unity is the commonality of Chicano ethnicity.* (22, emphasis added)

He goes on to advocate the study of Vernacular Chicano English (VCE), which he defines as "the dialect of Chicano speakers of English who have minimum contact with non-Chicanos in their daily communicative life" (23).

His characterization of the language setting of Chicanos in the US is not based on empirical linguistic research. It does not model linguistic variation, and it does not directly model contact. Instead, he uses US census data about reported income, language spoken at home, and ability to speak English to diagram the distribution of standard and nonstandard English speakers, standard and nonstandard Spanish speakers, monolinguals, and bilinguals in various parts of the US. The decision to directly associate income with standard and nonstandard language varieties is empirically problematic given Doran's (2001) dissertation about the range of variation found in a single Chicano family. However, it is also problematic in that it assumes little or no control over which variety a Chicano speaker uses (or, if it does, it ties the control directly to income). Since the assumption of this model seems to be that Chicano speakers have a wider range of appropriate repertoires available to them, the question of agency should probably have been given greater prominence in this model.

3.6 Eckert and McConnell-Ginet's communities of practice

Eckert and McConnell-Ginet's (1992) *communities-of-practice* model builds on earlier social models, directly addressing questions of agency that are often treated as secondary in other models. Unlike Labovioan models, which show how the use of certain linguistic variables correlates with (externally assigned) social categories, the communities-of-practice

model assumes that the social networks of an individual allow them the opportunity to index an identity in relationship to other speakers or groups of speakers in that network. In their own words:

> The fundamental point of a community of practice is to articulate its participants with larger social configurations (note that articulating can include connecting, but also cutting off or marginalizing)....Communities of practice are locations in individual's social networks, and they mediate individuals' relations to larger institutions (schools, churches, legal systems), and to more global imagined communities (nations, hiphop, women). (Eckert & McConnel-Ginet 2006:28)

Thus, a Mexican-American speaker who is trying to gain acceptance among a group of women who take pride in the same ethnic identity might index her own ethnicity through the use of certain ethnically marked linguistic forms. Conversely, if she were trying to distance herself from such an identity (either to avoid inclusion with the aforementioned group of women or to gain inclusion within a network of a different ethnicity), she could choose to simply avoid forms that were ethnically marked or she could also choose forms that were marked as belonging to another ethnicity. Either option involves some level of agency on the part of the speaker, even if she is not consciously aware of the individual linguistic units she controls.

Of particular interest to Eckert and McConnell-Ginet are *global imagined communities*, which include such diverse constructs as nations, corporations, sports team fans, TV show audiences, the American gay community (2006:33), and the Latino community. Similarly, Bucholtz's (2001) research on "hyperwhite nerd" identities is also a construction of a nongeographically centered community. Orientation to such communities "helps mediate individuals' relation to larger social structures" (2006:33), and it is this interest in the orientation that speakers have toward social institutions that distinguishes the communities of practice approach from other models. Eckert and McConnell-Ginet explain, "network studies

seek to find paths by which innovative forms make their way from community to community (Milroy and Milroy 1985), but what's missing from such treatments is the set of practices that constitute receptivity or resistance towards external influence" (2006:33).

Drawing heavily from theories of symbolic capitalism, Eckert and McConnell-Ginet emphasize that social institutions are integral to understanding communities of practice since they provide locations for such communities to compete for (linguistic) resources.

The *communities-of-practice* model is critical for understanding the orientation that Latino speakers in Benton Harbor, Michigan, have to local norms, since this orientation is undoubtedly influenced by their orientation toward global imagined communities such as the African-American community or European-American community. Although considerable strides have been made in race relations in this country over the last several decades, Benton Harbor is one place where the competition for social resources continues to lead to particularly public clashes. As Mexican Americans and other Latinos settle in the area, they must cautiously negotiate a place for the construction of their own ethnic identity within already established local constructs that exhibit considerable tension.

Possibilities within a community such as Benton Harbor include rejection of, acceptance of, or active orientation toward various ethnic identities, such as

1. an imposed Latino ethnicity or +Spanish-Heritage identity;
2. a specific national origin identity (e.g. Mexican or Mexican American vs. Guatamalan or Puerto Rican;)
3. the local African-American community;
4. a more global, imagined African-American community (one that extends beyond the borders of Benton Harbor or Southwest Michigan);
5. the local European-American community;
6. a more global, imagined European-American community (one that extends beyond the borders of Benton Harbor or Southwest Michigan).

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These possibilities echo those outlined in Santa Ana's *language-setting model* (discussed above), albeit with an emphasis on ethnicity rather than language varieties. With respect to Mexican Americans in Benton Harbor, ethnographic evidence suggests that a few generalizations about these orientations can be made.

Most actively exhibit an orientation toward a Spanish-Heritage identity (usually incorporating their own national identity), thus distancing themselves from a global European-American identity. Even those who do not appear to be actively indexing their identity through their speech exhibit other behavioral patterns that indicate an allegiance to this ethnic identity (e.g. making a special effort to hire those of a similar ethnic background). These findings are interesting since social research suggests that a Latino identity is a construct that is often more relevant to researchers than to their subjects (Brodie et al 2002). However, in the case of Benton Harbor, the ethnic identity appears to be reinforced by an identity tied to migrant farm work experiences and a pride in the work ethic affiliated with this employment. Speakers such as Bob and Sancho, who have never worked in the fields, orient themselves differently. Bob actively distances himself from the community, saying he would never marry a Spanish speaker because he feels it is important to marry someone from his own culture. Sancho, who is married to a local European-American woman and does not appear to have extensive contact with other Latinos outside of his own family, comments that as the only Mexican American to be enrolled in school year-round, it was strange being classified with the migrant workers. Though he seems to accept his ethnicity to a greater degree than Bob (who seems to be actively distancing himself from it), he does not appear to actively engage it.

In terms of negotiating a place within the already established ethnic relationships in Benton Harbor, considerable evidence suggests that the subjects in this study, by and large, are most likely to orient themselves toward European Americans and to distance themselves from African Americans. As discussed in Chapter 2, these biases appear to correlate with stereotypes about work ethics rather than an actual disdain for certain skin colors. However, what is also interesting is that their orientation appears to be toward a local (rather than a more global) European-American community, based on a belief that European Americans in Michigan have fewer racist tendencies than those in other parts of the country. Thus, there is a faith that if they continue to work hard, they (and/or their children) will be fully accepted in the community. Their upward mobility ties them to the people they see most in successful positions in society; and in Benton Harbor, these are usually European Americans.

Exceptions to this orientation exist. Salina, for example, moved to Benton Harbor when she was a teenager. She has married a local African American and shows such a strong orientation toward that community that her friends regularly comment on it. Carmen, who has had a child with an African American, does not orient herself to African-American culture to the same degree that Salina does, but believes that this pattern of orientation may become more common among Mexican-American children who are growing up in Benton Harbor. She points out that her son refers to himself as "Blacksican" and seems to think that this earns him an element of "coolness" among his friends even though they are confused by the contrast between this claim and her son's light skin color. Generational differences in the orientation toward local African Americans are likely to emerge as the second generation reaches adulthood, but it is also possible that outreach to the Latino community could change the orientation of local Latino adults.

For instance, in 2006, a local African-American minister who was trying to do outreach to the Latino community offered a Spanish-speaking church the use of his church's facilities. As of early 2007, the two congregations still have separate services, but they also hold joint events. This is a particularly significant event in terms of race relations because it creates an opportunity for these speakers to create meaningful network ties (locations for communities of practice) with local African Americans. If similar patterns continue, such positive interactions could help to make Latinos more open to interacting with African Americans in the community at large and, consequently, mitigate the negative orientation toward African Americans that was often observed among Latino adults during the fieldwork for this study.

3.7 Discussion

Because there is merit and tradition in each of the various approaches outlined here, the current study will employ both a Labovian variationist model in the analysis (Chapter 5) and a more qualitative analysis of ideological information, such as that which is typical in the communities-of-practice model (Chapter 6). In tandem, these results will show that quantifiable social demographics are significantly correlated with accommodation and change, but that ideological information also provides important explanations for the analysis of the Benton Harbor subjects, especially as it pertains to predictions about future linguistic development.

Though significant results are found in Chapter 5, the approach taken in Chapter 6 is particularly important in the case of Benton Harbor, since one could argue that these speakers cannot be considered members of the local speech community based on the precedent set by Labov (1966), who excluded immigrants from his study of New York. What's more, the Benton Harbor speakers have arrived at different times over the course of 30 years, and therefore have

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been exposed to local language norms for varying lengths of time. Their opportunities to acquire local language features vary considerably based on length of residence and other social factors. Only a few subjects were born in the area and would have had the opportunity to acquire local features natively.

Classifying Latinos in Berrien County as a speech community is also problematic, even if we limit membership to something as specific as Mexican Americans in Benton Harbor who share length of residence and nativeness characteristics. It is doubly problematic since the speakers and their families do not share a common origin (e.g. Roeder's Mexican Americans in Lansing, Michigan, who were almost exclusively from the Valley region of South Texas). Many of the speakers in this study are from families who once lived in the Valley, but this is neither a defining characteristic of the community at large nor of the subjects in the study. For example, Sancho was born in Wisconsin, Roman was born near San Antonio, and Grace, Roger, and Rita were born in Mexico. Most subjects in this study are interacting within a Spanish-speaking community solidified by common experience with migrant fieldwork and/or by religious affiliations that permit a more global-Latino identity to be as important as their national origin. Since both religious organizations and the need for migrant labor continue to draw an enormous variety of Latino immigrants, this community cannot be described as having a cohesive linguistic background.

Santa Ana (1993, discussed above) makes the argument that being Chicano makes one a Chicano English speaker even if one does not speak Vernacular Chicano English. Such a definition could be particularly useful for uniting speakers of fairly diverse social and linguistic backgrounds in a contact situation like Benton Harbor. However, his language setting model does not provide a model for describing how linguistic variation spreads through a

community, nor does it account for any of the ethnographic details important for understanding why people interact and which interactions are most likely to lead toward the convergence or divergence of linguistic variables. Like the speech-community model, it does not address issues of nativeness.

Milroy's social networks offer the opportunity to trace the transmission of local linguistic norms (those of African Americans or European Americans) through the new, young community of Latinos in Berrien County. The Mexican Americans in Benton Harbor do not appear to have a territorially based network of dense, multiplex ties, with other members of the same ethnicity. Based on Milroy's Network-Strength Scale, one should predict rapid change to be transmitted through the community. In this case, since many of the speakers are interacting with European Americans who have had some contact with the Northern Cities Shift, one could predict faster adoption of some of the patterns of the NCS by those who are most in contact with European Americans and slower adoption by those who are not. It cannot be assumed, however, that because there is not a strong, territorially based network in Benton Harbor that the subjects in this study do not have strong ties to other Latinos within the county, across the country, and/or abroad, and this is a problem for the full adoption of the Milroy model as initially conceived. Furthermore, the social-network model does not fully account for the agency of the speaker in the practice of indexing their social (linguistic) identity, although the distinctions between strong and weak ties are a move in the right direction.

For cases like those of Mexican Americans in Benton Harbor, the implications of the communities-of-practice model must be taken into account in addition to social-networks model. Of particular interest is the concept of the global imagined community adopted in

Eckert and McConnell-Ginet's work, which is compatible with Santa Ana's description of a Chicano English speaker as any Chicano who speaks English. Global imagined concepts such as a "Latino community" could be critical for understanding how, for example, Mexican Americans in Benton Harbor use their available social networks as opportunities to index their identity as they negotiate their own place in the community, but so could other imagined concepts that are typical among these subjects, including "Americans" (usually used to refer to the local white community) and "African Americans." As Chapter 6 will show, orientation toward each of these communities is not necessarily quantifiable in such early stages of a dialect formation, but these orientations are critical for the understanding of language variation and change in Benton Harbor.

CHAPTER 4: LANGUAGE CONTACT AND MEXICAN AMERICAN ENGLISH

4.1 Introduction

Very few sociolinguistic investigations have been carried out on Chicano English varieties in the United States, and only a fraction of them have employed acoustic methods in the investigation of the F1/F2 vowel space. Instead, researchers have focused on the relationship between the dialect and Spanish, often ignoring possible influences from regional variation in the speech of the other ethnic groups with whom Chicanos come in contact.

Many early studies of Mexican-American or Chicano English struggled to establish it as a stable dialect, rather than an *interlanguage*, or imperfectly acquired L2. This debate has since petered out as more and more speakers of the variety have been shown to be monolingual English speakers, but certain features of this dialect clearly have their origin in interlanguage phenomena and in situations of language contact. Studies of *second language acquisition* (SLA), then, can provide additional insight into issues surrounding Mexican-American English. SLA research is doubly relevant in a community like Benton Harbor, where the need for migrant labor means that the stream of monolingual Spanish speakers who are interested in learning English locally is likely to continue indefinitely. The first part of this chapter will examine SLA models most relevant to the current analysis—those that seek to address possible phonetic transfer in the vowel system in L2 acquisition.

A separate but related issue that affects the speakers of Benton Harbor is whether Chicano English shows regional variation and, if so, to what degree that variation is related to the regional variation of the matrix community (European Americans). Recent research has shown that regional variation does exist (e.g. Moriello 2003; Wolfram, Carter, & Moriello 2004; Fought 1999, 2003; Roeder 2006; etc.). The second half of this chapter will examine examples of

possible regional variation that have surfaced in acoustic studies of the vowel systems of Mexican Americans.

4.2 SLA Research

Underlying several SLA models are questions regarding the hypothesized critical *period*, a time between birth and puberty when language acquisition is most likely to result in nativelike acquisition (first put forward by Lenneberg, 1967). Strong versions of this theory suggest that those who do not acquire the language until after this period has passed are doomed to imperfect acquisition, and evidence suggests that Age of Learning (AOL) plays an important role in determining success in second language acquisition—particularly in phonology. (Major provides an excellent review of this literature [2001:6-10]).

Stronger versions of the *critical period hypothesis* (CPH) often suggest that access to *Underlying Grammar* (UG) deteriorates and/or disappears as children get older. Since UG is credited with L1 acquisition abilities, it is hypothesized that this deterioration is responsible for the findings that later L2 learners are generally less successful at acquiring nativelike proficiency. Weaker versions of the CPH suggest that limited access to UG is available to L2 learners: L2 learners are able to access those aspects of UG that are present in L1. Thus, such theories are able to account for transfer of L1 features to the L2.

Still others reject the CPH on the basis of insufficient evidence. For example, Bialystock and Hakuta note that while "it is true that transfer distinguishes L2A from L1A in some respects, it is not clear that the process itself is unique to L2A" (1999:167). Such researchers remind us that correlation does not equal causation (161). Given the different learning conditions of L1 and L2 learners, they argue that transfer is just as likely to be a cognitive process as a linguistic one (168). If transfer were a cognitive process instead of a linguistic one,

then it would be possible for later learners to achieve nativelike production with proper training, or (as Flege often points out) with sufficient exposure to native speakers.

These criticisms of the CPH model deserve consideration. Particularly in the context of a minority group who has been the victim of historic oppression, one should not forget one of the basic tenets of sociolinguistics: language is both code and behavior. While SLA researchers may be interested in producing speakers without foreign accents, their subjects may have other goals. Many L2 learners may be satisfied with a version that allows them to communicate with L1 speakers and may even celebrate foreign-markedness in some cases. Attitudinal research lends support to this possibility. Moyer (1996, 1999 in Major 2001) shows that age of L2 learning is confounded by factors such as motivation and cultural empathy, while Coates (1986 in Major 1999) reports that those who have a high desire for more general achievement are most likely to succeed in pronunciation proficiency. Given the social history of many Latinos in the United States, who were often treated as second-class citizens, it seems probable that what began as transfer could have been celebrated as an ethnic identity marker and encoded into the regular vernacular. Such possibilities confound efforts to understand what it is possible to achieve in SLA, but they offer important insight into how language is used as a vehicle of cultural transmission.

Confounding factors aside, previous research has demonstrated that perceptual differences develop as L1 is acquired, indicating that phonological transfer in the speech production of L2 learners is likely to have a maturational/neurological component. Empirical evidence shows that discrimination of tokens that occur within a phonemic boundary of a speaker's language is more difficult than that of those at phonemic boundaries. Two relevant models for explaining language acquisition phenomena include Kuhl's *Native-Language–Magnet*

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(NLM) model, which attempts to explain early L1 acquisition and Flege's *Speech-Learning Model* (SLM), which explores L2 acquisition.

4.3 Kuhl's Native-Language–Magnet (NLM) model

The Native-Language–Magnet (NLM) model focuses on the development of language-specific perceptual categories in an infant's first year, "prior to the time that infants acquire word meaning and contrastive phonology" (Kuhl & Iverson 1995:139). The theory holds that infants, like certain nonhuman animals, are born with inherent perceptual psycho-physical boundaries (shown in A in Figure 4.1) that "guide" the initial selection of stimuli for a phonetic inventory (140-141). As children are exposed to their first language, the inherent guidelines that are distinctive in the L1 become reinforced; those which are not distinctive in the L1 fade.

Figure 4.1: Illustration of the NLM theory (Kuhl & Iverson 1995:140). A illustrates proposed underlying boundaries in the F1/F2. B shows the acquisition of native language phonemes of 6-month-old infants based on ambient language input. These phonemes will serve as perceptual magnets. C demonstrates the effective loss of natural underlying boundaries as induced by the specific language stimuli.
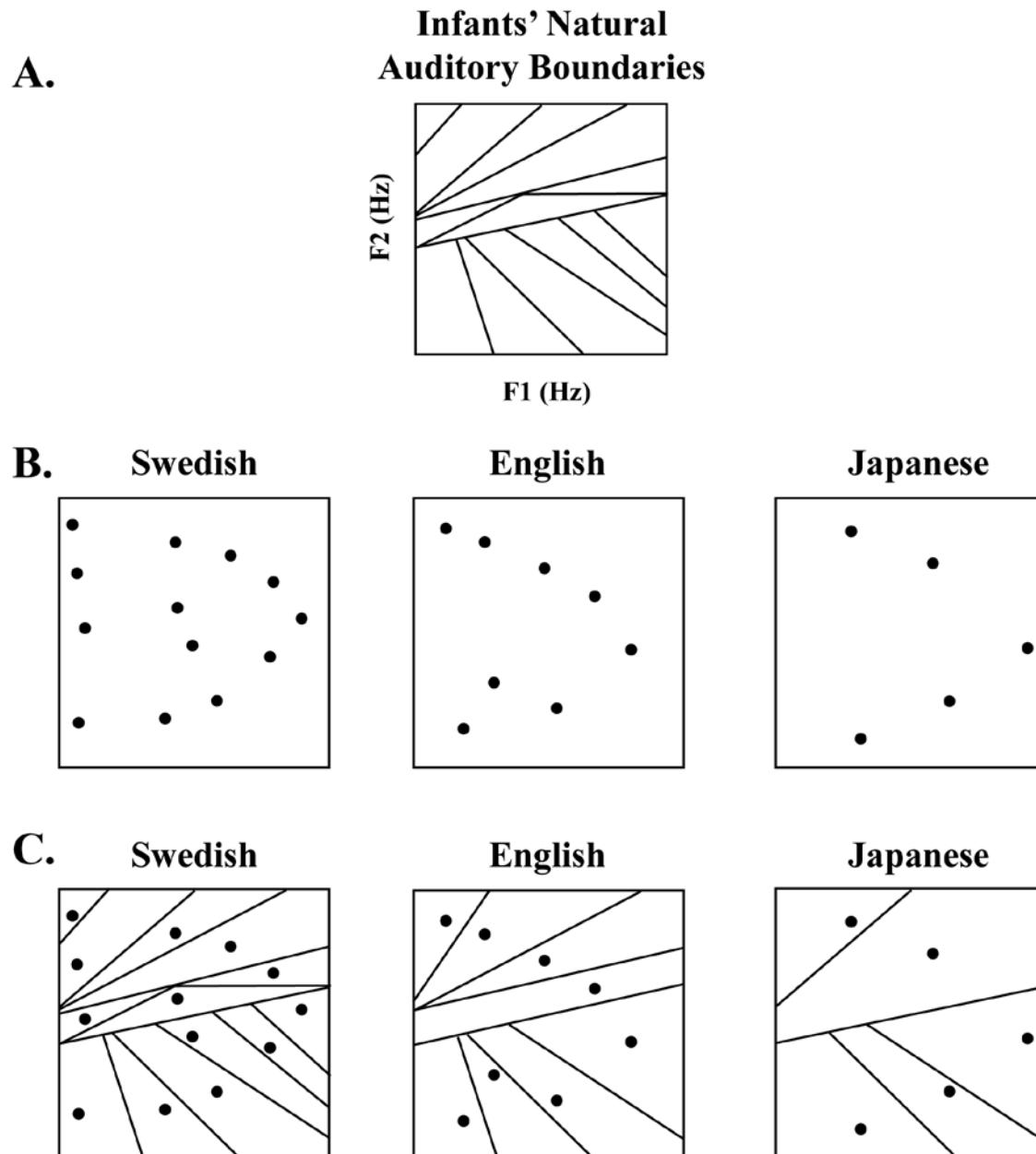
Interestingly, data show that this process does not weaken the ability to discriminate phonetic differences, only phonological ones, leading Kuhl and Iverson (1995:142) to speculate that the change occurs "at a higher level, one that involves memory and/or attention." The primitive categorization process underway results in an alteration, or "warping" of the perceptual space, such that by the age of ten to twelve months, infants already "exhibit a failure to discriminate foreign-language sounds that they had discriminated earlier" (142). Kuhl and Iverson's NLM suggests that a magnetlike mechanism in the brain is responsible for this change. That is, the mechanism for ignoring nondistinctive differences is an inherent part of the language learning process, which is conditioned by the exposure to L1. Later, the NLM argues, "infants' perceptual representations serve as targets for the acquisition of phonetically relevant gestures" (147).

4.4 Flege's speech-learning model (SLM)

While the NLM is interested in the early acquisition of phonetic categories in L1, Flege's Speech-Learning Model (SLM) is concerned with age-related effects of L2 acquisition—namely that older learners experience more transfer effects than younger learners. Primarily, this working model tries to account for the paradox that "At an age when children's sensorimotor abilities are generally improving, they seem to lose the ability to learn the vowels and consonants of an L2" (Flege 1995:234-235). Flege hypothesizes that the same perceptual magnet effects accounted for by the NLM are responsible for transference in SLA.

Unlike supporters of the critical age hypothesis, Flege assumes that "the mechanisms and processes used in learning the L1 sound system, including category formation, remain intact over the life span, and can be applied to L2 learning" (1995:239). Indeed, his later research indicates that while early bilinguals pattern more like native speakers than they do

like later bilinguals, the change is neither quick nor dichotomous (Flege & Mackay 2004).

Relevant to dialect contact research, Flege (1995) also asserts that "phonetic categories established in childhood for L1 sounds evolve over the life span to reflect the properties of all L1 and L2 phones identified as a realization of each category" (1995:239) and that "bilinguals strive to maintain contrast between L1 and L2 phonetic categories, which exist in a common phonological space" (1995:239).

Based on these assumptions, Flege puts forward a number of hypotheses about how the perceptual relationship between L1 and L2 sounds influences production. Essentially, he argues that L1 and L2 sounds share an allophonic relationship within the speaker's system and that a new phonetic category can only be established if there is a perceptually sufficient difference between the L1 and L2 sounds. Flege notes that the formation of a new category for a particular L2 sound may be prevented by the "mechanisms of equivalence." The likelihood of this mechanism's implementation increases with Age of Learning (AOL), and results in "a single phonetic category... used to process perceptually linked L1 and L2 sounds (diaphones)." He suggests, importantly to language contact situations, that "the diaphones will resemble one another in production," a hypothesis that is likely related to his suggestion that "the production of a sound eventually corresponds to the properties represented in its phonetic category representation" (1995).

In the case of Spanish speakers who acquired English, this would entail transitioning from a five-vowel system (shown in bold) to the much more complicated traditional English vowel system (shown in grayscale in Figure 4.2). Dotted lines represent predictions that might be made about the magnet effects of the L1 (Spanish) system on the perception of English vowels. If speakers are not able to overcome such perceptual effects, Flege's SLM predicts that

their production will be unable to accurately (distinctly) produce them. This model accounts

for some of the phonological patterns typically reported in Mexican Americans' speech (e.g.

sheep /i/ and *ship* /I/ conflation (Galindo 1987), backed pronunciations of /ʌ/, as in *cut*, and the

readiness of the Mexican-American population to accommodate to the low back merger

(*cot/caught*) in Texas and the Southwest).

Figure 4.2: SLM Predictions of Spanish to English Vowel Effects (based on a conservative English vowel system)
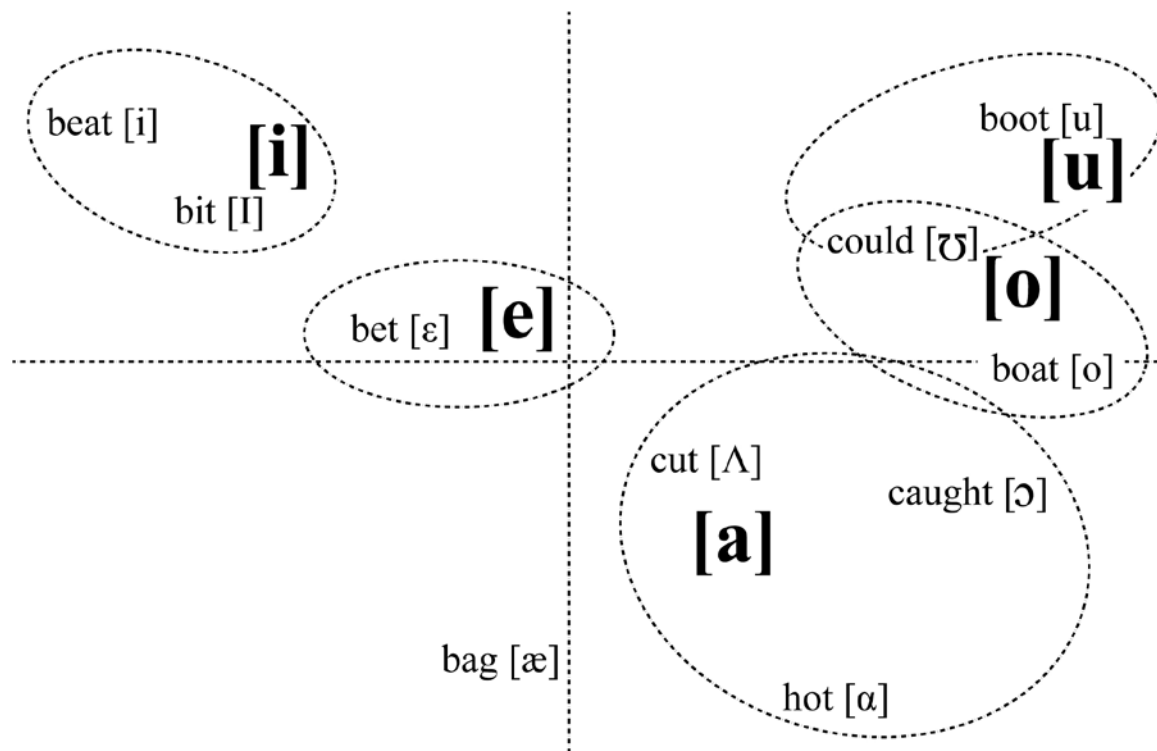
Flege, Mackay, and Meador (2004) test this hypothesis with Native Italian speakers in

Ottawa, Ontario. Like most SLA research on production, Flege and Mackay used a panel of

Native English (NE) speakers to judge the productions of Native Italian (NI) subjects who were

subdivided into groups based on AOA (early, mid, and late). Word lists produced by the NI

speakers were created using auditory prompts. As a control, NE speakers' productions were

also included. The signal was then modified to mask the surrounding consonants and to eliminate other surrounding contexts before being presented to a panel of 6 NE-speaking judges. Responses from the NE judges indicated that early and middle groups did not differ significantly in the ratings of vowels as native/non-native with one exception: /ʌ/ produced by the middle group were perceived as significantly more foreign than the NE and early groups. Not surprisingly, late learners were considered significantly more accented, especially for vowels that are not found in Italian (e.g. /ɪ/, /æ/, /ʊ/, /ʌ/). When vowels were misidentified, they were generally heard as a vowel that was slightly lower than the target (/e/ for /i/, /ɛ for /ɪ/, /ɛ/ for /e/, /ɑ/ for /o/, /o/ for /ʊ/, and /ʊ/ for /u/), except in the case of /æ/ and /ɑ/ which were "most frequently heard as slightly higher vowels" (/ɛ/ and /ʌ/, respectively).

These results provide a foundation for further investigations, but only limited conclusions about the validity of the SLM model can be drawn from this experiment alone since what is actually being tested in this experiment is the perception of these vowels by native speakers, not the acoustic properties of the productions by the Italian speakers of English. Since Kerswill and Wright (1990) have shown that transcription processes can be unreliable even when trained linguists are involved, these data are especially suspect. Likely, such transcription has led to false reports in the literature on Latino English varieties. For example, conflation of /i/ and /ɪ/ is often reported in Chicano English when impressionistic techniques are used, but no acoustic study has ever shown a merger of these two vowels in the F1/F2 vowel space (see, for instance, Thomas 2001; Godinez & Maddieson 1985; Roeder 2006; Carter 2006). Godinez and Maddieson (1985) show that Mexican Americans in California show a smaller Euclidean distance between the two vowels in their F1/F2 space than can be found in

the European Americans in the area, but very little overlap. Instead, they find durational

differences in the way that the two ethnicities distinguish between two vowels. Since the SLM

is weighted so heavily on the effects of the F1/F2 vowel space, testing would be better geared

toward measurements of production of the language learners than the perception of native

speakers, who could be influenced by durational differences and other factors that are

unrelated to the F1/F2 space.

4.5 The possible role of motoric abilities in transfer

Interestingly, neither model deals directly with articulation. Flege (1995) discounts the

suggestion that a foreign accent (transfer) is caused by motoric difficulty based on three pieces

of evidence from several different studies. However, a review of the evidence presented in

these studies is problematic, suggesting that motor functions might need to be accounted for

in such models.

First, Flege claims that studies like Hill (1970) and Novoa, Fien, & Obler (1988) show that

"foreign accents are apparently not *inevitable*" (Flege 236), implying that some speakers do

master production. In fact, Hill offers very little in the way of concrete evidence about

production to support this claim. Instead, her article focuses on the cultural influences and

linguistic experiences that might affect the perception of a foreign accent. In her words,

"different speech communities display varying sensitivity to foreign accents, and...there are

some situations, such as multilingualism, inside "phonetic areas" where one would like to

predict that sensitivity would be low" (Hill 1970:244).

In a more specific example, Hill offers anecdotal evidence of a speaker who abandoned

his first language at a young age for a series of four different languages. She speculates that it

would be unlikely for this speaker to recognize a foreign accent, but offers no empirical

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evidence for this assumption. Similarly Novoa, Fein, and Obler (1988) offer interesting

evidence from a battery of tests on a single subject that indicate that exceptional language

learning may be correlated with "a compromised visio-spatial system" and "underlying

strengths in verbal memory or a strong general memory," but their subject's production was

not discussed beyond the claim that they "interviewed native speakers of the different

languages C.J. speaks and asked them to evaluate C.J.'s abilities, accent, and fluency" (295).

Because no review of these evaluations is provided, neither study provides concrete evidence

for Flege's claim.

Second, Flege cites Neufeld (1979) who reports that listening exercises can train adults

to produce "sentences in an unfamiliar foreign language without foreign accent" (ibid. 236).

Indeed, Neufeld presents evidence that after 18 hours of foreign language videotape exposure,

subjects were able to produce accurate imitations of that language up to 16 syllables in length.

However, Neufeld concedes that this is not conclusive evidence of nativelike mastery, merely

of imitation (which Boersma delineates clearly in his 1998 dissertation). Moreover, this early

study was done without the benefit of acoustic analysis, so it is unclear whether subjects were

truly matching nativelike productions or whether they had merely managed to eliminate

foreign-marked productions. Finally, Flege cites Snow and Hoefnagle-Hohle (1979), who show

that "adults were first better able than children to imitate and spontaneously produce Dutch

sounds. By the end of the one-year study period, the spontaneous production of Dutch sounds

by NE adults and children were roughly equivalent" (Flege 1995:236).

Snow and Hoefnagle-Hohl (1979) offer more concrete evidence for Flege's claim than

the other research cited. Studying 51 NE speakers who were learning Dutch *naturalistically*

(without formal instruction), they tested production at three 4-5 month intervals over the

course of one year with two types of word elicitation tasks (imitation tasks and spontaneous tasks). Results do indicate that foreign accent production is not inevitable, but two criticisms of this research deserve consideration. First, speakers often perform differently in elicitation tasks than in natural conversation, so these laboratory results do not necessarily indicate nativelike mastery in more natural settings. Second, the coding of their data was done impressionistically, and, while "rescoring of the subjects several months later produced 89 percent agreement with original scores," this study lacks the acoustic phonetic detail also missing in Neufold's study, and thus their claims (and Flege's) about native-mastery deserves the same critical scrutiny.

What is more, it is not clear why any of this research would be evidence that motoric ability limitations should be completely discounted. The evidence that training can improve production is evidence that some speakers can acquire sufficient motor skills for passing as "nativelike" in controlled, impressionistic testing environments, but one should not discount the possible influence of procedural memory—particularly in less guarded speech situations. Evidence of the effect of procedural memory in areas outside linguistics provides a useful analogy. For example, it is not uncommon for sports trainers to spend considerable time retraining the muscle gestures necessary for superior athletic performance—even among those athletes with considerable natural talent. It seems unlikely that muscle movement of the tongue would be much different. Researchers should not discount the possibility that some speakers are better (easier to train or retrain) linguistic athletes than others and that procedural memory (muscle memory) could take over even when perceptual competence is

sufficient to distinguish differences.[2] In fact, research into speech motor development

suggests that

> Children must develop the complex, multilayered mappings that adults use with
> such apparent ease. The experimental data have revealed that very precise
> details of the motor commands that drive muscle activity are sculpted by details
> of the linguistic units being processed. By 4-5 years, this multilevel sculpting
> appears to be taking place. (Smith 2006:346)

More strongly, Smith's research suggests that the "linkages between language and motor

systems...are bidirectional" such that "not only do linguistic goals shape motor commands, but

preferences and features of the motor system shape linguistic processes as well" (346).

If Smith's model for development of production techniques is correct, then the

strategies learned during L1 acquisition could have profound effects on the production

strategies of L2, particularly with later learners whose L1 motor strategies have had sufficient

time to develop and mature. The effects of such strategies would be compatible with the

magnetlike effects cited by NLM and SLM researchers, since there would be a strong

correlation between the amount of synchronization between the acoustic and motoric targets

in L1 and the speaker's chronological age. Moreover, this model would help to explain why L2

vowels not "sufficiently close" to L1 vowels (like /æ/, which should be perceptually distinct

from all of the Spanish vowels) are still produced with a foreign accent. These production

effects would not necessarily preclude perceptual effects, but instead explain why L2 speakers

who might be able to perceive the differences between their own productions and those of

native speakers are still unable to perform identically.

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[2] Consider also evidence from the *caught/cot* merger where some speakers are perceptually
merged, but maintain a distinction.

4.6 Regional variation and Chicano English

Together, the NLM and SLM provide a good starting point for understanding how the effects of categorical perception in L1 might have contributed to the development of the vowel systems now found in dialects of English spoken by those with a Spanish heritage. However, as suggested above, these models are not necessarily appropriate for understanding the patterns of Latinos who learned English either as their first language or as a second language acquired at a very young age. Few studies have examined the phonetic properties of such dialects, and even fewer have done so acoustically. Notable exceptions include Godinez and Maddieson (1985); Santa Ana (1991); Veatch (1991); Thomas (2000, 2001); Fought (2003); Wolfram, Carter and Moriello (2004); Roeder (2006); Konopka and Pierrehumbert (2008). This section contains a review of these studies,[3] and considers the degree to which Mexican-American English varieties might be accommodating to European American regional norms.

One of the earliest acoustic investigations of Chicano English was done by Godinez and Maddieson (1985), who investigate claims similar to those put forth by Flege, namely, Garcia's (1974) hypothesis that

> the Chicano experiences interferences with vocalic, consonantal and suprasegmental phonemes when he speaks English. The Chicano's phonemic system filters the phonemes when he speaks English to the nearest equivalent phonemes in Spanish, which is to say that the Chicano substitutes Spanish phonemes for English. (in Godinez & Maddieson 1985:43)

Godinez and Maddieson's detailed results provide an excellent starting point for discussing (a) differences between monolinguals and bilinguals that might be caused by transfer from a first language; (b) the dialect differences between Chicanos and European Americans from the same geographic region; and (c) the degree to which Chicanos may

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[3] Except for the latter two, which will be used for direct comparisons in Chapter 5.

participate in an ongoing sound change in that region. Figure 4.3 shows a comparison of the vowel space of these three groups (which they label Chicano monolinguals, Chicano bilinguals, and General Californian) using the means of each vowel for each group. Figures 4.4 through 4.6 show the individual vowel plots for each group, where each ellipse encloses approximately 95 percent of the original data points. Notable differences will be discussed below, but it is important to begin by noting that this chart does not show radically different systems, thus casting doubt on Garcia's claim.

Figure 4.3: A formant frequency plot (in Hz) from Godinez and Maddieson (1985:51), who show Chicano monolinguals, Chicano bilinguals, and General Californian groups.

● Chicano monolingual
▲ Chicano bilingual
☐ General Californian
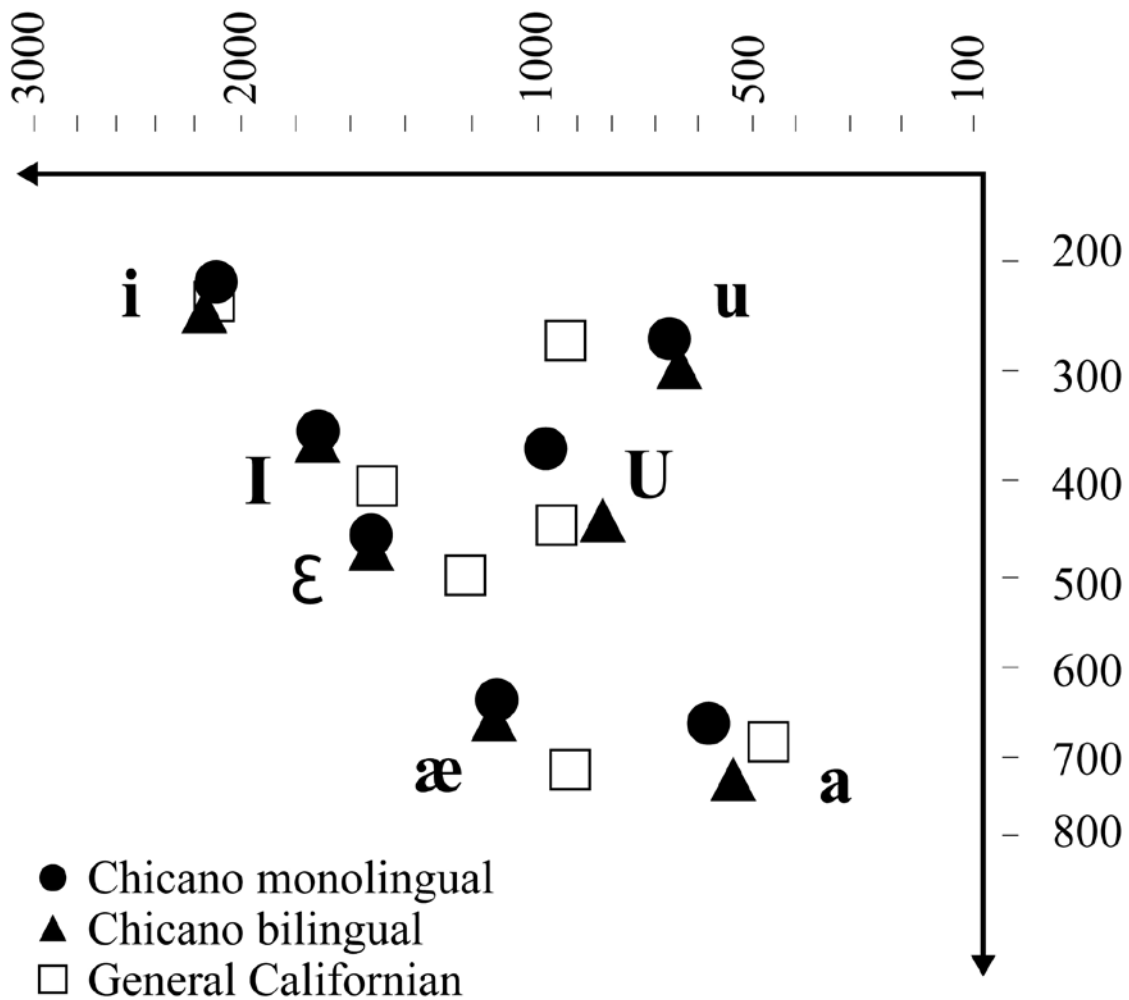
Figure 4.4: A formant frequency plot (in Hz) of Godinez and Maddieson's (1985:50) General California group vowels; each ellipse encloses approximately 95% of the original data points for 15 speakers.
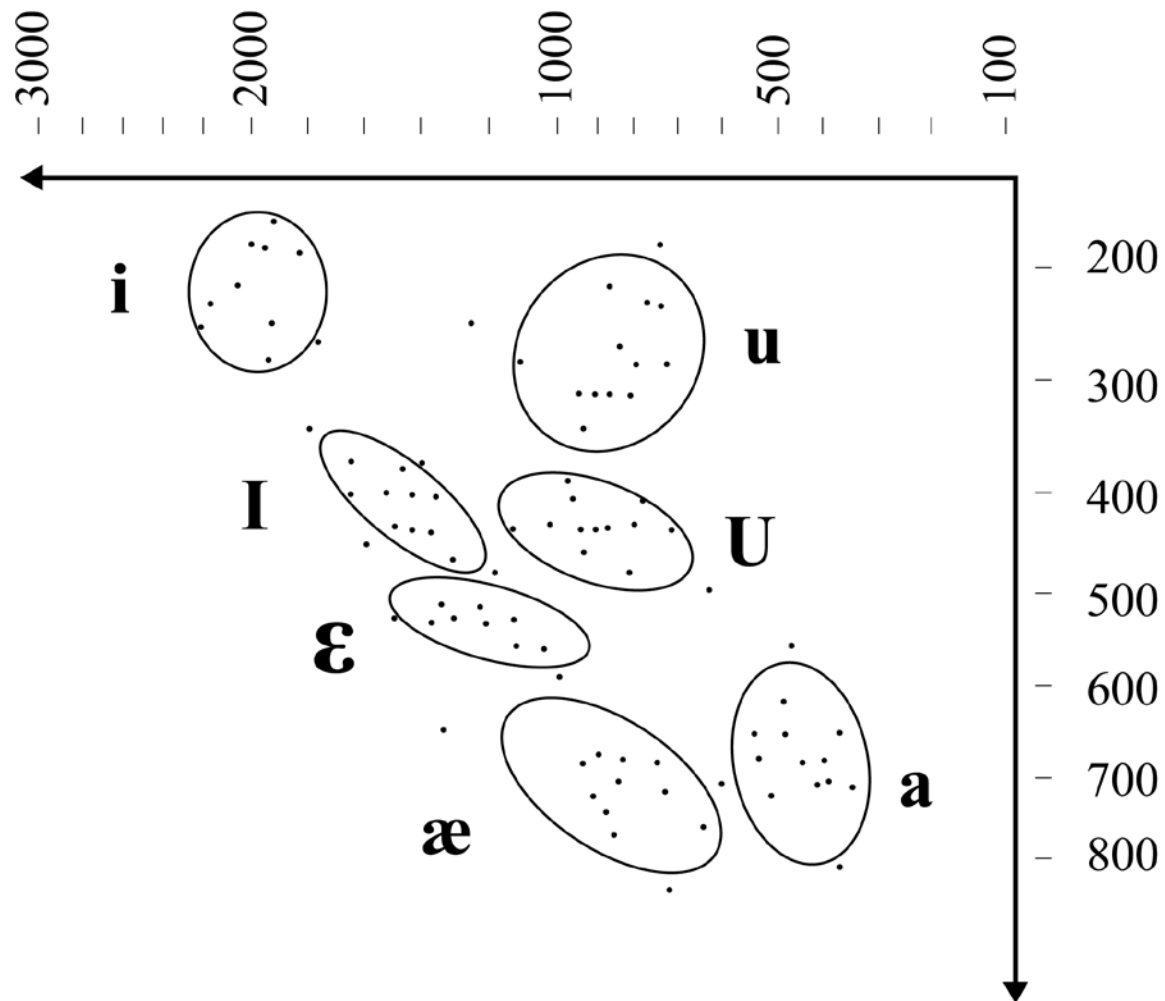
Figure 4.5: A formant frequency plot (in Hz) of the Chicano bilingual group's vowels in Godinez and Maddieson (1985:49); each ellipse encloses approximately 95% of the original data points for 15 speakers.
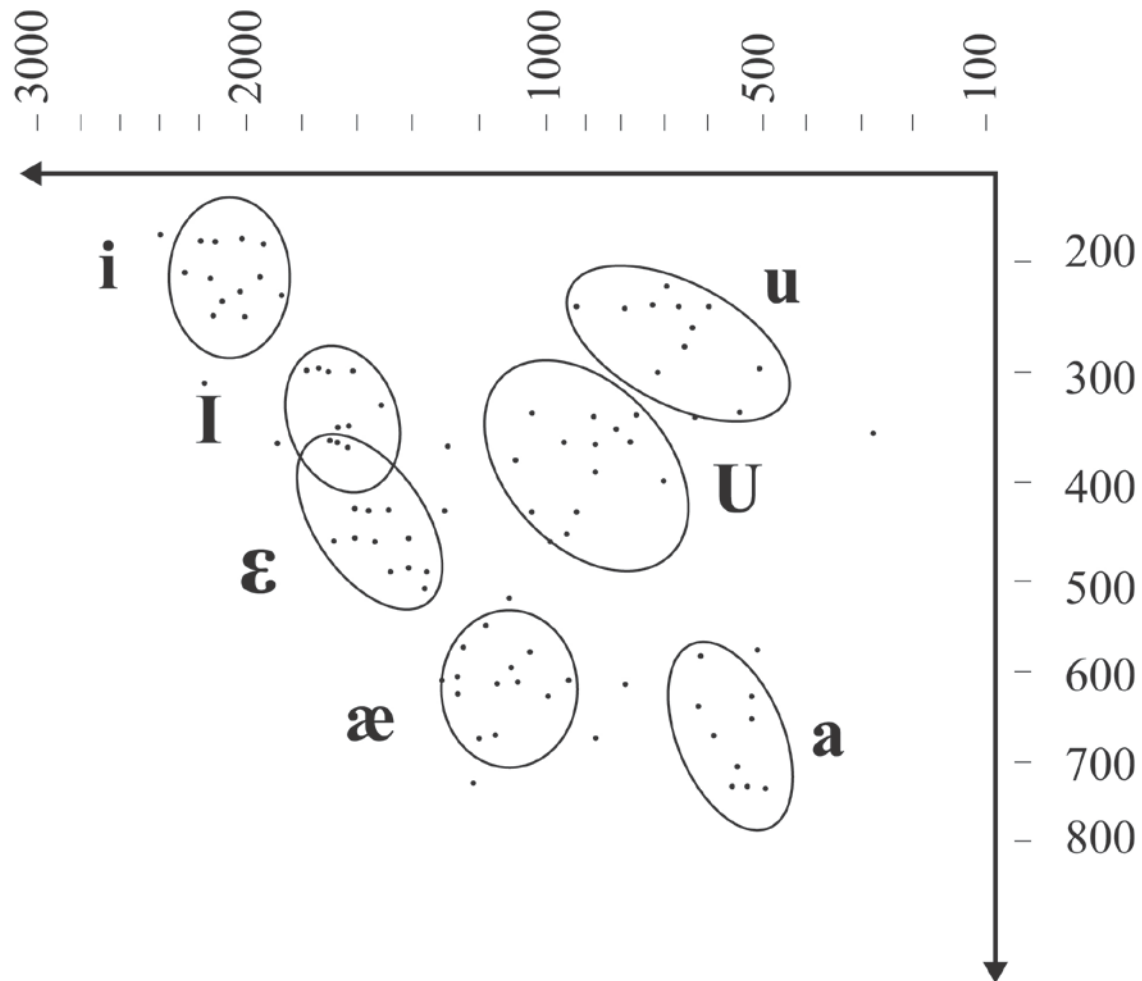
Figure 4.6 A formant frequency plot (in Hz) of the Chicano monolingual group's vowels in Godinez and Maddieson (1985:48); each ellipse encloses approximately 95% of the original data points for 15 speakers.
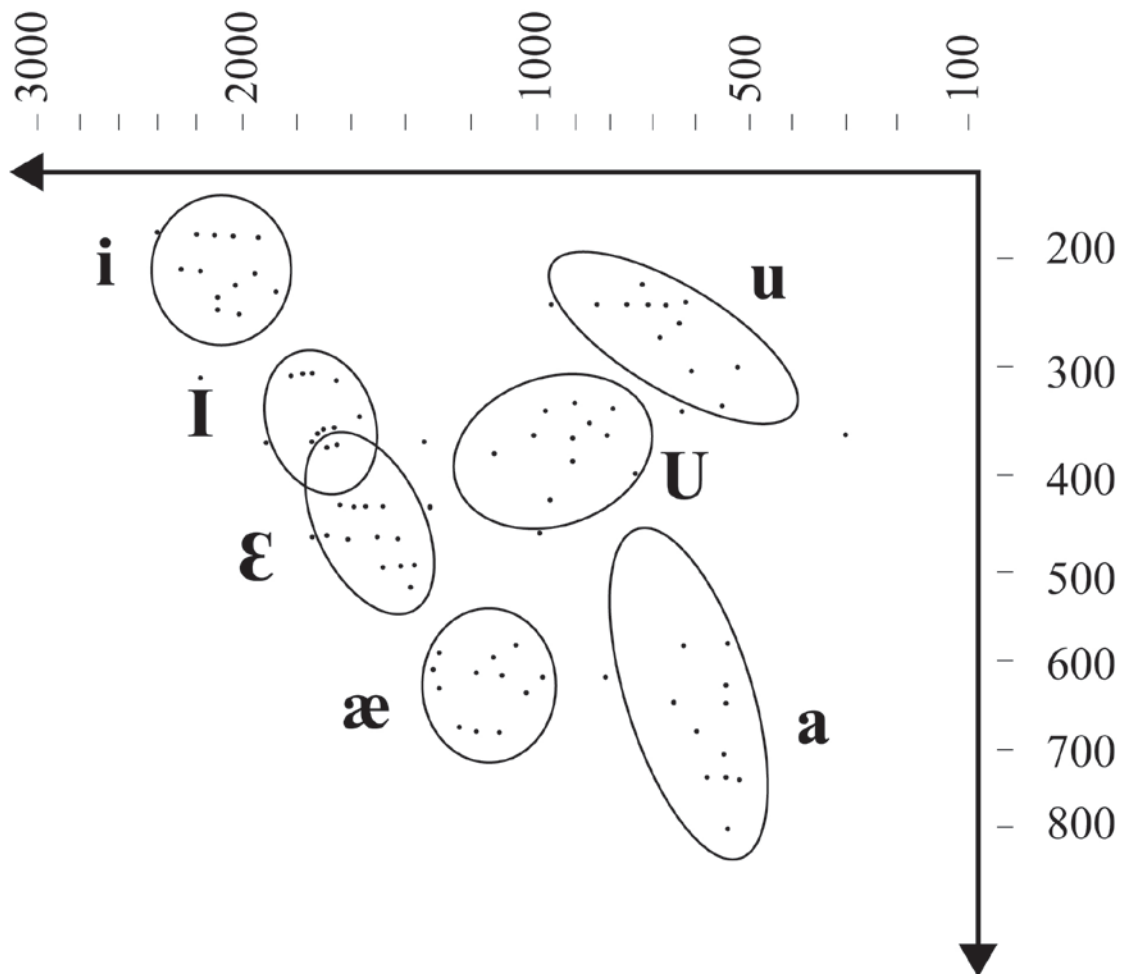
Results indicate that Chicano monolinguals are significantly different from Chicano bilinguals, but not necessarily in ways that are predictable based on transfer. For example,

Godinez and Maddieson found that monolinguals tended to produce their vowels significantly higher than bilinguals, while trends in the front-back dimension were less important. Monolinguals tended to have a smaller front-back range than bilinguals (that is, front vowels tended to be backer and back vowels tended to be fronter than those produced by bilinguals), but this effect was not shown to be statistically significant. Thus, the shape of the vowel system is not especially different, and since monolinguals cannot be directly experiencing transfer effects, it is difficult to suggest that the Chicano English patterns are caused be interference. Instead, it looks like Chicano speakers—whether or not they speak Spanish— share a stable vowel system that would be better described as a dialect than as interlanguage.

A comparison between the more detailed plots of monolinguals and bilinguals in Figures 4.5 and 4.6 also illustrates similarities between the two groups of Chicano speakers and offers support for the claim that Chicano English is a dialect, not simply the cumulative effects of second language acquisition. As these charts show, monolinguals and bilinguals are showing the same patterns in their vowel system, but there is not strong evidence for the claims that Spanish phonemes are substituted for English ones. Instead, only /I/ and /ɛ/overlap in the vowel spaces of the two groups, and even this effect is not strong enough to suggest that Chicano speakers are substituting their Spanish /ɛ/ for English /I/. Thus, strong versions of the claims about filter or magnet effects of Spanish on the English vowel system do not appear to be supported by this data.

Differences between so-called General Californian speakers and Chicanos were more prominent, but also do not provide evidence for strong versions of filter or magnet effects. As Godinez and Maddieson point out, no speaker produced *who'd* and *hood* as homonyms. Instead,

they conclude that "Chicanos who are bilingual in English and Spanish are learning a variety of English which is essentially the dialect of the Chicano English monolinguals" (57).

Differences in height between Chicanos and European Americans were fairly predictable. Differences in the front-back dimension were more idiosyncratic, except in one case that appears to be attributable to an ongoing change among European Americans. In general, Chicano speakers produced significantly higher vowels than the European American speakers regardless of whether or not they spoke Spanish. However, this was not true when the vowels /i/ and /ɑ/ were produced by Chicano monolinguals—which were significantly lower than the same vowels produced by European Americans. In the front/back dimension, the results indicated that both groups of Chicano speakers produced vowels that were fronted compared to their European American counterparts, with three exceptions: (1) Chicano monolinguals' /i/ and /ʊ/ were not significantly different from those produced by European Americans; (2) Chicano bilinguals' /ʊ/ was significantly different from that of European Americans, but, in contrast to most other vowels, was backed rather than fronted; and, most significantly, (3) both groups of Chicanos produced an /u/ that was back relative to the European-American productions.

Godinez and Maddieson (1985) assert that "the backing of /u/ by Chicano speakers is a historical relic of the initial language-contact situation that prevailed in Los Angeles" and is "reinforced by the continuation of contact" (56). While this assertion may be true, the backing of /u/ also turns out to be exceptionally important for understanding the degree to which Chicano English speakers participate in local mainstream sound changes. Research has since shown an ongoing fronting process that affects the /u/ productions of European Americans in California (e.g. Hinton, et al, 1987; Veatch 1991), which was also likely to have contributed to

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the differences between Chicanos and European Americans. In this case, there was no evidence that Chicanos had begun to accommodate to the local sound change. Later research by Fought (2003), though, shows that acquisition of this sound change by Chicanos correlates with socioeconomic status. Gender complicates the situation, but in general, Fought's middle-class speakers were most likely to pattern with the European-American change, while other groups, especially those with gang affiliations, retained the backer form of the variant.[4]

Wolfram, Carter, and Moriello (2003) offer more evidence that contact with local (white) varieties can influence Chicano English development. Their study shows that speakers in rural Siler City, North Carolina, produce a monopthongal variant of /ai/ that is consistent with that of rural European Americans in the area, but that Chicano speakers in the larger, capital city of Raleigh do not monopthongize this vowel. However, in an examination of the same phoneme, Thomas (2000) shows that differences between Mexican-American and European-American speech can be far more subtle. His study shows that target values for the /ai/ offglide among Mexican Americans in Laredo, Texas differ considerably from those of European Americans in central Ohio in their production of /ai/ even though neither dialect is monopthongized; he hypothesizes that some of this difference could be attributed to the fact that Spanish, unlike English, has an /ai/ with two distinct steady-states (3). Thus, what is likely an ethnic marker for Mexican Americans in South Texas is subject to regional variation among European Americans across the country.

A review of instrumental studies also reveals some degree of regional variation in the low-back vowels of Mexican Americans. Veatch (1991) and Fought (2003) show that Chicanos

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[4] Veatch (1991) finds some u-fronting in the working-class, male speaker of Los Angeles Chicano English he analyzes.

in Southern California participate in the merger of *cot* and *cought*, and Veatch suggests that this might be related to fact that the merger can also be found in the speech of local European Americans. This does not, however, indicate that the Mexican Americans have merely assimilated to a European-American standard. As Thomas (2001) explains, "The acoustic data presented in Godinez (1984), Godinez and Maddieson (1985), and Veatch (1991) indicate that Mexican Americans in California also show more fronted values of the merged /ɑ = ɔ/" (188). Such a finding is compatible with Spanish influence, since Spanish /a/ is known to be more fronted than English / ɑ /. Thomas (2001) also offers his own evidence of the merger among Mexican Americans in Texas and North Carolina in his compendium. Although there are only 17 Mexican Americans in this study (which was not a community-based analysis) twelve of them (70 percent) are merged. Interestingly, two speakers are especially unlikely to have acquired the shift from contact with merged European Americans. One speaker from Edinburg, Texas, (outside McAllen in the Valley region of Texas) was born in 1936, before the merger was likely to have affected European Americans in Texas. Another speaker was a young girl in Siler City, North Carolina, where European Americans are known to have distinct productions of the two vowels. Compare this with the findings of Roeder (2006), who shows distinct productions among Mexican-American speakers in Lansing, Michigan, where /ɑ/ and /ɔ/ are known to be shifting forward, but still discrete among the European Americans in the community. It seems quite likely, based on the converging evidence of these studies, that perceptual magnet effects (such as those proposed by Kuhl or Flege) might make Spanish speakers more susceptible to such a merger even with little or no exposure to European American varieties that are participating in the merge. At the same time, these studies provide some evidence that Mexican Americans show regional variation in their vowel system

that is related to the changes underway in mainstream (European-American) communities. Therefore, the production of /ɑ/ and /ɔ/ might be a good candidate for a regional dialect marker among Mexican Americans.

Finally, instrumental studies have revealed considerable variation in /æ/. First, it has been shown that Mexican Americans in Southern California exhibit an /æ/ that is raised relative to the low back vowels (Fought 2003; Santa Ana 1991; Veatch 1991). Veatch (1991) attributes this raising to phonological preferences, suggesting that a vowel that is both +front and +low is particularly marked for those whose phonological inventory includes the Spanish system. If this is true, it might explain other variation that is reported in instrumental studies of Mexican-American /æ/. Santa Ana's (1991) dissertation offers evidence that /æ/ productions are not merely raised but unstable, claiming that /æ/ shows an enormous F1 range and a reduction pattern that is different from other vowels. While the other vowels produced by his speakers reduce towards a high, central vowel /ɨ/, /æ/ reduces towards /ɛ/.

Other reports indicate that /æ/ variation might be influenced by linguistic context. Substitution of /æ/ for /ɛ/ in pre-lateral environments has been reported by several impressionistic studies (e.g. Garcia 1984), and Santa Ana's instrumental study reports that words like *and, man,* and *that* are most likely to be produced as an /ɛ/. However Fought (2003) says that alternation between /æ/ and /ɛ/ appears only to occur among non-native speakers, and Thomas claims that /æ/ does not appear to raise pre-nasally among his Mexican-American subjects, even though that is a typical pattern for many European Americans (personal communication in Roeder 2006). Meanwhile, Carter (2006) reports that as one of his speakers in Raleigh, North Carolina, adjusted her speech to sound more *Mexicana,* her /æ/ became more retracted (towards /a/), which he characterized as "stereotypical" of Latino English.

The intrinsic variability of /æ/ among speakers influenced by Spanish might also be conducive to its use as a regional marker in Mexican-American English. For example, this variability could help to explain the findings in Roeder (2006) and Ocumpaugh and Roeder (2007), which indicate that the conflation of /æ/ and /ɛ/ is typical of Mexican Americans in Michigan who have been in contact with the Northern Cities Shift, where the two vowels typically reverse positions in the F1/F2 vowel space. While some might argue that this conflation is not unique to the Mexican Americans in this region based on the evidence from previous impressionistic studies, it should be noted that the conflation found in these Michiganders is not limited to pre-lateral contexts (like those in California) and that previous instrumental studies of Mexican-American English in other parts of the country show considerable F1 differences in the means of the two vowels even when /æ/ is considered raised. If the variability of /æ/ that was found in Santa Ana's Mexican Americans is a relic of a Spanish phonemic system in which it is desirable to assimilate /æ/ into a phoneme that is more compatible with that system (as Veatch's phonological analysis predicts), then contact with the Northern Cities Shift might have provided the necessary push needed to decide between /ɛ/ and /a/.

4.7 Discussion

Early research typically focused on the role that Spanish has played in the formation of Chicano English varieties, rather than the possible influences of regional English varieties that have undoubtedly influenced the dialect as well. A review of the literature shows that the Kuhl's NLM and Flege's SLM provide interesting models for understanding how language transfer might initially affect the vowel space of speakers who learn English as a second language; their predictions do not account for the patterns found in the F1/F2 vowel space of

speakers who have been investigated acoustically (e.g. Godinez & Maddieson 1985; Fought 2003; Santa Ana 1991; Veatch 1991; Thomas 2001; Roeder 2006). As Godinez and Maddieson have shown, claims made by early (impressionistic) researchers of Chicano English (e.g. Garcia 1974) that Chicano speakers substitute Spanish vowels when speaking English have not been borne out by more careful analysis, suggesting that both SLA and sociolinguistic research needs to be suspect of claims based on impressionistic research. Chicano speakers show differences that could be related to Spanish influence, but this claim should not be overstated. Meanwhile, a review of the literature shows that regional variation of the vowel system is likely occurring among Chicano speakers, though this is an aspect of the dialect that is often ignored by researchers.

CHAPTER 5: CORRELATION OF SPEAKER DEMOGRAPHICS, SUBSTRATE SPANISH INFLUENCE, AND ACCOMMODATION TO THE NORTHERN CITIES SHIFT

5.0 Introduction

Previous chapters have (1) outlined the importance of considering the range of accommodation options available to people with a Spanish-heritage background, (2) described which kinds of accommodation are most likely in Benton Harbor based on an ethnographic history of the region, and (3) described which parts of the vowel system deserve the most attention based on previous research. This chapter will explore the systematic effects of two of the most likely influences on the English vowel system of Mexican Americans in Benton Harbor: (1) the effect of the heritage language (Spanish) and (2) the effect of the local varieties of English (conservative and NCS systems).

For the descriptive purposes of this study, it will be assumed that exposure to a more conservative English vowel system (e.g. that outlined by Peterson and Barney 1952) has also been available within this community via communication with (1) white, rural Michiganders who are not participating in the shift are only minimally participating, (2) African-American Michiganders, and/or (3) people from other dialect regions. Lumping all of these disparate varieties together under the Peterson and Barney umbrella is somewhat problematic, but given the wide variety of social backgrounds in this community, some simplification is necessary.

As discussed in previous chapters, very few studies have examined Latino varieties of English acoustically, meaning that the specific details of how such interaction unfolds between this ethnic variety and the mainstream/regional Englishes that people with a Spanish-heritage background come in contact with are largely missing from the literature. However, acoustic

investigations of Spanish-influenced English have not just been limited in number; they have also been geographically limited. Until recently, very few have been conducted in the Northern regions of the United States.

One notable exception is Roeder (2006), which is particularly useful to this study because it examines Mexican Americans in Lansing, Michigan—about 120 miles east of Benton Harbor. In addition to its proximity to the research location of the current study, Roeder's research is also relevant because it looks at a well-established community (3 generations) of Mexican Americans who are most certainly in contact with the Northern Cities Shift, giving us an idea of what the vowel systems of the Benton Harbor residents might look like in the coming years.

Another notable exception, Konopka and Pierrehumbert (2008), compare the vowel systems of L1 and L2 English among Mexican Americans in neighboring Chicago. This study provides less information about the community structure and, consequently, the possible social demographic effects on accommodation, but it offers invaluable information about the differences between speakers who are acquiring English in the NCS region and those who are acquiring a new variety of English. Given the complicated nature of the language setting in Southwest Michigan, the insights of both studies will be critical. These studies will also be supplemented with observations from Preston, Ocumpaugh, and Roeder (2009), which compare data from this study to that of Roeder's (2006) data.

Figures 5.1 and 5.2 offer a comparison of the F1 and F2 values of several language varieties that are relevant to the development of the Mexican-American English in Benton Harbor. As demonstrated in these figures, the Benton Harbor sample mirrors that of Roeder's more than it does either the canonical Peterson and Barney system or one that has been

heavily affected by the NCS. Further investigation of these findings will show that individual

speakers are affected differently by the several varieties in the language setting, but will also

demonstrate (as seen in Figures 5.2 and 5.3), that, as the community begins to develop, so will a

regionally influenced variety of Mexican-American English similar to those found in Roeder

(2006) and Konopka and Pierrehumbert (2008).

Figure 5.1: F1 Averages of (1) Mexican Americans from Benton Harbor, MI, (2) Roeder's (2006)
Mexican Americans from Lansing, MI, (3) typical NCS vowels and (4) Peterson and Barney's
vowels
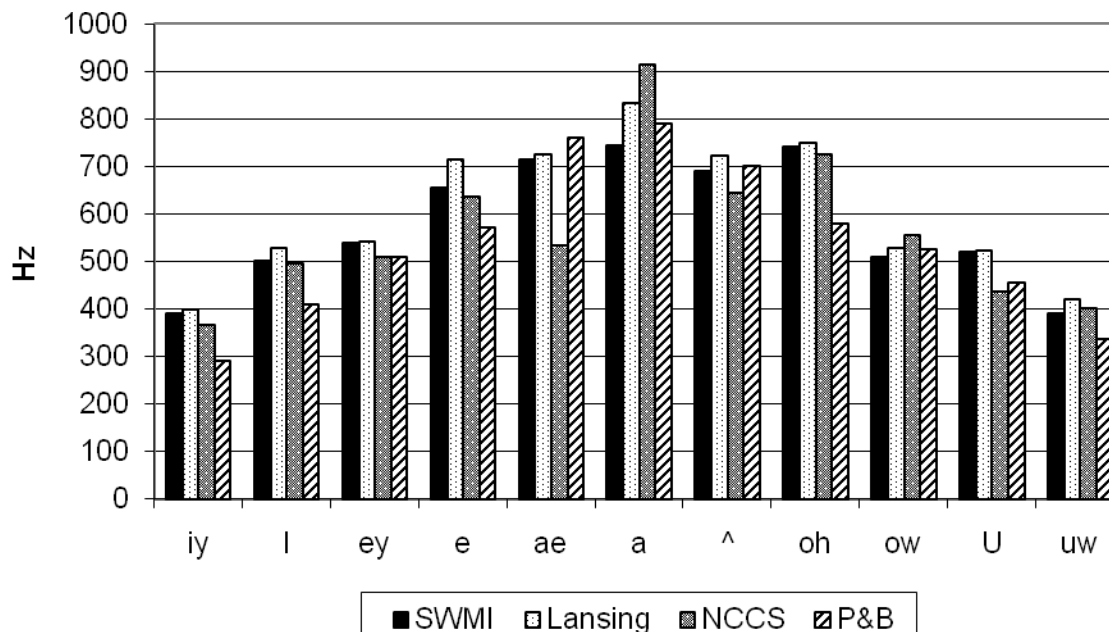
Figure 5.2: F2 Averages of (1) Mexican Americans from Benton Harbor, MI, (2) Roeder's (2006) Mexican Americans from Lansing, MI, (3) typical NCS vowels and (4) Peterson and Barney's vowels
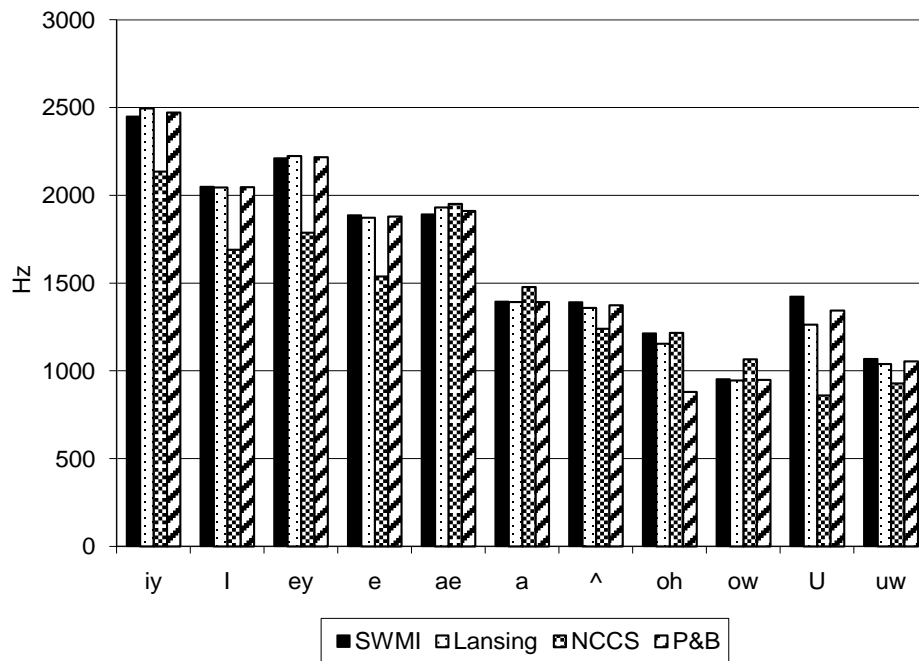
One of the fundamental questions of this chapter is whether demographic characteristics can be shown to condition sociolinguistic patterns in such a young, small community, and (if so) whether they condition patterns in predictable directions (based on the most likely influences in the language setting). Among the social factors that will be examined in this study are two different network scores based on questions outlined by Milroy (1980), age of arrival in Southwest Michigan (AOA), length of residence (LOR), sex, ESL/native status, and whether English was first acquired in the Inland North (where the Northern Cities Shift is

taking place) or in another region (EAL). If these network scores accurately quantify the density of the speaker's ethnic network and, by implication, his or her emotional ties to the community, then accommodation theory tells us that we can predict that speakers with higher network scores should retain the most Spanish-like influence in their vowel system, though other contributing factors (e.g. ESL status) may also be at work. Meanwhile, accommodation to the Northern Cities Shift is likely to correlate with factors like AOA, LOR and the location of English acquisition (EAL), although it may also show a negative correlation to network scores if the predicted outcomes of the two influences are in competition.

Previous research using network models suggests that linguistic change is inhibited by dense, multiplex networks (e.g. Milroy 1980). Since Benton Harbor does not have a multigenerational, territorially based network, rapid accommodation to the Northern Cities Shift should be possible, but it is also possible that this community (which maintains strong ties to a large migrant community that frequents the area) will also demonstrate substrate influences of Spanish, as ethnographic evidence suggests that the heritage language continues to be important to the identity of most members of this community.

Through a close examination of the vowel space, each section in this chapter will determine what social factors, if any, can be shown to contribute to (1) greater substrate Spanish influence or (2) greater accommodation to the NCS (or to other possible English influences), in the vowel system of the Benton Harbor subjects. For example, this chapter will determine whether several of the substrate Spanish effects that are typically reported in the literature (including the conflation of /i/ and /ɪ/, the backing of /æ/ into /ɑ/, and the conflation of /ɑ/, /ɔ/ and /ʌ/) can be found among the Benton Harbor speakers. Possible accommodations to the Northern Cities Shift must also be considered. The NCS is generally

described as the systematic (1) tensing and raising of /æ/, (2) fronting of /ɑ/, (3) lowering and fronting of /ɔ/, (4) backing and lowering of /ɪ/, (5) backing *or* lowering of /ɛ/, and (6) backing and lowering of /ʌ/. Since accommodation to the Northern Cities Shift is rarely described in terms of absolute values, this study will also examine the relative positions of various vowels that are typically referenced in the NCS literature, such as (1) /æ/ and /ɛ/, (2) /ɑ/ and /ʌ/, and (3) /æ/ and /ɑ/. Roeder (2006) found partial accommodation to this shift in her examination of four of these vowels (/æ/, /ɛ/, /ɑ/, and /ɔ/) in the speech of Mexican Americans in Lansing. Ocumpaugh and Roeder (2007) suggested that a smaller sample of the Benton Harbor subjects in the current study were showing a similar pattern of accommodation that was highly dependent upon their length of residence in Southwest Michigan. The current study will address whether LOR is the primary speaker demographic affecting NCS accommodation among Mexican Americans in Benton Harbor—which may or may not exactly mirror the NCS patterns typically described among white speakers in urban areas of the Inland North, particularly since participation among the speakers in this study is not likely to have undergone the gradual, language-internal motivations that are typically cited for this change. Instead, they are experiencing a contact-induced change, that (while probably still a change from below) is triggering a different order of accommodation.

Given that both of these language varieties (the NCS and Spanish-influenced English) as well as more conservative English systems are likely playing a role in the formation of a new variety of English among the incipient Latino community in Benton Harbor, the interface between these influences also needs to be addressed. For example, accommodation theory predictions suggest that high ethnic network scores should keep /i/ and /ɪ/ closer together because such a relationship would allow speakers to demonstrate an allegiance to their

heritage through the production pattern that reflects substrate Spanish influence. Meanwhile lower network scores, longer LORs, and younger AOAs should drive the two vowels further apart since these factors should make integration into the mainstream community (and, subsequently, NCS accommodation) more likely, particularly since /ɪ/ is lowered ad therefore even more distinct from /i/ in the NCS configuration. However, the situation with the vowels /ɑ/, /ɔ/, and /ʌ/ will be more complicated since the influence of the Spanish phonological system could cause considerable overlap among these vowels, but so could various dialects of English. The interaction of effects produced by each variety (especially substrate Spanish influence and the NCS) will be addressed point by point and will also be dealt with substantially in the conclusions.

The remainder of this chapter will be organized as follows. Section 1 will briefly outline the methods used in this study, including a brief overview of the kinds of demographic information included and how it was encoded. It will also include a short discussion of the conversion to the Bark scale, which is not typically used in sociolinguistic studies.

Section 2 examines the relationship of /i/ and /ɪ/ (to determine whether Spanish-influenced conflation can be found among Benton Harbor subjects. Since these speakers are in contact with the NCS (a variety with a notably backed and lowered /ɪ/), this study predicts that they will be less likely to exhibit such an influence. Section 3 will continue to explore this region of the vowel space, this time concentrating on the relationship between /ɪ/ and /ɛ/. In addition to helping to demonstrate possible NCS effects on /ɪ/, this section will also allow us to address claims that /ɪ/ might be assimilated into Spanish /ei/ (or /ɛ/ in the NCS system) instead of Spanish /i/.

Section 4 will examine /æ/ and /ɛ/, which appear to show considerable conflation among Mexican Americans in contact with the NCS (Roeder 2006; Ocumpaugh & Roeder 2007; Konopka & Pierehumbert 2008). This section will offer explanations for this pattern, which is likely distinct from (but a result of contact with) the NCS. Section 5 will complement this section by comparing /æ/ to /ɑ /, which is stereotypically more similar to /æ/ in Mexican-American English than in other varieties of English.

Section 6 will ambitiously examine the relationships of three vowels: /ʌ/, /ɔ/, and /ɑ/. This will entail three different comparisons (/ɑ/ versus /ʌ/, /ɑ/ versus /ɔ/, and /ʌ/ versus /ɔ/), but they will be addressed in single section because of the close proximities these three vowels have to one another in conservative English varieties and because the effects of different demographic characteristics are likely to be quite similar to one another in this region of the vowel space.

Finally, the conclusions for this chapter will be presented in Section 7, where the results shown in previous sections will be discussed. Specifically, this chapter will show that social demographic factors that are predicted to favor accommodation to one variety in a language setting over another (e.g. substrate Spanish influences vs. NCS accommodation) can be found even in the incipient stages of a speech community. That is, even when the speakers do not comprise a traditional, speech community with a dense, multiplex, geographically based ethnic network, an ethnically distinct variety of English is apparently emerging.

5.1 Methods

Recordings were made using a Marantz PMD201 cassette-tape recorder and an AT831b Audio-technica unidirectional clip-on microphone. Every effort was made to use locations that lent themselves to high-quality recordings, but compromises were sometimes made in the

interest of keeping subjects willing to participate in the interviews, which consisted of a brief sociolinguistic interview (usually 45 to 60 minutes long), a reading passage, and a word list (see Appendices C and D for this information). Since most recordings were made in subjects' homes, some noise was inevitable, and some speakers were eliminated from the study based on these problems.

In the interest of controlling as many language-internal influences as possible, only the word-list data was used for the production study. This entails the exclusion of several speakers who were less literate, but one should not expect to find a significant difference in NCS accommodation between those who are literate and those who are not since the NCS is a change from below that is not widely recognized by either the mainstream population or, as ethnographic fieldwork indicates, the population of this study.

Recordings were digitized using Boersma's acoustic analysis software, Praat (16 bit samples, 10kHz sample rate). Vocalic measurements were then taken using the sociophonetic software program Akustyk, designed by Plichta for Praat. Whenever possible, measurements were taken from the center of the stead-state part of the formant so that the effects of consonantal context could be minimized. However, since these were field recordings, discretion had to be used. Sometimes the primary decision for where to take the measurement was based on the clearest location in the recording, but every effort was made to ensure that these measurements reflected the values found in the main section of the vochoid.

Once measurements were collected, they were converted from Hertz to Bark using the script provided in Akustyk. There are two primary reasons for this decision: (1) Other normalization methods (e.g. those developed by Nearey) that are typically used in sociolinguistic research were developed on the assumption that subjects are part of a speech

community. In Benton Harbor, where the permanent Mexican-American population is relatively new to the area, it is not clear that the traditional standards of a speech community have been met. (2) The current study is also investigating perception, so the conversion to the perceptually based Bark scale seemed especially appropriate. There are some drawbacks to this decision. For example, the Bark scale does not appear to be particularly adept at eliminating anatomically based differences that might make one sex appear to be accommodating more to one linguistic variety to another. But, to the degree that such differences might also be perceivable among the subjects in this study, eliminating such differences with the hope that other, social variables might appear to be more robust might not serve our purposes. Research by Hefferman (2007) suggests that such differences may contribute to sex-differentiated trends in vowel changes, meaning that the elimination of sex-based differences could inhibit our understanding of changes in progress.

The Bark scale allows for interpretations of differences that are perceptually more meaningful than those that could be made with measurements given in Hertz. Since differences in lower frequencies are easier to hear than differences in higher frequencies, raw Hertz scores do not provide an accurate picture of how formant differences are interpreted. The Bark scale does not completely eliminate these biases, but it does help to reduce them. Iivonen (1994) suggests that critical bandwidths in the spectrum (about 1 Bark for F1 and 1.5 Bark for F2) are appropriate for both phonetic perception and as an expression of minimal phonological distances. For general purposes, a guideline of Hertz and Bark equivalencies is given in Table 5.1.

Table 5.1: Guide for Conversion from Hz to Bark

Hertz	Bark
100	0.7
500	4.9
1000	8.5
1500	11.1
2000	13
2500	14.5
3000	15.7
3500	16.7

Demographic information was collected from each subject and encoded into the

statistical software SPSS for analysis. Three demographic variables seem most likely to predict

Spanish Influence:

(1) English Second Language (ESL): speakers are coded as having acquired
English before or after the age of ten.
 (2) Network I (NWI): a measurement from one to five of how density and multiplexity
of a subject's ethnic network, based on Milroy's (1980) self-report questions. A copy of
these questions may be found in Appendix A.
(3) Network II (NWII): a self-report score of ethnic loyalty estimated by how many of
the subject's closest friends are of the same ethnicity. This score ranges from one to
five.

Other demographics that may also predict accommodation to the NCS include:

(1) Sex: male vs. female.
(2) English Acquisition Location (EAL): either in the Inland North region (where the
NCS is common) or elsewhere.
(3) Length of Residence (LOR): years spent in Southwest Michigan.
(4) Age of Arrival (AOA): age subject arrived in Southwest Michigan.

Not included in the analysis is the raw age of each speaker, due to its homoscedicity with LOR

and AOA. A summary this information for each speaker is given in Table 5.2.

Table 5.2: Summary of demographic information by speaker

Subject	Sex	ESL	EAL	Age	LOR	AOA	NW I	NW II	NW Tot
Bob	M	under10	Inland N	18	1	17	1	1	2
Carmen	F	under10	Inland N	26	21	5	3	0	3
Domingo	M	under10	elsewhere	72	40	32	5	4	9
Grace	F	under10	Inland N	43	37	6	1	0	1
Josie	F	under 10	elsewhere	52	5	47	5	1	5
Juan	M	over10	Inland N	36	8	28	1	0	1
Lacey	F	under 10	elsewhere	47	23	24	0	1	1
Melanie	F	under 10	Inland N	30	28	2	0	0	0
Michelle	F	under 10	elsewhere	30	10	20	5	3	8
Miguel	M	under 10	Inland N	25	3	22	3	0	3
Monica	F	under 10	elsewhere	30	5	25	4	1	5
Rita	F	over 10	Inland N	26	10	16	3	4	7
Roger	M	under10	Inland N	42	37	5	1	2	3
Roman	M	under 10	Inland N	24	21	3	0	0	0
Salina	F	under10	elsewhere	27	4	23	2	0	2
Salvador	M	under 10	elsewhere	28	17	11	0	0	0
Sancho	M	under 10	Inland N	26	26	0	1	0	1
Servando	M	under 10	elsewhere	27	1	26	3	4	7
Soliz	M	under 10	elsewhere	32	14	18	5	0	5
Sonya	F	under 10	elsewhere	26	16	10	3	5	8

Two kinds of analysis were conducted on the data using SPSS. For each vowel pair considered in this study, a within-speaker analysis was conducted using a T-test. These results are particularly important for vowel pairs like /i/ and /ɪ/, where conflation is often reported, and are summarized throughout the chapter in tables that include the means, standard deviations, and mean differences for each pair. Second, an across-speaker analysis was conducted using multiple regression to determine the effects of social demographics on each vowel included in the study. Predicted and actual effects are illustrated for each vowel in figures throughout this chapter. Details of these results are summarized in tables.

The reader should note that while some might object to the large number of statistical tests being run for this experiment, each test is actually independent of the others. That is, the

statistical test for conflation of a given vowel pair in one speaker is independent of a test for the same conflation in another speakers. Similarly, the across-speaker analysis of one vowel is statistically independent from that of another vowel.

5.2 /i/ and /ɪ/

Conflation of /i/ and /ɪ/ by speakers whose English is influenced by Spanish is predicted by language-acquisition models such as the NLM and SLM and has been reported in impressionistic studies of Chicano English (e.g. Peñalosa 1980). However, these predictions are based on an English vowel space that more closely resembles that of Peterson and Barney than one that might be found in the Inland North today. Although /ɪ/-movement is not one of the first changes in the shift, it has been found even among rural white speakers in Michigan (Ito 1999; Gordon 2001). Because of Berrien County's historical ties to Chicago, local white speakers are likely to show this feature as well. Thus, we should expect that three demographic features among the subjects in this study should influence the relationship between /i/ and /ɪ/.

First, as suggested above, speakers with higher network scores should show higher incidents of /i/ and /ɪ/ conflation if (a) ethnic scores are a good indication of Spanish phonological interferences or (b) this conflation has become a marker of ethnic identity supraregionally. Second, speakers who learned English later in life should be more likely to exhibit this conflation, since they are most likely to show transfer effects from Spanish. Third, speakers whose English acquisition occurred inside of the Inland North should be least most to show any conflation between these two vowels, since the lower, backer /ɪ/ of NCS speakers would be more difficult to confuse with /i/ while the patterns fond in other parts of the

country (e.g. the tense-lax inversion of the Southern Shift) might be more likely to condition such confusion.

To test for the conflation of /i/ and /ɪ/, T-tests were performed on the data of each speaker. As Tables 5.3 and 5.4 show, results indicate that conflation is not an overwhelming pattern among the subjects in this study, and further acoustic evidence supports this. At the alpha = .005 level, only five speakers (Domingo, Juan, Melanie, Rita, and Salina) show conflation in both dimensions, and an additional three speakers (Grace, Monica and Sonya) show no significant distinction in height.

Table 5.3: Means, Mean differences, and T-Test results for F1 of /i/ and /ɪ/

	/i/	/ɪ/	/i/ – /ɪ/	t	p
Bob	3.9	5.1	1.2	-5.289	0.000
Carmen	4.3	5.7	1.3	-5.711	0.000
Domingo	3.8	4.0	0.2	–0.705	0.501
Grace	5.2	5.7	0.5	–1.713	0.112
Josie	3.8	4.7	0.9	-3.703	0.004
Juan	4.2	4.7	0.6	–3.125	0.010
Lacey	4.2	5.2	1.0	-4.42	0.002
Melanie	5.5	5.5	0.0	-0.004	0.997
Michelle	4.0	5.2	1.2	-6.541	0.000
Miguel	3.8	4.9	1.1	-6.92	0.000
Monica	4.6	5.4	0.8	–2.703	0.027
Rita	4.5	4.9	0.3	–1.812	0.103
Roger	3.5	5.0	1.5	-11.73	0.000
Roman	3.5	4.7	1.3	-8.289	0.000
Salina	4.2	4.8	0.6	–1.964	0.085
Salvador	3.7	5.0	1.3	-5.198	0.001
Sancho	3.7	4.8	1.0	-4.578	0.002
Servando	3.9	5.5	1.5	-4.713	0.002
Soliz	3.4	4.4	1.0	-9.381	0.000
Sonya	5.0	5.6	0.6	–1.46	0.182

Table 5.4: Means, Mean differences, and T-Test results for F2 of /i/ and /I/

	/i/	/ɪ/	/i/ - /ɪ/	t	p
Bob	**14.3**	**12.5**	**1.8**	**8.899**	**0.000**
Carmen	**15.2**	**13.3**	**1.9**	**6.672**	**0.000**
Domingo	13.8	14.2	-0.4	-0.525	0.614
Grace	**15.6**	**13.8**	**1.8**	**7.563**	**0.000**
Josie	**14.9**	**13.6**	**1.3**	**5.362**	**0.000**
Juan	13.7	13.5	0.2	0.883	0.396
Lacey	14.7	13.8	0.9	3.932	**0.003**
Melanie	15.4	14.0	1.4	2.607	0.026
Michelle	**15.4**	**13.7**	**1.7**	**6.065**	**0.000**
Miguel	**14.4**	**12.7**	**1.7**	**4.555**	**0.001**
Monica	**15.3**	**13.8**	**1.6**	**4.008**	**0.004**
Rita	14.8	14.1	0.7	1.766	0.111
Roger	**14.1**	**12.1**	**2.0**	8.76	**0.000**
Roman	**14.0**	**12.6**	**1.4**	**6.854**	**0.000**
Salina	15.4	14.4	1.1	3.298	0.011
Salvador	**13.5**	**11.6**	**1.9**	**6.001**	**0.000**
Sancho	**14.3**	**12.7**	**1.6**	**6.847**	**0.000**
Servando	**14.3**	**12.4**	**1.9**	**7.581**	**0.000**
Soliz	**12.8**	**11.4**	**1.3**	**6.021**	**0.000**
Sonya	**14.9**	**13.3**	**1.6**	**5.621**	**0.000**

Among those who maintained a significant difference between the two vowels, the mean difference ranged from 0.9 to 1.5 Bark in the F1 dimension, suggesting a sufficient difference in the phonetic space to maintain both a perceptual and a phonological distinction. In other words, this series of T-tests shows that more than half of the subjects in Benton Harbor are not showing conflation in height. These differences are illustrated below in Figure

5.3, where speakers are arranged in order of smallest differences to largest difference, and speakers who show statistical differences between the two vowels are graphed using black bars.

Figure 5.3: Mean differences in F1 (Bark) between /i/ and /ɪ/ for each speaker
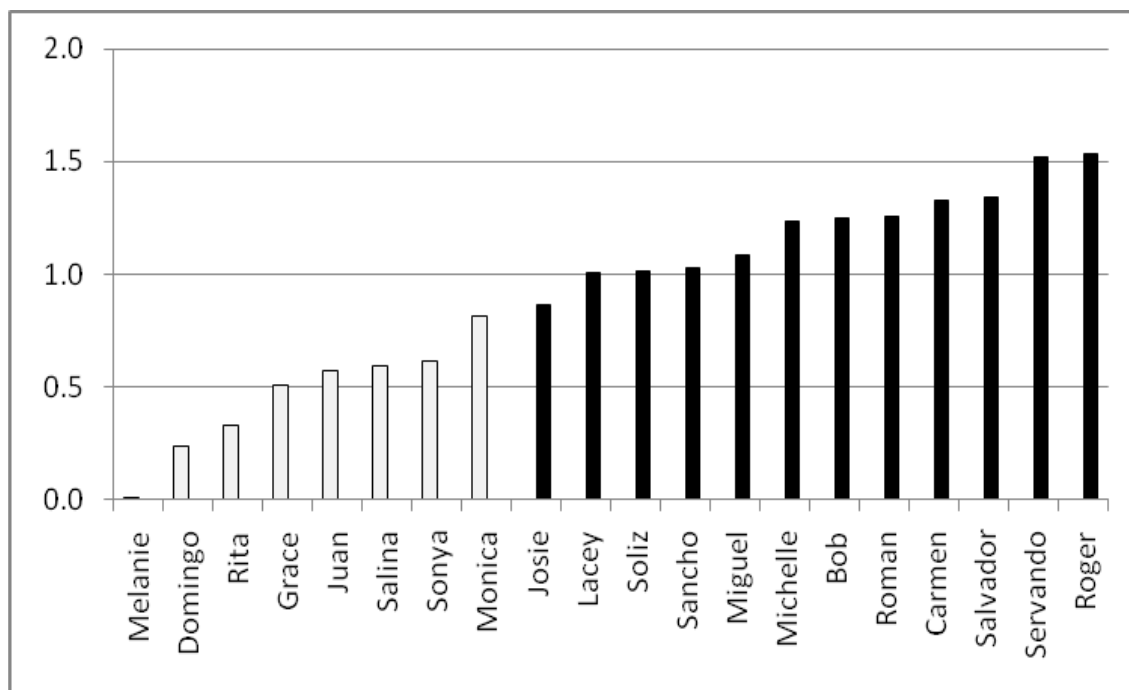
The Bark range was slightly greater in the F2 dimension than it was in the F1 dimension, but this is likely an artifact of the perceptual differences that still remain even after converting to the Bark scale. Though 1 Bark is a sufficient difference for the prediction perceptual and phonological distinctiveness for F1, Iivonen (1994) suggests that a greater distance (1.5 Bark) is needed for F2. If the criteria for distinction is both (1) a significantly different average for both vowels based on the individual T-tests and (2) a difference greater than 1.5 Hertz, nine of the speakers in this study have distinct productions of /i/ and /ɪ/. Based on both criteria, it appears that the community is also split in the front/back distinctions of /i/ and /ɪ/: about half maintain an F2 distinction and half do not.

Figure 5.4: Mean differences in F2 (Bark) between /i/ and /ɪ/ for each speaker
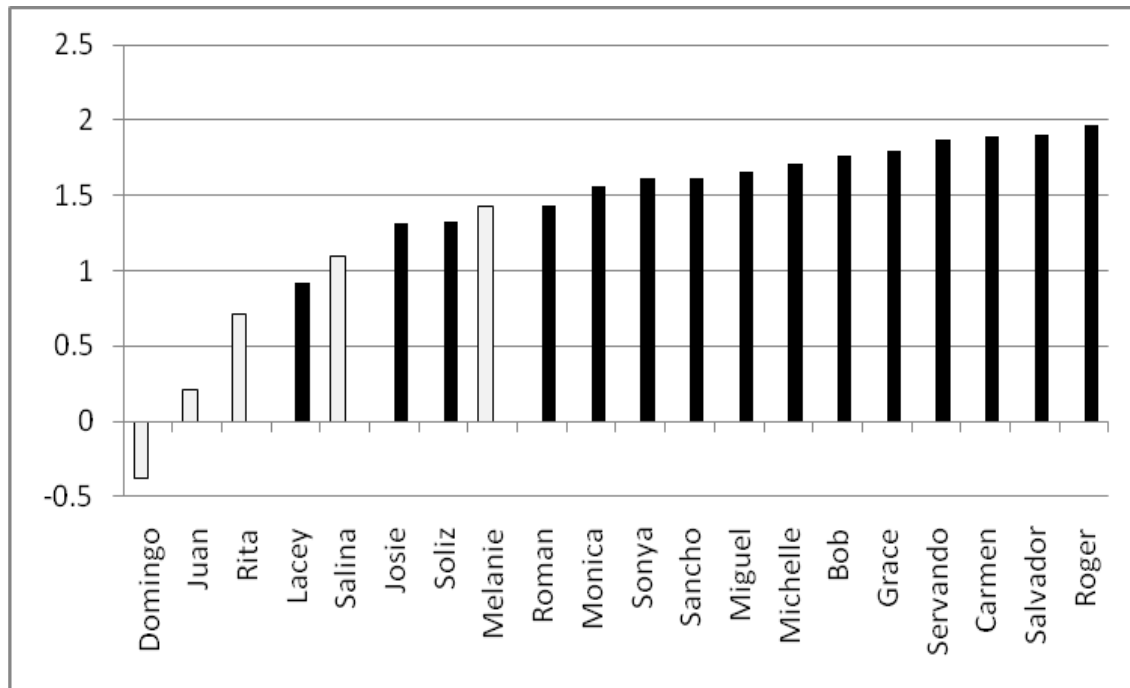
Assessing the degree to which social demographic factors contribute to these results is

difficult. Linear regression was performed for each vowel to determine which social

demographics (if any) correlate with movement in the F1 and F2 dimensions when the data of

the group was considered as a whole. Figures 5.5 and 5.6 summarize these findings while also

illustrating changes that might be predicted based on the influences of major varieties in the

language setting of these speakers.[5]

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[5] In these illustrations (as with those to come in following sections), the reader should assume
that the arrows correspond with the traditional layout of the spectral envelope. That is, down-
arrows indicate a lowered tongue position (or higher F1), and left-arrows indicate a fronted
tongue position (or higher F2). Predictions based on influences of substrate Spanish
(phonetics or phonology), NCS accommodation, biology (women tend to have higher formant
patterns than men), and other possible contact issues (e.g. the *caught/cot* merger) are
presented at the ends of each arrow. For the sake of convenience and consistency, significant

Figure 5.5: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /i/

Higher F2:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: ns
AOA: ns
NWI: ns
NWII: ns

Spanish Phonetics

Women (biology) ← → **Sp. Phonetics**

—

Women (biology)
Spanish Phonology

Higher F1:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: ns
AOA: ns
NWI: ns
NWII: ns
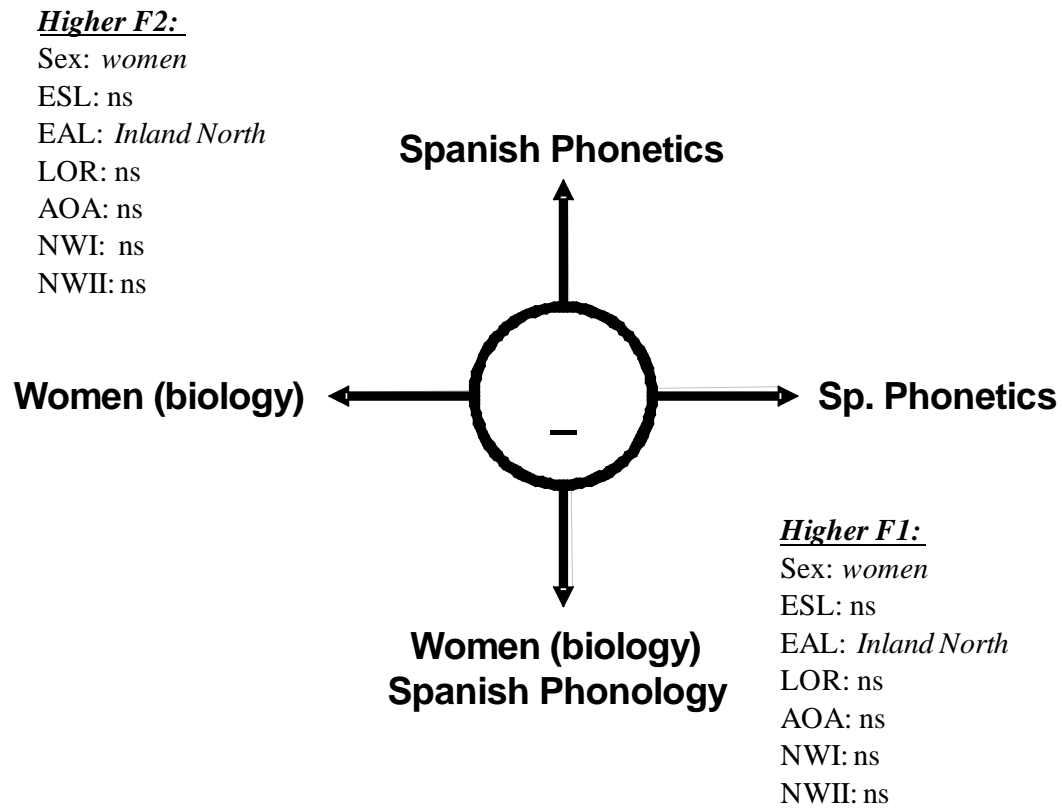
results from the multiple regression analysis are also summarized (in the top left corner for F2 and in the bottom right corner for F1).

Figure 5.6: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /ɪ/

Higher F2:
Sex: *women*
ESL: ns
EAL: *Inland North!*
LOR: *longer!*
AOA: *older*
NWI: ns
NWII: ns

Sp Phonology + Cons Eng

Women (biology)
Sp. Phon + Cons Eng

I

NCS Acc
Sp. Phon + NCS

Higher F1:
Sex: *women*
ESL: *younger*
EAL: *Inland North*
LOR: *shorter!*
AOA: *younger*
NWI: ns
NWII: *higher*

Women (biology)
Spanish Phonology +NCS
NCS Accommodation
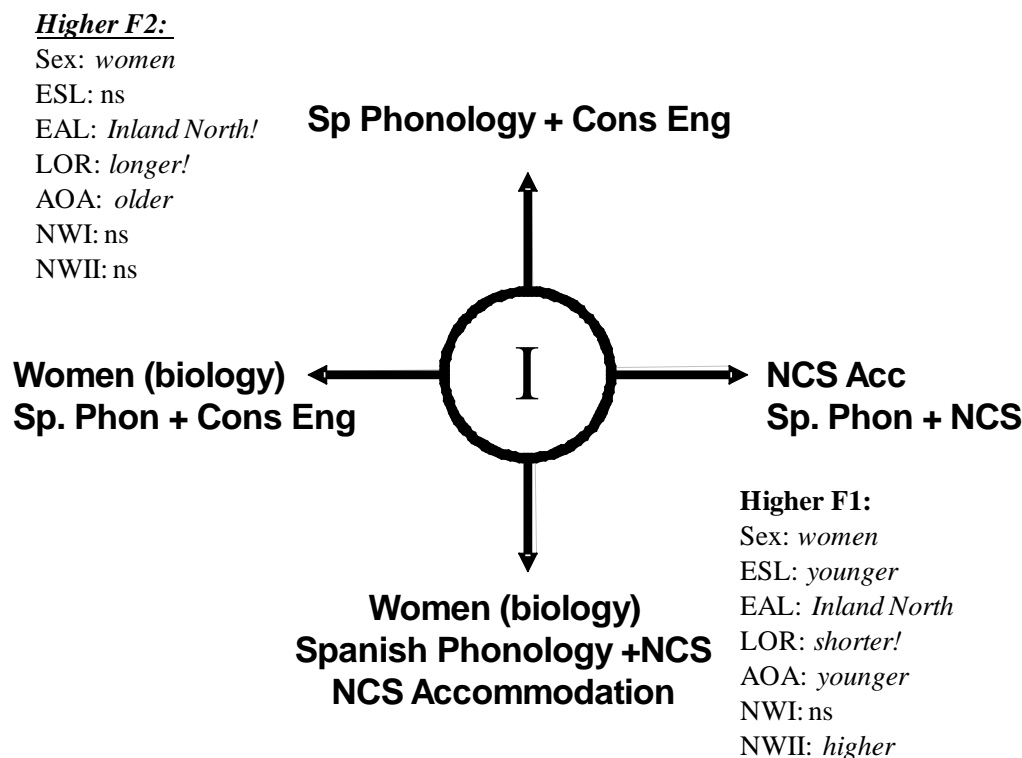
Table 5.5: Summary of F1 findings for /i/ and /ɪ/

F1	/i/				/ic/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.598	5.462	0.000	women	0.416	6.275	0.000	women
ESL	-0.145	-1.055	0.296	ns	-0.376	-4.634	0.000	younger
EAL	-4.740	-2.941	0.005	Inland North	-0.315	-3.173	0.002	Inland North
LOR	0.001	0.089	0.930	ns	-0.285	-3.887	0.000	shorter!
AOA	0.086	0.603	0.549	ns	-0.265	-3.012	0.003	younger
NWI	-0.123	0.943	0.350	ns	-0.226	-2.753	0.007	ns
NWII	0.222	1.836	0.071	ns	0.237	3.146	0.002	higher

Of the seven demographic categories tested, only two are significantly correlated with the F1

of /i/ (see Table 5.7). Women have a lower /i/, an effect that is likely a result of biologically

conditioned patterns since women tend to have higher formant patterns in general. The same

effect of sex is found in the F1 of /ɪ/. EAL is also significant for both vowels, which seems to be

part of a pattern of higher frequencies more generally among those who have acquired English in the Inland North.[6] Thus, we can conclude that both sex and EAL have an effect on the size of the speaker's spectral envelope, but they do not correlated with a conflation of /i/ and /ɪ/ in height.

Though sex and EAL do not condition height differences between these two vowels, four other social variables (ESL, LOR, AOA and NWII) do. Two of these factors (ESL and AOA) have significant effects that might be predicted based on primary influences in the language setting (specifically, NCS accommodation and the interaction of Spanish phonology with the NCS), but the other two (LOR and NWII) are significant in the direction that runs opposite to language setting predictions.

The first of the significant findings that matches language-setting predictions is the social variable ESL. (Recall that in this sample, ESL is coded rather weakly. Those who acquired English before the age of ten are in one group, while those over the age of ten are in another). A younger acquisition age (ESL) has no effect on /i/, but it significantly lowers /ɪ/, meaning that those who learned English earlier in life show a larger height differentiation between the two vowels than those who were late learners. These results match predictions of the SLM, especially in the environment of the NCS. Native English speakers are more likely to maintain a height distinction between two vowels in relatively close proximity to one another, and they are doing so by lowering /ɪ/, a strategy that would be more difficult for someone experiencing transfer effects from Spanish phonology.

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[6] This pattern will be discussed in more detail in the conclusions.

AOA results also match predictions based on the language setting. A younger AOA in the Inland North also lowers /ɪ/, meaning that those who were exposed to the NCS at a younger age are more likely to have developed a production strategy for /ɪ/ that is accommodating to the matrix community.

One of the more curious results is the effect of LOR, which shows that those who have been in the area for a shorter length of time are more likely to lower /ɪ/ than those who have been around longer despite the fact that a longer LOR should allow speakers more time and opportunity to develop this pattern. This may simply be an anomaly, but the results of NWII (which also run counter to the predictions of this chapter) should also be considered before dismissing this finding as an artifact of the data.

Since high NWII scores correspond with a lowered /ɪ/, it may be better to assume that this is a change that is rapidly spreading throughout the Latino population in the region, which might also make it a good candidate for rapid acquisition. That is, all other things being equal, the lowered /ɪ/ of the NCS might be so much easier to perceive than that of a more conservative system that it is one of the first accommodations that people make upon arrival.

Demographic effects in the F2 dimension are quite similar to those for F1. Sex (women) and EAL (acquisition in the Inland North) condition higher frequencies in both vowels. The correlation between acquiring English in the Inland North and a higher F2 does not match language-setting predictions, but since EAL (like sex) is correlated with fronting in both vowels, it is less problematic. Sex and EAL are moving both vowels in the same direction, so they do not actually have any effect on the F2 difference between /i/ and /ɪ/ in the Benton Harbor community.

Table 5.6: Summary of F2 findings

F2	/i/				/ic/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.701	7.154	0.000	women	0.585	8.802	0.000	women
ESL	-0.327	-2.666	0.010	ns	0.093	1.141	0.256	ns
EAL	-0.592	-4.109	0.000	Inland North	-0.373	-3.745	0.000	Inland North!
LOR	-0.097	-0.857	0.395	ns	0.241	3.277	0.001	longer!
AOA	0.130	1.017	0.314	ns	0.454	5.157	0.000	older
NWI	0.044	0.375	0.709	ns	0.074	0.899	0.370	ns
NWII	0.199	1.838	0.071	ns	0.175	2.311	0.022	ns

Two other demographics do condition a smaller difference between /i/ and /ɪ/.

Both an older AOA and a longer LOR are correlated with fronter /ɪ/ productions. The latter,

like the EAL results above, violates language-setting predictions, but curiously the former does

not. AOA is significant in the predicted direction: those who arrived in the in the area at a

younger age are more likely to show a distinction between /i/ and /ɪ/ even if acquiring

English in the Inland North has the opposite effect.

These two vowels were not examined in Roeder (2006), but they were included in

Konopka and Pierrehumbert's (2008) study of Mexican Americans in Chicago, where the shift is

quite advanced. Interestingly, their results indicate that /i/ and /ɪ/ conflation can be found

among Mexican Americans in Chicago, but only among those for whom English is a second

language. The L1 English speakers show some backing, but the distinction that they show

between these two vowels is primarily due to lowering. If a new regional variety of Mexican-

American speech is developing in the Inland North, these results suggest that it is rapidly

acquired (LOR) and spread throughout the community (NWII), especially by people who

learned English at a young age (EAL) and/or in the Inland North (EAL), and/or arrived in the

area at the younger age.

In the F2 dimension, factors that should condition /ɪ/ backing (an NCS pattern) instead are correlated with fronter /ɪ/ productions. Significantly fronter productions of /ɪ/ among those who acquired English in the NCS region are less problematic, since this same group also produces significantly fronter productions of /i/, but the LOR results are more troubling. Depending on whether the conflation of /i/ and /ɪ/ is likely to be a marker of ethnic identity in the region, there are two possible explanations for these findings.

First, Milroy (1980) suggests that when networks are loose, rapid changes may spread through a community, but the orderliness of sound changes that take place in contact situations that meet this criteria is not usually studied. It is possible that /ɪ/ backing is happening (or has happened) very quickly among Mexican Americans who arrived more recently in Southwest Michigan because of the lack of a territorially based network in the area but that those who had the opportunity to establish themselves in the area are more reluctant to participate in this part of the mainstream sound change, especially if a small difference between /i/ and /ɪ/ has become a marker of ethnic identity supraregionally.

Secondly, it is also possible, based on the fronter productions of /i/ that are found among those who acquired English in the Inland North (EAL), that /i/ and /ɪ/ conflation are not going to be an ethnic marker in the region, and that those who have just arrived, arrived at an older age, or acquired English elsewhere are overcompensating in their F2 distinction as they initially begin to integrate into the mainstream community. This strategy may stem from substrate Spanish influences in the perceptual systems of these speakers. That is, F2 distinctions are thought to be less important to Spanish speakers than to English speakers because of the simpler vowel inventory in Spanish since their less crowded vowel space means that they are not as dependent upon the front/back dimension as English speakers. If this

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perceptual strategy has transferred to the English variety in the area, speakers may initially develop a position for /ɪ/ that is hyper-back in order to maintain a production strategy that meets their own perceptual needs. If the patterns found by Konopka and Pierrehumbert (2008) are any indication of the direction that the Benton Harbor community's system is headed in, speakers may find that accommodation in the F1 dimension is sufficient for maintaining the most important aspects of the NCS.

5.3 /ɪ/ and /ɛ/

While the literature on Chicano English typically focuses on the conflation of /i/ and /ɪ/, others have suggested that /ɪ/ might more naturally assimilate to Spanish /e/ than to Spanish /ɪ/, a prediction that deserves some consideration since /ɪ/ and /ɛ/ were the only two vowels to show acoustic overlap in Godinez and Maddieson's (1985) study of Chicano English in California.[7] In Benton Harbor, the production patterns of Mexican Americans do not offer strong support for the predictions that phonemic transfer should draw /ɪ/ into /ɛ/. Although a substantial number of speakers show overlap in the F2 dimension (13 of 20 speakers), fewer do so in the more critical F1 dimension.

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[7] This study will discuss /ɪ/ in relationship to /ɛ/ instead of in relationship to /ei/ because of Godinez and Maddison's (1985) findings and because of the smaller number of /ei/ tokens available in the word list used in the current study.

Table 5.7: Means, Mean Differences, and T-test results for F2 of /ɪ/ and /ɛ/

f2	/ɛ/		/ɪ/	/ɪ/-/ɛ/	t	p
Bob	**11.69**	**0.49**	**12.1**	**0.40**	**3.361**	**0.004**
Carmen	12.95	0.44	13.3	0.34	2.38	0.032
Domingo	12.90	0.74	14.4	1.45	2.944	0.009
Grace	**13.13**	**0.39**	**11.4**	**-1.69**	**4.286**	**0.001**
Josie	13.21	0.30	11.6	-1.60	1.627	0.123
Juan	12.80	1.33	12.5	-0.31	1.335	0.201
Lacey	**12.74**	**0.59**	**12.6**	**-0.19**	**4.164**	**0.001**
Melanie	**13.33**	**0.72**	**13.8**	**0.44**	**3.323**	**0.005**
Michelle	**12.95**	**0.30**	**13.7**	**0.78**	**4.226**	**0.001**
Miguel	12.07	0.42	12.4	0.35	2.709	0.015
Monica	13.24	0.32	14.0	0.72	3.171	0.007
Rita	**12.79**	**1.04**	**14.1**	**1.30**	**4.588**	**0.001**
Roger	**11.34**	**0.45**	**12.7**	**1.36**	**3.531**	**0.003**
Roman	12.09	0.31	12.7	0.61	2.115	0.050
Salina	14.25	0.82	13.8	-0.47	0.386	0.705
Salvador	11.26	0.39	14.2	2.92	1.593	0.132
Sancho	12.27	0.23	13.5	1.20	-0.875	0.396
Servando	12.49	0.46	13.8	1.30	-0.438	0.668
Soliz	11.08	0.20	13.6	2.47	2.347	0.035
Sonya	12.83	0.34	13.3	0.46	2.993	0.009

Table 5.8: Means, Mean Differences, and T-test results for F1 of /ɪ/ and /ɛ/

f1	/ɛ/		/ɪ/	/ɛ/-/ɪ/	t	p
Bob	6.36	0.35	5.0	1.33	-8.542	0.000
Carmen	7.62	0.76	5.6	1.99	-8.801	0.000
Domingo	6.57	0.44	4.8	1.77	-12.508	0.000
Grace	7.55	0.63	4.4	3.10	-11.571	0.000
Josie	5.74	0.54	5.0	0.71	-5.297	0.000
Juan	5.56	0.89	5.1	0.45	-2.666	0.017
Lacey	6.10	0.32	4.7	1.37	-4.554	0.000
Melanie	7.56	0.83	5.4	2.15	-7.504	0.000
Michelle	6.41	0.39	5.2	1.19	-5.307	0.000
Miguel	5.71	0.30	5.5	0.25	-4.426	0.000
Monica	6.48	0.34	5.5	0.97	-6.147	0.000
Rita	6.86	0.64	4.9	1.99	-10.437	0.000
Roger	5.98	0.40	4.8	1.22	-10.503	0.000
Roman	6.04	0.60	4.9	1.11	-5.261	0.000
Salina	5.87	0.46	5.7	0.14	-4.18	0.001
Salvador	5.85	0.39	4.0	1.81	-3.919	0.001
Sancho	5.73	0.23	4.7	0.99	2.285	0.040
Servando	5.61	0.43	5.2	0.37	-0.875	0.396
Soliz	4.97	0.37	4.7	0.26	-4.618	0.000
Sonya	7.07	0.33	5.7	1.39	-5.647	0.000

Though 13 speakers are not significantly different in their F2 of /ɪ/ and /ɛ/ (and only one maintains a difference greater than 1.5 Bark), the type of conflation that could be attributed to the Spanish phonological system is not present since only /ɛ/ appears to be lowering. In other words, Benton Harbor speakers do not appear to be particularly susceptible to the predictions that /ɪ/ should assimilate to Spanish /ei/ (or in this case, its allophone /ɛ/) even when exposed to a mainstream English dialect (the NCS), that might more favorably induce such assimilation than dialects in other parts of the country (e.g. Texas).

That being said, the three speakers who do show statistical overlap in height (Juan, Sancho, and Servando) also show overlap in F2, and one of them (Juan) did not begin to acquire

English until he was well into adulthood. An additional four speakers maintain significant differences that are less than 1 Bark in height (the necessarily threshold for F1), and half of these speakers do not maintain the 1.5 Bark threshold for F2. Thus, it appears possible that /ɪ/ might assimilate to Spanish /ei/ for some speakers, but it does not appear to be a norm that this community is embracing.

The next section will show that /ɛ/ is undergoing substantial lowering in the Mexican-American population of Benton Harbor. Such a move leaves room in the acoustic space for substantial lowering of /ɪ/, but the evidence presented here (and in the previous section) suggests that these speakers are not taking full advantage of this evacuated area of the vowel space. They are participating in some lowering, but their F1 changes in /ɪ/ are not even as extreme as Mexican Americans in Chicago (Konopka & Pierehumbert 2008), let alone mainstream NCS speakers. Whether this is because the Benton Harbor speakers are (1) in an ethnic community that has only been in the area for 1-2 generations, (2) are in a contact with a matrix community that is less shifted than those in Chicago, or (3) going to maintain a significantly higher /ɪ/ than similar ethnic varieties in the area is a question for future research. Preston, Ocumpaugh, and Roeder (2009) show patters in these vowels that suggest that Benton Harbor speakers are very similar to those in Lansing, but have not yet fully accommodated to the extreme lowering of /ɪ/ that appears to be conditioned by the NCS. It may be that /ɛ/ lowering and /ɪ/ lowering are crucially ordered.

5.4 /ɛ/ and /æ/

Previous research on Mexican Americans in Michigan, including preliminary research in Benton Harbor (Roeder 2006; Ocumpaugh & Roeder 2007), suggests that spectral overlap is

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quite likely to occur between the vowels /ɛ/ and /æ/. Recall from Chapter 4 that such overlap

is rarely reported in the English of Mexican Americans in other regions of the country (except

in prelateral conditions), leading Ocumpaugh and Roeder (2007) to propose that the NCS may

be conditioning it among those in Michigan. Figures 5.7 and 5.8 summarize predictions that

might be made based on the language setting in Benton Harbor and the results of multiple

regression analysis to be discussed later in this section.

Figure 5.7: A comparison of predicted effects of possible influences in the language setting and
ANOVA results for corresponding social demographics for /ɛ/

Higher F2:
Sex: *women*
ESL: ns
EAL: ns
LOR: ns
AOA: *older*
NWI: ns
NWII: ns

**Women (biology)
Spanish Phonology** ← ɛ → **NCS Acc**

**Women (biology)
NCS Acc**

Higher F1:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: *longer*
AOA: ns
NWI: ns
NWII: *higher*
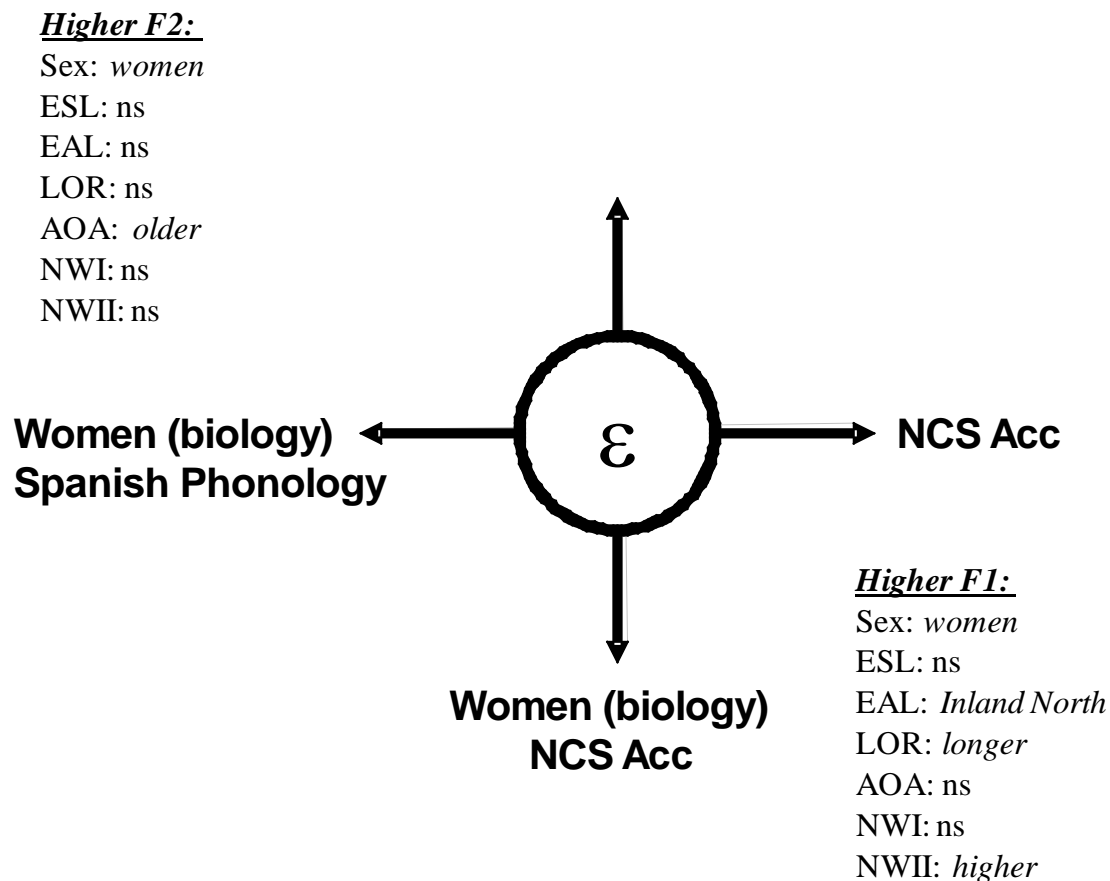
Figure 5.8: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /æ/

Higher F2:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: *longer*
AOA: *older*
NWI: ns
NWII: ns

NCS Acc
Spanish Phonology + NCS

¾

Women (biology)
NCS Acc

Sp. Phonology

Women (biology)
Spanish Phon + Cons Eng

Higher F1:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: ns
AOA: ns
NWI: ns
NWII: *higher*
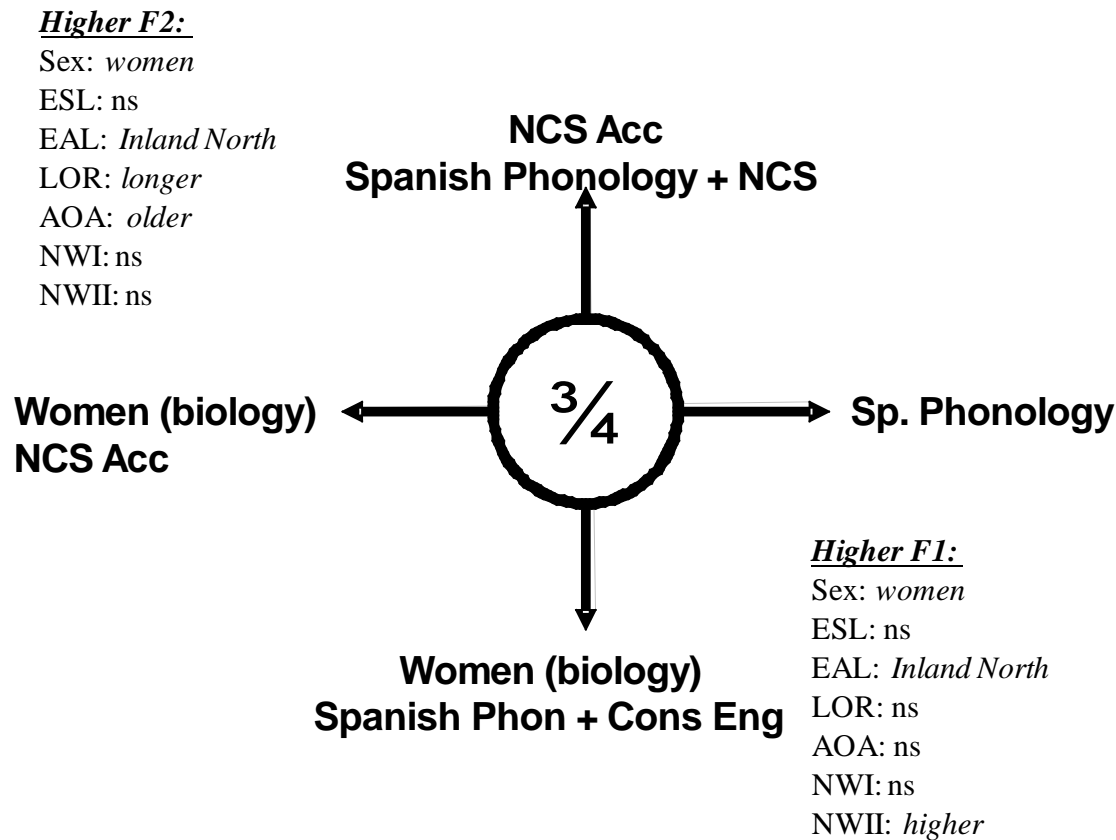
Results of T-tests among the subjects in this study are compatible with the proposal that overlap between /æ/ and /ɛ/ is becoming an ethnic norm in the Inland North. Nine of twenty speakers are not producing significantly different tokens of /ɛ/ and /æ/ in either dimension. Four are producing a statistically different distinction only in the F1 dimension, and four others are producing it only in the F2 dimension. This leaves only three subjects (Servando, Monica, and Michelle) who are producing significantly different tokens in both dimensions.

Of course, we also need to consider whether the significant differences are in the direction predicted by accommodation to the NCS. For this, we also need to consider the relative position of these two vowels, which is shown in the "/æ/ - /ɛ/" column for Table 5.9

and the "ep-ae" column for Table 5.10. For both tables, a positive number in this column indicates a pattern consistent with the NCS; a negative number indicates a pattern more consistent with more conservative varieties of English. As these tables demonstrate, all seven of the significant differences in the F1 dimension are in the direction of the NCS. For F2, only three of eight meet this criteria.

Table 5.9: Means, Mean Difference, and T-test Results for F1 of /ɛ/ and /æ/

F1	/ɛ/	StdDev	/æ/	StdDev	/æ/ - /ɛ	t	p
Bob	6.36	0.35	6.24	0.35	-0.12	0.896	0.378
Carmen	7.62	0.76	7.9	0.76	0.29	-0.996	0.329
Domingo	6.57	0.44	6.77	0.44	0.2	-1.216	0.234
Grace	7.55	0.63	7.59	0.63	0.04	-0.2	0.843
Josie	5.74	0.54	6.57	0.54	0.82	-3.945	0
Juan	5.56	0.89	6.39	0.89	0.82	-2.501	0.018
Lacey	6.1	0.32	7.09	0.32	0.99	-7.238	0
Melanie	7.56	0.83	7.6	0.83	0.04	-0.118	0.907
Michelle	6.41	0.39	7.42	0.39	1.01	-5.361	0
Miguel	5.71	0.3	6.05	0.3	0.34	-2.489	0.019
Monica	6.48	0.34	7.47	0.34	0.99	-6.631	0
Rita	6.86	0.64	7.3	0.64	0.45	-1.737	0.092
Roger	5.98	0.4	5.75	0.4	-0.23	1.641	0.112
Roman	6.04	0.6	5.99	0.6	-0.05	0.228	0.821
Salina	5.87	0.46	6.91	0.46	1.04	-5.283	0
Salvador	5.85	0.39	6.14	0.39	0.29	-1.702	0.101
Sancho	5.73	0.23	6.06	0.23	0.34	-3.41	0.003
Servando	5.61	0.43	6.59	0.43	0.98	-5.949	0
Soliz	4.97	0.37	5.45	0.37	0.48	-3.079	0.006
Sonya	7.07	0.33	7.37	0.33	0.31	-2.15	0.041

Table 5.10: Means, Mean Difference, and T-test Results for F1 of /ɛ/ and /æ/

f2	/ɛ/	StdDev	/æ/	StdDev	/ɛ/-/æ/	t	p
Bob	**11.69**	**0.49**	**12.40**	**0.49**	-0.72	**-3.505**	**0.002**
Carmen	12.95	0.44	12.95	0.44	0.00	-0.553	0.585
Domingo	12.90	0.74	13.01	0.74	-0.11	-0.375	0.710
Grace	**13.13**	**0.39**	**13.76**	**0.39**	-0.64	**-4.521**	**0.000**
Josie	13.21	0.30	13.16	0.30	0.05	0.37	0.714
Juan	12.80	1.33	12.05	0.15	0.75	1.467	0.153
Lacey	12.74	0.59	12.69	0.59	0.05	0.211	0.834
Melanie	13.33	0.72	13.86	0.72	-0.53	-2.12	0.043
Michelle	**12.95**	**0.30**	**12.53**	**0.30**	0.42	**3.305**	**0.003**
Miguel	12.07	0.42	12.00	0.42	0.07	0.477	0.637
Monica	**13.24**	**0.32**	**12.64**	**0.32**	0.60	**4.834**	**0.000**
Rita	12.79	1.04	12.62	1.04	0.17	0.42	0.678
Roger	**11.34**	**0.45**	**12.30**	**0.45**	-0.96	**-5.318**	**0.000**
Roman	**12.09**	**0.31**	**12.57**	**0.31**	-0.48	**-3.245**	**0.003**
Salina	14.25	0.82	14.00	0.82	0.25	0.824	0.418
Salvador	11.26	0.39	11.21	0.39	0.04	0.281	0.781
Sancho	12.27	0.23	12.42	0.23	-0.16	-1.279	0.215
Servando	**12.49**	**0.46**	**11.53**	**0.46**	0.96	**5.712**	**0.000**
Soliz	11.08	0.20	11.01	0.20	0.07	0.717	0.481
Sonya	**12.83**	**0.34**	**13.22**	0.34165	-0.39	**-3.362**	**0.002**

Interestingly, the fact the three subjects who are maintaining significantly different means for /ɛ/ and /æ/ do so in the NCS direction offers further confirmation that the NCS is triggering this conflation pattern, which is typical among Mexican Americans in Michigan. That is, Servando, Monica, and Michelle are maintaining a statistical distinction because they exhibit the complete reversal of /ɛ/ and /æ/ that is typical among mainstream NCS speakers. Moreover, they are showing F1 differences that approach the appropriate limen for perceptual distinction (1 Bark), but they are nowhere near producing F2 distinctions that meet the same standard (1.5 Bark). Since no speakers are maintaining conservative differences in both

dimensions, it looks like some accommodation to the NCS in these vowels may become a new regional norm among this ethnic community even if complete reversal does not occur.

In addition to suggesting that this pattern appears to be an instance of partial accommodation to a regional, mainstream sound change, Ocumpaugh and Roeder (2007) also proposed that the manner of achieving this pattern may differ significantly from that of the mainstream population. Whereas the participation of mainstream NCS speakers appears to be conditioned by social factors (with young, urban females leading the way), the mainstream NCS is still largely an internally driven process. For Mexican-American groups like those in Benton Harbor, however, contact appears to be playing a more substantial role.

Results from the linear regression analysis offer a confirmation for both these claims, particularly in regard to accommodation in height. Recall that the typical pattern of the NCS is for /æ/ to front and then raise (the first two stages of the shift). Neither backing nor lowering of /ɛ/ is typical until later stages. Among the Benton Harbor speakers, however, /æ/ fronting appears to be conditioned by sex (women), EAL (acquisition in the Inland North), LOR (longer), and AOA (younger). Compare this to /ɛ/ backing, which shows only two kinds of social conditioning: sex (men) and AOA (younger). In this dimension, speakers appear to be conforming to the typical NCS pattern (with /æ/ fronting leading the change).

Table 5.11: Summary of F1 findings

F1	/ep/				/ae/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.610	11.237	0.000	women	0.682	17.182	0.000	women
ESL	-0.065	-1.013	0.313	ns	-0.070	-1.365	0.173	ns
EAL	-0.486	-6.085	0.000	Inland North	-0.294	-4.830	0.000	Inland North
LOR	0.285	5.027	0.000	longer	0.062	1.383	0.167	ns
AOA	-0.127	-1.827	0.069	ns	0.032	0.532	0.554	ns
NWI	0.146	2.197	0.029	ns	0.086	1.725	0.085	ns
NWII	0.283	4.560	0.000	higher	0.200	4.331	0.000	higher

Table 5.12: Summary of F2 findings

F2	/ep/				/ae/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.527	7.472	0.000	women	0.509	11.388	0.000	women
ESL	0.020	0.246	0.806	ns	-0.100	-1.738	0.083	ns
EAL	-0.247	-2.377	0.019	ns	-0.348	-5.080	0.000	Inlnd North
LOR	0.038	0.513	0.609	ns	0.293	5.794	0.000	longer
AOA	0.368	4.074	0.000	older	0.206	3.414	0.001	older!
NWI	0.049	0.566	0.572	ns	0.032	0.566	0.572	ns
NWII	0.087	1.086	0.279	ns	0.029	0.558	0.577	ns

However, in the F1 dimension, the Benton Harbor speakers differ substantially from the typical NCS process. Only two social factors condition the raising of /æ/ (documented to be the second step of the NCS, after /æ/ raising): sex (male), EAL (elsewhere) and Network II (lower).[8] Sex and EAL results violate language-setting predictions about NCS accommodation, but neither these factors nor the significant effect of NWII are changing the difference between /ɛ/ and /æ/, since all three of these factors are moving /ɛ/ in the same direction as /æ/. However, a longer LOR does appear to affect the height distinction between /ɛ/ and /æ/.

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[8] Notice that these results are presented differently than in table 5.1, above, where effects are labeled in terms of a higher F1 instead of in terms of a raised production (which might indicate accommodation to the NCS).

These results indicate that longer exposure to the NCS correlates with lower /ɛ/ productions, indicating that /ɛ/ lowering, which is supposed to be acquired later (if typical NCS patterns were being followed), is being adopted by this community. Combined with T-Test results that show that all of the speakers showing significant differences in the F2 values of these two vowels match the NCS pattern (/æ/ fronting), but four of seven speakers showing significant differences in the height dimension do not (/æ/ is significantly lower than /ɛ/), the multiple regression analysis strongly suggests an ethnically distinct NCS accommodation process is underway.

The apparent preference to lower /ɛ/ before raising /æ/ is slightly different from regional accommodation pattern of Mexican Americans identified by Roeder (2006) in Lansing or Konopka and Pierrehumbert (2008) in Chicago. F2 patterns are similar throughout the region, but greater variation occurs in F1.

For example, Roeder finds F2 patterns that are nearly identical to those in the Benton Harbor community, and, like the current study, concludes that /æ/ fronting is more robust than /ɛ/ backing. Konopka and Pierrehumbert 2008 present vowel charts that once again exhibit a split based on ESL status. /ɛ/ and /æ/ exhibit little or no trends toward the NCS among L2 speakers, but L1 speakers are more accommodating. Like communities in both cities in Michigan, the L1 speakers in Chicago show some overlap in the two vowels, but /æ/ tends to be fronter than /ɛ/.

However, in F1, location appears to play a greater role. Roeder finds sex- and age-related patterns: Old women (those over 45) are not fronted (even though they are raised), young women are fronted, and men show a v-shaped pattern; where those in the 25 to 44 age bracket have significantly lower /æ/ productions than those who are younger or older. She

concludes that some /æ/ raising is present in the study, but suggests (based on speakers from Texas in Thomas' 2001 compendium) that it may not be related to the NCS. In other words, fronting is more important than raising in the Lansing community.

In Chicago, F1 differences are complicated by ESL status. Konopka and Pierrehumbert (2008) show an /æ/ that is considerably raised for their L1 speakers, but no raising among those who are second language learners in Chicago. Meanwhile the community in Benton Harbor appears to lower /ɛ/ rather than raising /æ/, which may indicate that the process of accommodation in these three ethnically and regionally similar communities is different even if the ultimate outcome is quite similar.

5.5 /æ/ and /ɑ/

The T-tests that compare /æ/ and /ɑ/ for each speaker provide two interesting results. First, an analysis of F1comparisons yields evidence that supports earlier claims about the height relationship between /ɛ/ and /æ/: namely that /ɛ/ appears to be lowering more than /æ/ appears to be raising. As Table 5.13 shows, eleven of the speakers in study, including Servando, Monica, and Michelle (who also show a complete reversal of /æ/ and /ɛ/), do not maintain a significant difference in the height of /æ/ and /ɑ/ despite other signs of accommodating to the NCS. Results for /æ/ and /ɑ/ comparison show that they are negotiating an ethnically unique pattern of accommodation.

Table 5.13: Means, Mean Differences, and T-test results for F1 of /æ/ and /ɑ/

f1	/ɑ/	StdDev	/æ/	StdDev	/ɑ/- /æ/	t	p
Soliz	5.73	0.31	5.45	0.37	0.28	2.174	0.039
Juan	6.49	0.64	6.39	0.89	0.10	0.362	0.720
Salvador	**6.56**	**0.26**	**6.14**	**0.39**	**0.42**	**3.177**	**0.004**
Miguel	**6.64**	**0.46**	**6.05**	**0.30**	**0.59**	**4.564**	**0.000**
Servando	6.67	0.26	6.59	0.43	0.08	0.542	0.592
Roger	**6.71**	**0.41**	**5.75**	**0.40**	**0.96**	**6.844**	**0.000**
Roman	**6.86**	**0.48**	**5.99**	**0.60**	**0.87**	**4.573**	**0.000**
Bob	**6.97**	**0.28**	**6.24**	**0.35**	**0.73**	**6.147**	**0.000**
Domingo	7.03	0.40	6.77	0.44	0.26	1.519	0.141
Sancho	**7.12**	**0.49**	**6.06**	**0.23**	**1.06**	**7.495**	**0.000**
Salina	7.21	0.73	6.91	0.46	0.30	1.365	0.183
Josie	**7.38**	**0.51**	**6.57**	**0.54**	**0.82**	**4.38**	**0.000**
Lacey	**7.45**	**0.31**	**7.09**	**0.32**	**0.36**	**3.125**	**0.004**
Rita	7.53	0.65	7.30	0.64	0.23	1.068	0.293
Monica	7.82	0.28	7.47	0.34	0.36	2.684	0.013
Michelle	7.82	0.22	7.42	0.39	0.40	2.675	0.014
Sonya	**8.06**	**0.23**	**7.37**	**0.33**	**0.69**	**6.179**	**0.000**
Carmen	8.46	0.49	7.90	0.76	0.55	2.163	0.039
Melanie	**8.63**	**0.54**	**7.60**	**0.83**	**1.03**	**3.988**	**0.000**
Grace	**8.64**	**0.33**	**7.59**	**0.63**	**1.05**	**5.633**	**0.000**

The second interesting conclusion that can be drawn from the comparison of /æ/ and /ɑ/ is found in the F2 dimension. Notice in Table 5.14 and Figure 5.9 that all the speakers in this study maintain productions of /æ/ and /ɑ/ that are distinct in F2. There is not significant overlap among Benton Harbor speakers, and most show an average difference that is above the 1.5 Bark limen necessary for maintaining such a distinction. Acoustic studies have not proven an /æ/ and /ɑ/ overlap in many ethnically similar varieties, but /æ/ backing is a stereotypical feature of Mexican-American English that does not appear to have any sort of stronghold in Benton Harbor. This is likely due to the competing influences of the language setting: Spanish phonology is reported to induce backer productions of /ɑ/ in similar ethnic groups (e.g. the L2

English speakers in Konopka and Pierrehumbert's Chicago study). While NCS accommodation would lend itself to a fronter /ɑ/, there is no significant overlap among these speakers. Those subjects who learned English in the Inland North (EAL) and women are fronting both vowels, so no conflation is possible based on this demographic. Meanwhile, competing forces appear to be causing stagnation in the fronting of /ɑ/ among other social demographics while other social demographics appear to lend themselves to a fronter production of /æ/. These results offer further evidence for the development of a regionally distinct version of this ethnic variety.

Table 5.14: Means, Mean Differnces, and T-test Results for F2 of /æ/ and /ɑ/

f2	/ɑ/	StdDev	/æ/	StdDev	/æ/-/ɑ/	t	p
Soliz	9.64	0.35	11.01	0.20	1.38	-13.34	0.000
Juan	10.26	0.53	12.05	0.15	1.79	-4.61	0.000
Salvador	9.95	0.32	11.21	0.39	1.26	-8.96	0.000
Miguel	10.77	0.32	12.00	0.42	1.23	-9.02	0.000
Servando	9.88	0.45	11.53	0.46	1.65	-9.17	0.000
Roger	10.24	0.40	12.30	0.45	2.07	-13.7	0.000
Roman	10.65	0.79	12.57	0.31	1.92	-10.3	0.000
Bob	10.35	0.73	12.40	0.49	2.05	-9.66	0.000
Domingo	10.72	0.45	13.01	0.74	2.30	-8.57	0.000
Sancho	10.27	0.58	12.42	0.23	2.16	-13.2	0.000
Salina	11.28	0.62	14.00	0.82	2.72	-9.7	0.000
Josie	10.33	0.44	13.16	0.30	2.83	-22.8	0.000
Lacey	10.32	0.36	12.69	0.59	2.36	-12.3	0.000
Rita	10.78	0.92	12.62	1.04	1.84	-5.42	0.000
Monica	10.20	0.26	12.64	0.32	2.44	-19.3	0.000
Michelle	10.88	0.40	12.53	0.30	1.65	-11.5	0.000
Sonya	11.37	0.41	13.22	0.34	1.85	-13.2	0.000
Carmen	11.49	0.21	12.95	0.44	1.46	-10.4	0.000
Melanie	11.35	0.76	13.86	0.72	2.51	-9.76	0.000
Grace	11.21	0.51	13.76	0.39	2.55	-17.0	0.000

Figure 5.9 Illustration of F2 differences between /æ/ and /ɑ/
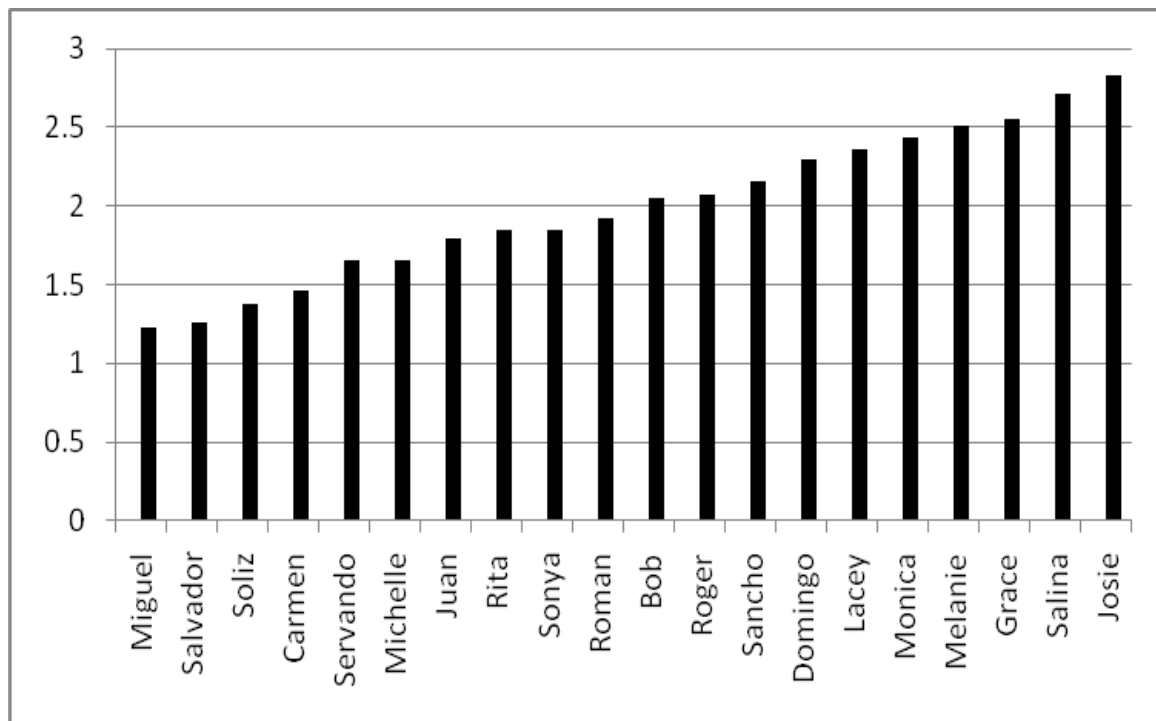
As with the results for /æ/ and /ɛ/ in the previous section, the patterns of /æ/ and /ɑ/

complement research on other Mexican-American varieties in the region, but do not perfectly

mirror their results. Again, F2 is very similar, but F1 shows differences based on location. For

example, Roeder (2006) concludes that /ɑ/ is not showing NCS accommodation (fronting)

among her subjects (though age is a complicating factor). She attributes this inhibition to "the

influence of alternative norms for the pronunciation of this vowel that have already been

established in Lansing's Mexican-American speech community" (72). In the Benton Harbor

community, these results are nearly identical, and the possible influence is made specific:

Spanish phonology. Whether the lack of /ɑ/ fronting among these speakers is a result of

language internal restrictions based on Spanish phonological transfer or a more active

resistance to /a/ fronting driven by ethnic identity remains to be seen.

Though F2 results for Lansing and Benton Harbor are very similar, F1 comparisons are less so. Roeder (2006) finds more evidence for /æ/ raising among her subjects than can be claimed for the Benton Harbor speakers. Instead, the results in Benton Harbor pattern more like those found among L1 speakers in Chicago by Konopko and Pierrehumbert (2008). In this variable, at least, Roeder's (2006) speakers are demonstrating greater accommodation to the NCS than either those in Chicago or Benton Harbor, results which are supported by the comparison found in Preston, Ocumpaugh, and Roeder (2007), where the F1 differences between /ɛ/ and /æ/ are shown to be much larger among the Benton Harbor group.

5.6 /ɑ/, /ɔ/, and /ʌ/

In some ways the analysis of /ɑ/, /ɔ/, and /ʌ/ is simpler than that of other relationships in the spectral envelope because, unlike /æ/ which might be drawn backward by Spanish phonology effects but forward by accommodation to the NCS, these vowels do not have as many contrasting predictions. For example, both NCS accommodation and Spanish phonology should draw /ʌ/ lower and backward while pushing /ɔ/ lower and forward, leading to a pattern in this part of the spectral envelop that is distinct from more conservative English varieties, but not necessarily from NCS effects. On the other hand, there is a strong possibility that many of these subjects may have acquired English while in contact with the low back merger, which would also be highly compatible with a Spanish phonological system that only maintained one phoneme in that region of the spectral envelope. If the caught/cot merger has influenced productions of these vowels that serve as an ethnic markers of identity supraregionally, predictions are more complicated.

Figure 5.10: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /ɑ/

Higher F2:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: ns
AOA: ns
NWI: ns
NWII: ns

Spanish Phonetics
Spanish Phonology
Caught/Cot Contact
NCS Acc

Women (biology)
NCS Acc
Spanish Phonetics

a

Caught/Cot

Women (biology)

Higher F1:
Sex: *women*
ESL: *younger!*
EAL: *Inland North!*
LOR: ns
AOA: ns
NWI: ns
NWII: *higher!*
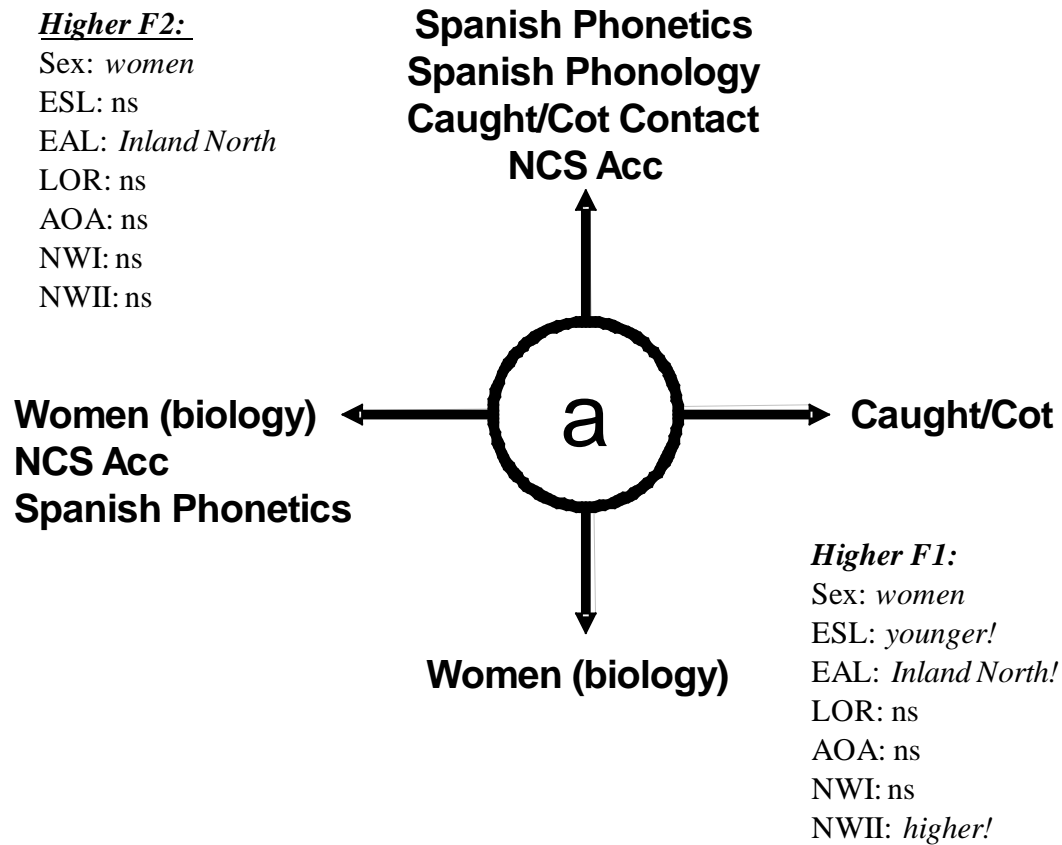
Figure 5.11: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /ɔ/

__Higher F2:__
Sex: *women*
ESL: ns
EAL: ns
LOR: ns
AOA: ns
NWI: ns
NWII: ns

Women (biology)
NCS Acc
Spanish Phonology
Caught/Cot Contact

Women (biology)
NCS Acc
Spanish Phonology
Caught/Cot Contact

__Higher F1:__
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: *longer*
AOA: ns
NWI: ns
NWII: *higher*
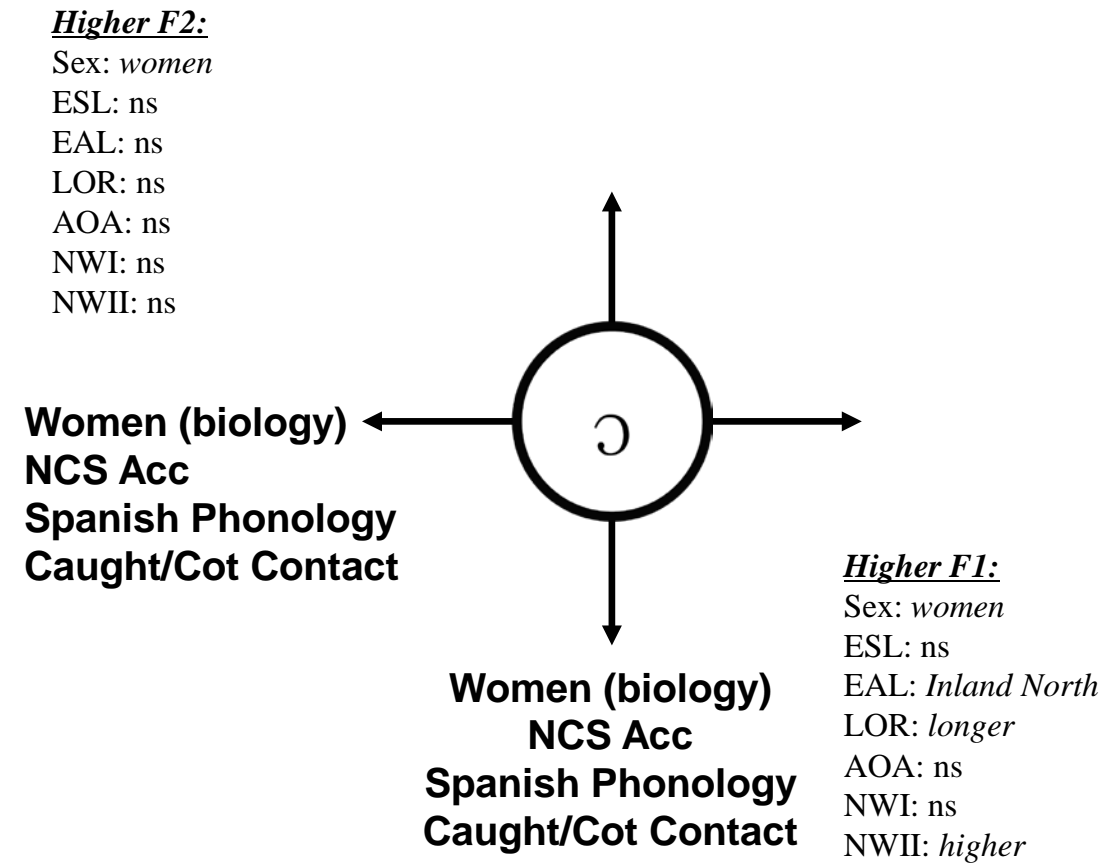
Figure 5.12: A comparison of predicted effects of possible influences in the language setting and ANOVA results for corresponding social demographics for /ʌ/

Higher F2:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: ns
AOA: ns
NWI: ns
NWII: ns

Women (biology) ←→ **Sp. Phonology**

Λ

**Women (biology)
Spanish Phonology
NCS Acc**

Higher F1:
Sex: *women*
ESL: ns
EAL: *Inland North*
LOR: *longer*
AOA: ns
NWI: ns
NWII: *higher*
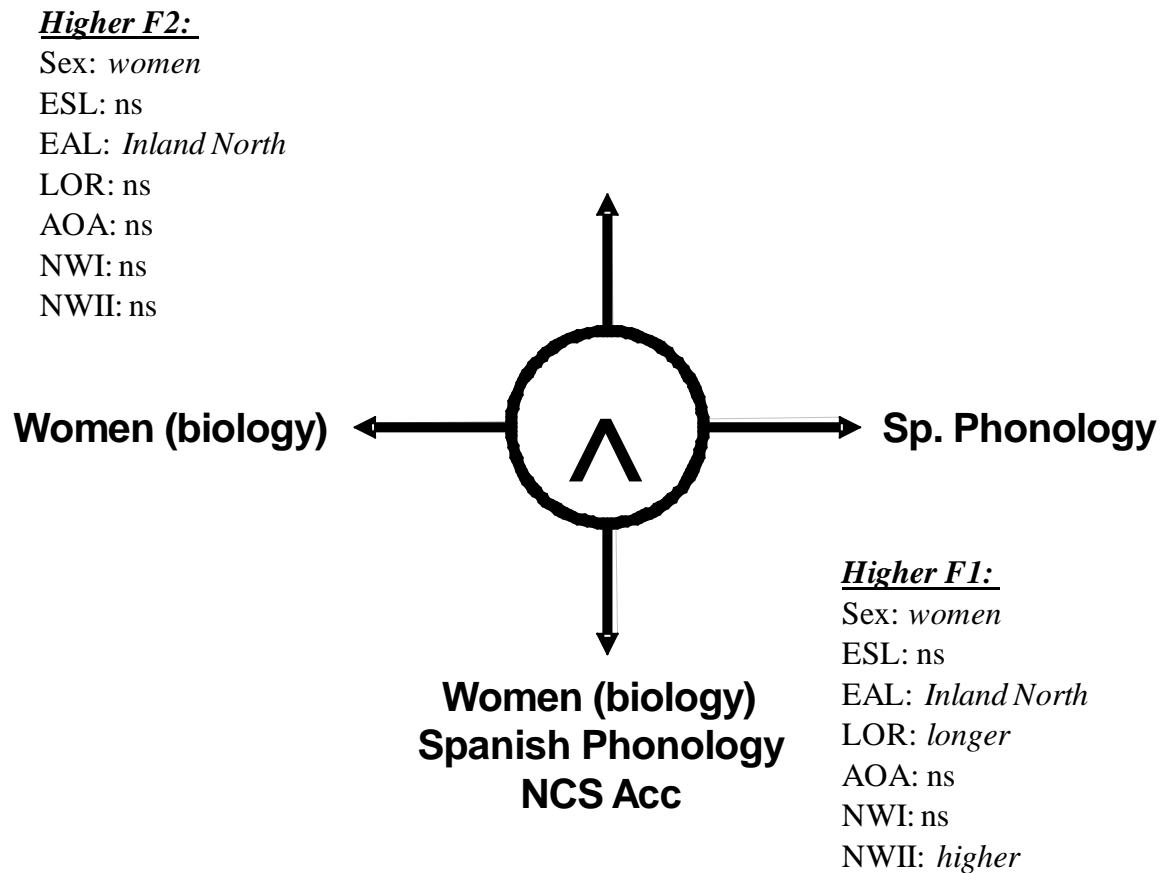
An analysis of the relationship between /ɑ/ and /ɔ/, shows that many speakers are not maintaining differences in this region of the spectrum (Table 5.15). For some speakers, this may be the result of acquiring English in a region where strong Spanish phonological influence and caught/cot merger interact. Domingo, for instance, has been in Michigan for decades, but acquired English in the valley region of Texas where he was unlikely to learn a distinction. He shows no significant difference in the height of these two vowels (p<.941). However, others may be showing conflation between the height of these two vowels because they are in contact with a lower, NCS /ɔ/ and a higher NCS /ɑ/ than they might be in other regions of the country. Regardless, the evidence suggests that a height distinction between these two vowels may not

be in the future for this emerging variety. Only 6 of the subjects in the current study

demonstrate significantly different heights, and those who do show differences range only

from .35 Bark (Sonya) to .78 Bark (Sancho), far below the 1 Bark threshold for a perceptual

distinction.

Table 5.15: Means, Mean Differences, and T-test results for F1 of /ɑ/ and /ɔ/

f1	/ɑ/		/ɔ/		/ɑ/ - /ɔ/	t	p
Bob	**6.97**	**0.28**	**6.47**	**0.21**	**0.51**	**4.854**	**0.000**
Carmen	8.46	0.49	8.27	0.52	0.19	0.882	0.389
Domingo	7.03	0.40	7.05	0.55	-0.02	-0.075	0.941
Grace	**8.64**	**0.33**	**8.00**	**0.26**	**0.65**	**5.302**	**0.000**
Josie	**7.38**	**0.51**	**6.68**	**0.27**	**0.70**	**3.897**	**0.001**
Juan	6.49	0.64	6.40	0.29	0.09	0.336	0.741
Lacey	**7.45**	**0.31**	**7.01**	**0.14**	**0.44**	**4.079**	**0.001**
Melanie	8.63	0.54	8.07	0.35	0.56	2.928	0.008
Michelle	7.82	0.22	6.74	2.27	1.09	1.355	0.199
Miguel	6.64	0.46	6.49	0.50	0.15	0.74	0.467
Monica	7.82	0.28	7.61	0.38	0.21	1.257	0.231
Rita	7.53	0.65	7.47	0.58	0.07	0.267	0.792
Roger	6.71	0.41	6.45	0.27	0.26	1.8	0.086
Roman	6.86	0.48	6.36	0.43	0.50	2.683	0.013
Salina	7.21	0.73	6.98	0.42	0.23	0.825	0.420
Salvador	**6.56**	**0.26**	**6.03**	**0.40**	**0.53**	**3.601**	**0.002**
Sancho	**7.12**	**0.49**	**6.34**	**0.27**	**0.78**	**4.087**	**0.001**
Servando	6.67	0.26	6.56	0.18	0.11	1.007	0.329
Soliz	5.73	0.31	5.64	0.26	0.08	0.647	0.526
Sonya	**8.06**	**0.23**	**7.71**	**0.20**	**0.35**	**3.668**	**0.002**

Figure 5.13: F1 /ɑ/ and /ɔ
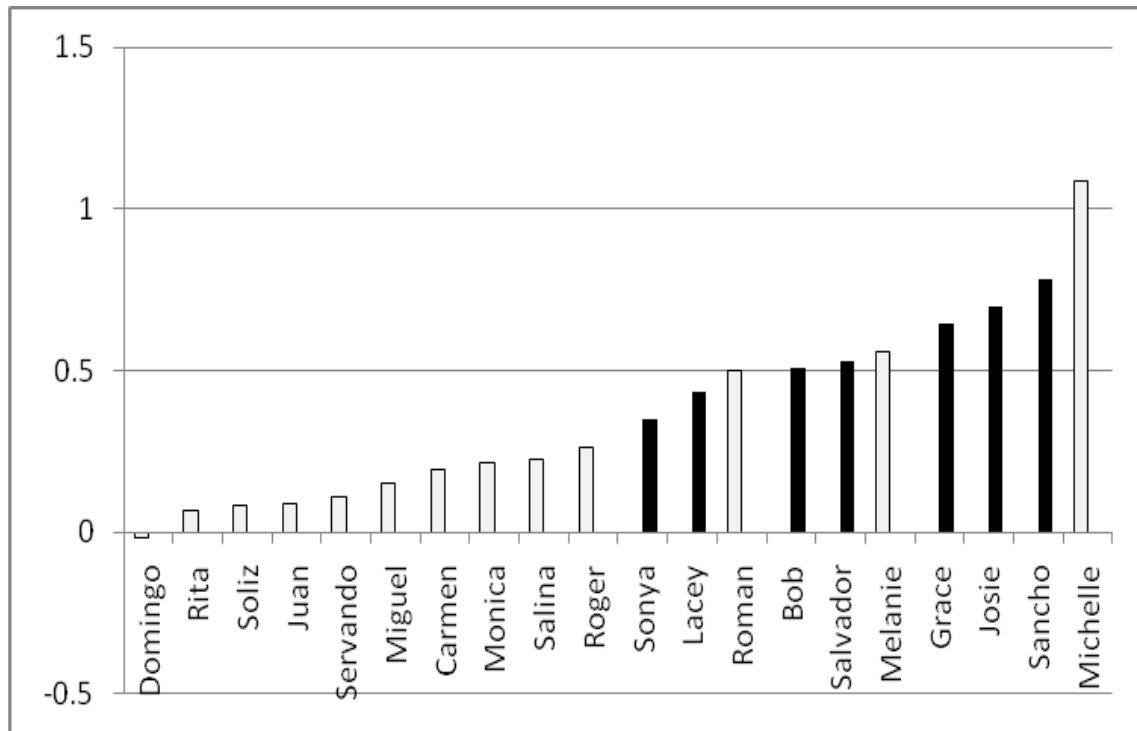
On the other hand, an F2 distinction between the two vowels may be likely in the future of this variety. Table 5.16 shows that eleven of twenty speakers maintain this distinction and that their range is considerably larger than that found in the F1 distinctions for these two vowels (.63-1.36 Bark for F2 compared to .35-.78 for F1). Whether this tendency ultimately manifests itself within the community cannot be fully predicted, especially since these values are still well below the 1.5 Bark limen needed to maintain an F2 distinction, but an analysis of the effects of social factors may help to strengthen predictions for both dimensions.

Table 5.16: Means, Mean Differences, and T-test results for F2 of /ɑ/ and /ɔ/

f2	/ɑ/		/ɔ/		/ɑ/ - /ɔ/	t
Bob	10.35	0.73	9.06	0.33	1.29	5.335
Carmen	11.49	0.21	10.77	0.25	0.72	7.041
Domingo	10.72	0.45	10.48	0.42	0.24	1.232
Grace	11.21	0.51	9.88	0.37	1.34	7.157
Josie	10.33	0.44	9.31	0.42	1.02	5.607
Juan	10.26	0.53	9.63	0.51	0.63	2.57
Lacey	10.32	0.36	9.70	0.39	0.63	3.832
Melanie	11.35	0.76	10.61	0.66	0.74	2.51
Michelle	10.88	0.40	9.30	3.04	1.58	1.466
Miguel	10.77	0.32	9.99	0.60	0.78	4.032
Monica	10.20	0.26	9.95	0.26	0.25	1.828
Rita	10.78	0.92	10.73	0.39	0.04	0.148
Roger	10.24	0.40	9.01	0.36	1.23	7.882
Roman	10.65	0.79	9.29	0.42	1.36	5.148
Salina	11.28	0.62	10.10	0.88	1.17	3.594
Salvador	9.95	0.32	8.89	0.47	1.06	5.98
Sancho	10.27	0.58	8.41	0.36	1.85	8.049
Servando	9.88	0.45	9.52	0.62	0.37	1.449
Soliz	9.64	0.35	8.91	0.17	0.72	5.421
Sonya	11.37	0.41	10.41	0.29	0.96	5.957

Figure 5.14: F2 /ɑ/ and /ɔ/
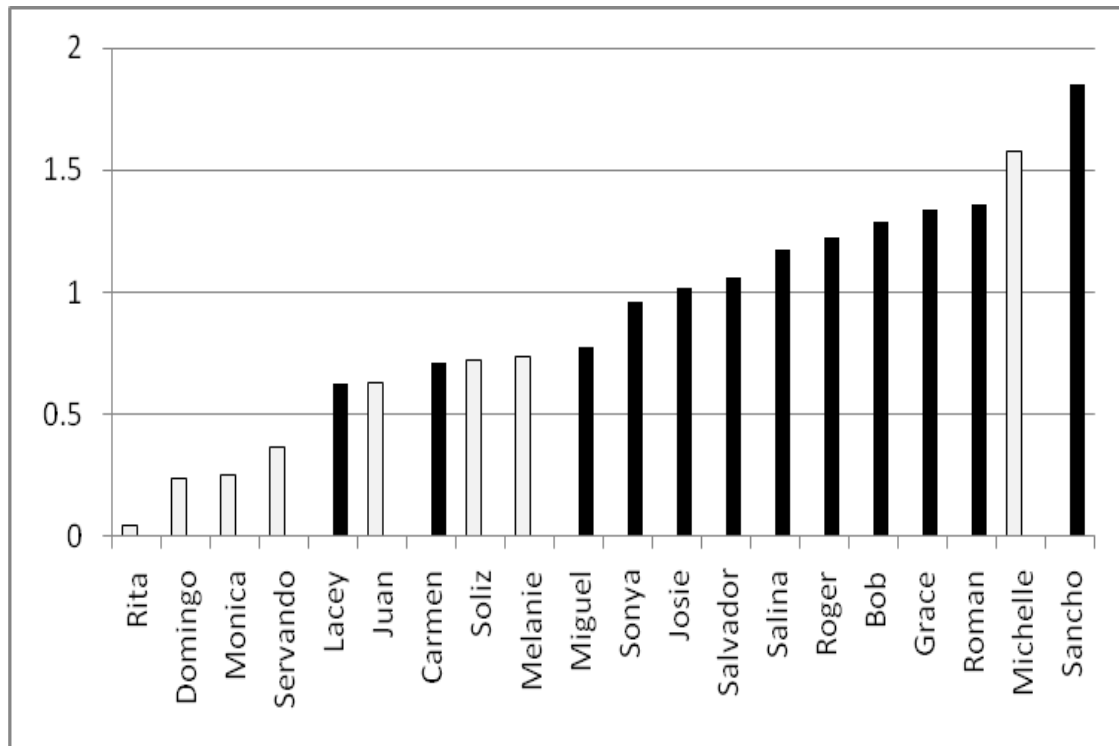
Multiple regression results suggest that F2 distinctions may be maintained in this community, and that they are conditioned by EAL. Those who acquired English in the Inland North are significantly more fronted for /ɑ/ than those who acquired it elsewhere. Despite predictions that /ɔ/ fronting should correlate with most of the demographics considered in this study, these results indicate that social forces in Benton Harbor may be driving /ɑ/ and /ɔ/ to become more distinct in F2.

For height, a greater number of demographic factors correlate with changes in both vowels. Sex (female), EAL (Inland North), and NWII (higher) correlate with lowered productions in both vowels, and a younger ESL categorization correlates with a lowered /ɑ/. Despite predictions that both NCS accommodation and substrate Spanish influence should condition raising in /ɑ/, factors compatible with both varieties appear to condition lowering.

For /ɑ/ and /ʌ/, both the NCS and Spanish phonetics and phonology should condition conflation: (1) The NCS should cause slightly lower productions of /ʌ/; (2) Spanish phonetics may cause /ɑ/ to be produced higher; and (3) the NLM predicts that Spanish phonology might cause /ʌ/ to assimilate to /ɑ/, also resulting in lower /ʌ/ productions. Thirteen of twenty speakers maintain a significant difference in the height of these two vowels, but only five show differences that are greater than 1 Bark, suggesting that the community is in fact highly susceptible to this combination of influences.

Table 5.17: Means, Mean Differences, and T-test Results for F1 of /ɑ/ and /ʌ/

f1	/ɑ/		/ʌ/		/ɑ/-/ʌ/	t	p
Bob	**6.97**	**0.28**	**6.13**	**0.28**	**0.84**	**6.087**	**0.000**
Carmen	**8.46**	**0.49**	**7.32**	**0.29**	**1.14**	**6.145**	**0.000**
Domingo	7.03	0.40	7.17	0.27	-0.14	-0.671	0.515
Grace	**8.64**	**0.33**	**7.46**	**0.38**	**1.19**	**7.854**	**0.000**
Josie	**7.38**	**0.51**	**6.19**	**0.22**	**1.19**	**6.502**	**0.000**
Juan	6.49	0.64	6.45	0.43	0.03	0.108	0.915
Lacey	**7.45**	**0.31**	**6.52**	**0.33**	**0.93**	**6.491**	**0.000**
Melanie	**8.63**	**0.54**	**7.64**	**0.54**	**0.99**	**4.218**	**0.000**
Michelle	**7.82**	**0.22**	**7.04**	**0.23**	**0.79**	**6.461**	**0.000**
Miguel	**6.64**	**0.46**	**5.96**	**0.44**	**0.69**	**3.496**	**0.002**
Monica	**7.82**	**0.28**	**6.98**	**0.25**	**0.84**	**5.973**	**0.000**
Rita	7.53	0.65	7.06	0.27	0.47	2.077	0.051
Roger	6.71	0.41	6.21	0.25	0.50	3.253	0.004
Roman	**6.86**	**0.48**	**6.10**	**0.46**	**0.75**	**3.732**	**0.001**
Salina	7.21	0.73	6.40	0.42	0.81	2.481	0.025
Salvador	**6.56**	**0.26**	**5.84**	**0.31**	**0.72**	**5.13**	**0.000**
Sancho	**7.12**	**0.49**	**5.74**	**0.18**	**1.39**	**6.623**	**0.000**
Servando	6.67	0.26	6.55	0.29	0.12	8.42	0.414
Soliz	5.73	0.31	5.41	0.13	0.31	2.376	0.030
Sonya	**8.06**	**0.23**	**6.96**	**0.84**	**1.10**	**4.352**	**0.000**

More overlap is found in the front/back distinction between /ɑ/ and /ʌ/. Only two speakers maintain a distinction in the F2 dimension, both showing an /ɑ/ that is significantly fronter than /ʌ/. The overwhelming pattern of alignment for these two vowels is not surprising. Though some vowel systems (e.g. a more conservative vowel system or a system that shows the influence of the *caught/cot* merger) might have an /ɑ/ that is backer than /ʌ/, both the NCS and Spanish phonology could be predicted to cause either conflation or reversal.

Table 5.18: Means, Mean Differences, and T-test Results for F2 of /ɑ/ and /ʌ/

f2	/ɑ/		/ʌ/		/ɑ/- /ʌ/	t	p
Bob	10.35	0.73	9.55	0.51	0.80	2.537	0.021
Carmen	11.49	0.21	11.58	0.29	-0.10	-0.819	0.426
Domingo	10.72	0.45	10.54	0.42	0.18	0.714	0.489
Grace	11.21	0.51	11.04	0.54	0.17	0.77	0.450
Josie	10.33	0.44	10.70	0.59	-0.37	-1.707	0.103
Juan	10.26	0.53	9.16	1.57	1.10	2.294	0.036
Lacey	10.32	0.36	10.70	0.47	-0.38	-2.037	0.057
Melanie	**11.35**	**0.76**	**12.85**	**0.34**	**-1.50**	**-5.517**	**0.000**
Michelle	10.88	0.40	11.40	0.48	-0.53	-2.233	0.045
Miguel	10.77	0.32	10.40	0.51	0.37	2.111	0.048
Monica	**10.20**	**0.26**	**11.07**	**0.39**	**-0.87**	**-5.153**	**0.000**
Rita	10.78	0.92	11.16	0.18	-0.38	-1.217	0.238
Roger	10.24	0.40	9.79	0.43	0.45	2.534	0.020
Roman	10.65	0.79	10.45	0.59	0.20	0.665	0.513
Salina	11.28	0.62	11.23	1.60	0.05	0.089	0.930
Salvador	9.95	0.32	9.64	0.59	0.32	1.453	0.167
Sancho	10.27	0.58	9.89	0.56	0.38	1.315	0.206
Servando	9.88	0.45	9.91	0.25	-0.03	-0.148	0.885
Soliz	9.64	0.35	9.52	0.37	0.12	0.655	0.552
Sonya	11.37	0.41011	10.71	1.19	0.66	1.768	0.096

The last pair to be considered in this region of the spectral envelop is /ʌ/ and /ɔ/. Recall that most speakers showed conflation in both of the other vowel comparisons in this section. The conflation rate is even higher for /ʌ/ and /ɔ/: 15 would be classified as conflated based on statistical tests alone, and when the stricter 1 Bark standard is applied, all show height conflation. (See Figure 5.15 for an illustration of these differences). It is not clear that such overlap is being conditioned by any one thing in the language setting. As summarized in the figures illustrating the predictions for these effects and in Table 5.19 (below), the social demographic effects are the same for both vowels.

Table 5.19: Means, Mean Differences, and T-test Results for F1 of /ʌ/ and /ɔ/

f1	/ɔ/		/ʌ/		/ɔ/- /ʌ/	t	p
Bob	6.47	0.21	6.13	0.28	0.34	-2.734	0.015
Carmen	**8.27**	**0.52**	**7.32**	**0.29**	**0.95**	**-4.81**	**0.000**
Domingo	7.05	0.55	7.17	0.27	-0.12	0.454	0.657
Grace	**8.00**	**0.26**	**7.46**	**0.38**	**0.54**	**-3.82**	**0.001**
Josie	**6.68**	**0.27**	**6.19**	**0.22**	**0.49**	**-4.31**	**0.000**
Juan	6.40	0.29	6.45	0.43	-0.05	0.255	0.804
Lacey	**7.01**	**0.14**	**6.52**	**0.33**	**0.49**	**-4.35**	**0.000**
Melanie	8.07	0.35	7.64	0.54	0.43	-2.156	0.045
Michelle	6.74	2.27	7.82	0.23	-1.09	0.318	0.756
Miguel	6.49	0.50	5.96	0.44	0.54	-2.453	0.025
Monica	7.61	0.38	6.98	0.25	0.63	-3.346	0.007
Rita	7.47	0.58	7.06	0.27	0.41	-1.945	0.068
Roger	6.45	0.27	6.21	0.25	0.24	-2.033	0.057
Roman	6.36	0.43	6.10	0.46	0.26	-1.291	0.213
Salina	6.98	0.42	6.40	0.42	0.58	-2.64	0.020
Salvador	6.03	0.40	5.84	0.31	0.19	-9.69	0.350
Sancho	**6.34**	**0.27**	**5.74**	**0.18**	**0.61**	**-4.73**	**0.000**
Servando	6.56	0.18	6.55	0.29	0.01	-0.076	0.941
Soliz	5.64	0.26	5.41	0.13	0.23	-1.963	0.073
Sonya	7.71	0.20	6.96	0.84	0.75	-2.629	0.021

Figure 5.15: F1 differences between /ʌ/ and /ɔ/
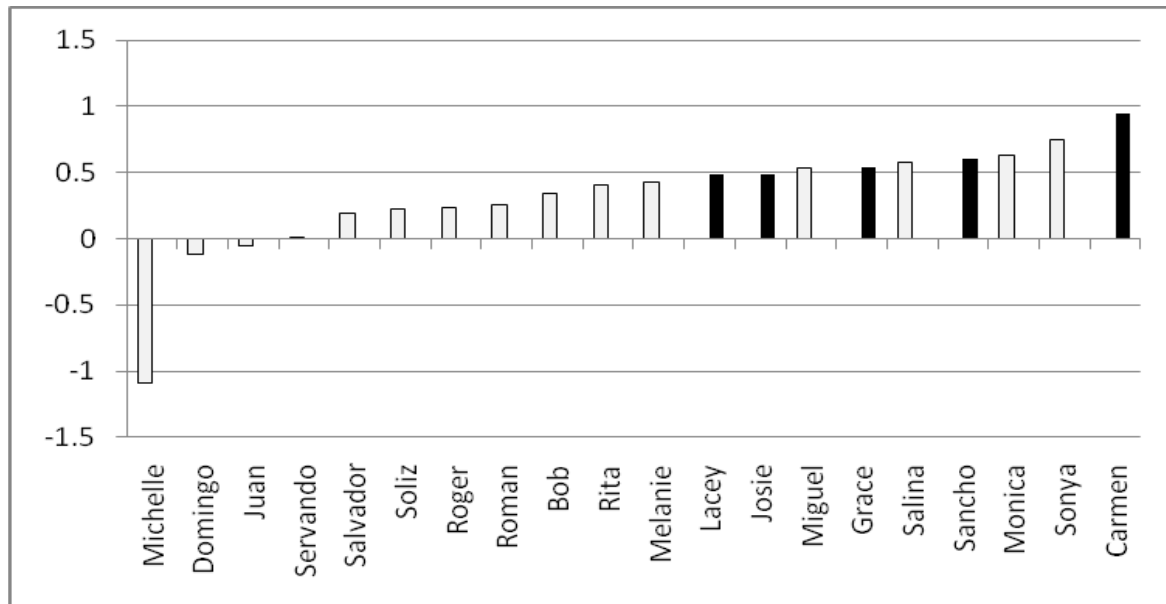
F2 comparisons of the same vowels (shown in Table 5.20), are slightly more interesting. In this dimension, half of the speakers do not maintain a distinction between /ʌ/ and /ɔ/, but those who do produce a /ʌ/ that is significantly fronter than /ɔ/. That is, the NCS might be compatible with the F2 alignment found among speakers who are not significantly different in these two vowels, but so are substrate Spanish influences, and no speakers are showing a more extreme NCS pattern where /ɔ/ productions are fronter than /ʌ/. Strangely, multiple regression analysis suggests that acquisition in the Inland North (where backer productions of /ʌ/ should be more likely) conditions fronting of /ʌ/.

Table 5.20: Means, Mean Differences, and T-test Results for F2 of /ʌ/ and /ɔ/

f2	/ɔ/		/ʌ/		/ʌ/-/ɔ/	t	p
Bob	9.06	0.33	9.55	0.51	0.49	0.2486	0.024
Carmen	**10.77**	**0.25**	**11.58**	**0.29**	**0.81**	**6.524**	**0.000**
Domingo	10.48	0.42	10.54	0.42	0.06	0.283	0.786
Grace	**9.88**	**0.37**	**11.04**	**0.54**	**1.16**	**5.687**	**0.000**
Josie	**9.31**	**0.42**	**10.70**	**0.59**	**1.39**	**5.982**	**0.000**
Juan	9.63	0.51	9.16	1.57	-0.47	-0.747	0.472
Lacey	**9.70**	**0.39**	**10.70**	**0.47**	**1.01**	**5.101**	**0.000**
Melanie	**10.61**	**0.66**	**12.85**	**0.34**	**2.24**	**9.261**	**0.000**
Michelle	9.30	3.04	11.40	0.48	2.11	1.671	0.123
Miguel	9.99	0.60	10.40	0.51	0.41	1.599	0.128
Monica	**9.95**	**0.26**	**11.07**	**0.39**	**1.13**	**5.818**	**0.000**
Rita	10.73	0.39	11.16	0.18	0.43	3.027	0.007
Roger	**9.01**	**0.36**	**9.79**	**0.43**	**0.77**	**4.412**	**0.000**
Roman	**9.29**	**0.42**	**10.45**	**0.59**	**1.15**	**5.13**	**0.000**
Salina	10.10	0.88	11.23	1.60	1.13	1.772	0.100
Salvador	8.89	0.47	9.64	0.59	0.74	2.696	0.018
Sancho	**8.41**	**0.36**	**9.89**	**0.56**	**1.48**	**6.011**	**0.000**
Servando	9.52	0.62	9.91	0.25	0.40	1.452	0.172
Soliz	**8.91**	**0.17**	**9.52**	**0.37**	**0.61**	**4.121**	**0.001**
Sonya	10.41	0.29	10.71	1.19	0.30	0.73	0.479

Figure 5.16: F2 differences between /ʌ/ and /ɔ/
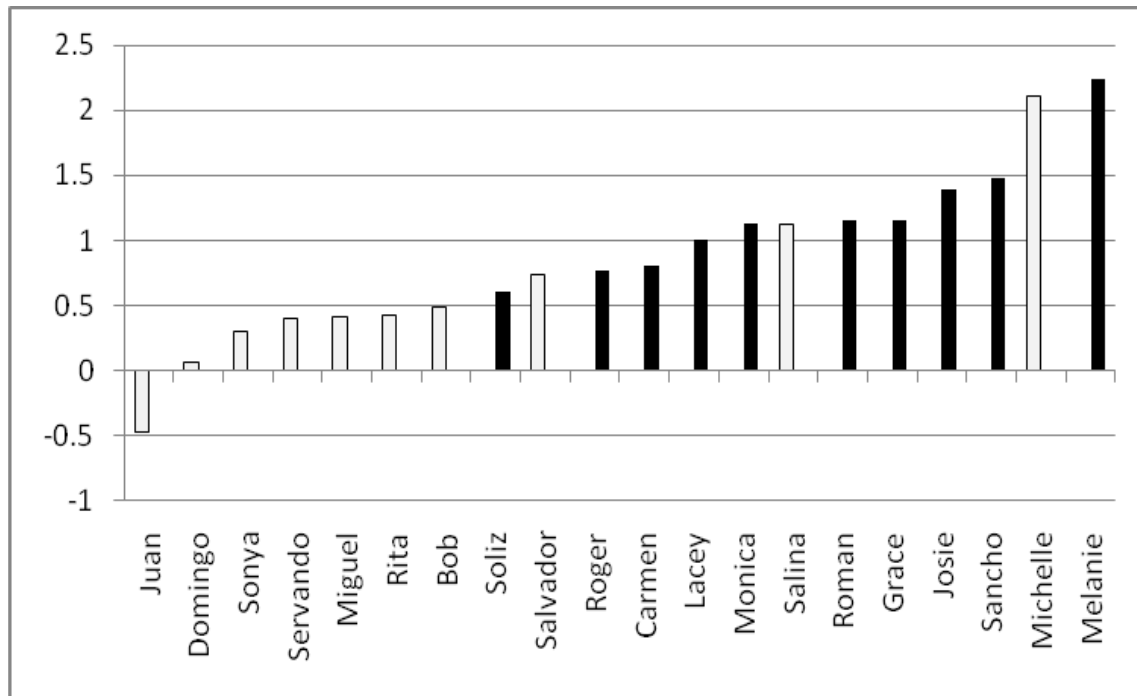
Table 5.21: Summary of F2 findings for /ʌ/ and /ɔ/

F1	/ct/				/vt/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.629	10.825	0.000	women	0.611	9.662	0.000	women
ESL	-0.136	-1.924	0.056	ns	-0.046	-0.590	0.556	ns
EAL	-0.482	-5.543	0.000	Inland North	-0.490	-4.272	0.000	Inland North
LOR	0.180	2.831	0.005	longer	0.262	3.507	0.001	longer
AOA	0.034	0.432	0.666	ns	0.042	0.485	0.628	ns
NWI	0.101	1.389	0.167	ns	0.098	1.231	0.221	ns
NWII	0.236	3.475	0.001	higher	0.307	4.247	0.000	higher

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Table 5.22: Summary of F1 findings for /ʌ/ and /ɔ/

F2	/ct/				/vt/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.411	5.927	0.000	women	0.640	9.099	0.000	women
ESL	0.126	1.497	0.136	ns	-0.087	-9.050	0.367	ns
EAL	-0.214	-2.062	0.041	ns	-0.315	-2.960	0.004	Inland North!
LOR	0.181	2.390	0.018	ns	0.057	0.687	0.493	ns
AOA	-0.030	-0.318	0.751	ns	-0.013	-0.136	0.892	ns
NWI	0.217	2.501	0.013	ns	0.082	0.924	0.357	ns
NWII	0.203	2.504	0.013	ns	0.050	0.622	0.535	ns

Table 5.23 Summary of F1 and F2 findings for /a/

	F1 /a/				F2 /a/			
	Std. Beta	t	p	Effect	Std. Beta	t	p	Effect
SEX	0.732	16.340	0.000	women	0.461	7.687	0.000	women
ESL	-0.250	-4.646	0.000	younger!	-0.011	-0.153	0.878	ns
EAL	-0.563	-8.746	0.000	Inland North!	-0.310	-3.592	0.000	Inland North
LOR	0.098	1.969	0.050	ns	0.116	1.728	0.085	ns
AOA	0.076	1.319	0.189	ns	-0.168	-2.172	0.031	ns
NWI	0.004	0.077	0.939	ns	0.129	1.759	0.080	ns
NWII	0.205	4.154	0.000	higher!	0.101	1.526	0.128	ns

This results for /a/, /ɔ/, and /ʌ/ in the current study are very compatible with the analysis provided by Roeder, who (based on the small standard deviations for /ɔ/ productions among her speakers) concludes that /ɔ/ is not moving in Lansing's Mexican-American speech community. She suggests that this is largely due to the lack of /a/ fronting among her speakers, which has not left an opening for /ɔ/ in the way that might be found among participants in the mainstream version of the NCS (76). She also speculates that /ʌ/, which appears to be relatively stable among her speakers, could also be blocking the movement of /ɔ/ (76).

The results of the current study also resemble those of Konopka and Pierrehumbert (2008), who find that Mexican Americans in Chicago have an /ɔ/ that is somewhat lower than

that of mainstream NCS participants even though /ɑ/ is not fronted in their data either. They

suggest that these findings raise concerns about the typical explanations of how chain shifts

work, namely that "adjacent vowels are either pushed or pulled to positions that maintain

maximal separation," but do not consider, as Ocumpaugh and Roeder (2007) suggest, that

Spanish transfer and contact with the low back merger would both contribute to a merged

category for these vowels in many of the border states where Mexican-American varieties first

emerged in this country. If overlap has become an identity marker within the larger ethnic

community, those in areas like Michigan and Chicago would have to learn to maintain a

distinction between the two vowels before they could participate in the shift.

5.7 Conclusions

The research presented in this chapter has responded to several questions raised by previous

research. First and most importantly, it illuminates the mechanisms of change involved in a

minority dialect that is in contact with a mainstream regional sound change, and it shows, in

contrast to Labov's early (1966 and 1994) claims, that the Mexican Americans in this study are

developing a system that reflects accommodation to the Northern Cities Shift. However, it also

addresses claims in other important research. For example, Milroy suggests that when

network scores are low (as they generally are in this sample), rapid change is possible, and

Trudgill claims that in such an early stage of development, factors like identity and prestige

are not necessary for making predictions about language change. Finally, the within-speaker

analysis of vowel pairs, in addition to demonstrating vowel changes that are being conditioned

by contact with the Northern Cities Shift, also addresses some of the claims made about

second-language acquisition and about the range of available options in the language setting

(e.g. Flege and Santa Ana, respectively).

In this early, perhaps even chaotic stage of new dialect formation, most of the speakers in Benton Harbor are rapidly undergoing changes that reflect partial accommodation to the Northern Cities Shift. To some degree, these changes may be mechanistic. After all, the trends found here suggest that these speakers are headed toward a standard that mirrors results found among Mexican Americans in Chicago (Konopka & Pierrehumbert 2008) and among Mexican Americans in Lansing (Roeder 2006), although I have suggested social as well as phonetic and phonological reasons for this similarity.

In Benton Harbor, Mexican Americans have the option of integrating into (1) the mainstream community of NCS speakers, (2) an ethnically distinct network of other Latinos, or (3) the African-American community. Results here have shown that demographics that correlate with allegiance to a Spanish heritage tend to influence accommodation to substrate Spanish effects, while those that correlate with integration into the mainstream community tend to influence accommodation to the NCS. A summary of these findings, given in Table 5.24, shows that nearly half of the demographic effects (47 of 98 tested) are significant in this data, and most of them are significant in the predicted direction.

Table 5.24 Summary of Significant Demographic Effects on Vowel Formants

		SEX	ESL	EAL	LOR	AOA	NWI	NWII
beat	F1	women	ns	Inland North	ns	ns	ns	ns
	F2	women	ns	Inland North	ns	ns	ns	ns
bit	F1	women	younger	Inland North	shorter!	younger	ns	higher
	F2	women	ns	Inland North	longer!	older!	ns	ns
bet	F1	women	ns	Inland North	longer	ns	ns	higher
	F2	women	ns	ns	ns	older	ns	ns
bat	F1	women	ns	Inland North	ns	ns	ns	higher
	F2	women	ns	Inland North	longer	older!	ns	ns
cot	F1	women	younger!	Inland North!	ns	ns	ns	higher!
	F2	women	ns	Inland North	ns	ns	ns	ns
caught	F1	women	ns	Inland North	longer	ns	ns	higher
	F2	women	ns	ns	ns	ns	ns	ns
cut	F1	women	ns	Inland North	longer	ns	ns	higher
	F2	women	ns	Inland North!	ns	ns	ns	ns

A few trends that have not yet been examined can be observed in Table 5.24. For example, NWI and ESL are not conditioning many changes in the formant patterns, but sex, EAL, and NWII are.

Only one demographic factor (sex) was consistently significant across all of the vowels included in this study. This result is likely due to biological rather than social factors. In some ways, it is unfortunate that these factors could not be completely eliminated through the use of the Bark scale, but to the extent that these differences may be perceptually salient, it may

be more productive to acknowledge their existence than to eliminate them through some other sort of normalization process.

EAL (English Acquisition Location) triggered almost as many significant results as sex. In general, having acquired English in the Inland North had the same effect as being female—it raised both F1 and F2 values in all but two contexts, F2 of /ɛ/ and F2 of /ɔ/, where it was not found to have a significant effect. In general, the significant effects of EAL matched language setting predictions, indicating a somewhat deterministic pattern accommodation to the NCS, whereby speakers who were exposed to the NCS at an early age, having little or no biases about the local dialect (if not the speakers of it), acquired parts of the shift.

NWII triggered fewer significant differences (6 of 14), but these also reveal an interesting trend. Speakers with a higher NWII score (the score based on how many close friends the speaker had of the same ethnicity) also had higher F1 values for /ɪ/, /ɛ/, /æ/, /ɑ/, /ɔ/, and /ʌ/. Only /i/ was unaffected by this trend. It is not clear what is triggering this generalized pattern, but these results point to the need for a more detailed analysis of crossdialectal patterns, including those that may not be socially salient.

Length of Residence (LOR) appears to produce a less deterministic outcome than the other variables examined so far; that is, this social factor does not produce a mechanically cohesive set of effects. It showed as many significant differences as NWII, but only four of them were significant in the directions predicted by the shift, and there was not a general trend (e.g. higher F1 values) that correlated with it like there was with NWII. This is somewhat surprising because it was found to be an important variable in Ocumpaugh and Roeder's (2007) analysis of these vowels. The difference in the findings could be related to differences in the

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normalization processes used in the two studies, but it may be that other variables are simply

more important than LOR.

Other patterns emerge when the results of the within-speaker analysis are considered

as a whole. Recall that seven sets of T-tests were performed for each speaker, one for each of

the following vowel pairs.

1. /i/ vs. /ɪ/: This relationship was examined to determine whether /ɪ/ was being pulled into the phonological vowel space of Spanish /i/, as would be predicted by Flege's models if a conservative variety of English were used.
2. /ɪ/ and /ɛ/: This relationship was examined to determine whether /ɪ/ was being pulled into the vowel space of Spanish /e/ (which has /ɛ/ allophonically).
3. /ɛ/ and /æ/: This relationship was examined for several reasons. Overlap between these two vowels is found (a) in mainstream NCS speakers, (b) in Mexican Americans in Chicago and Lansing, and (c) pre-laterally among Mexican Americans in California. Partial accommodation to the NS could also contribute to overlap.
4. /æ/ and /ɑ/: This relationship was examined because the backing of /æ/ into /a/ appears to be an ethnic marker in other parts of the country (e.g. Texas and North Carolina) and because SLA models predict /ae/ could be assimilated to /ɑ/.
5. /ɑ/ and /ɔ/: This relationship was also examined for several reasons. (a) SLA models suggest that /ct/ could be assimilated to Spanish /a/. (b) Some of these speakers are from Texas, where they could have been in contact with the low back merger. (c) Partial accommodation to the NCS (e.g. if speakers fronted without lowering) could also induce conflation.
6. /ɔ/ and /ʌ/. This relationship was examined for two reasons. (a) Both /ɔ/ and /ʌ/ should assimilate to Spanish /a/ in some SLA models. (b) NCS accommodation should also contribute to conflation in these vowels, particularly in F2.
7. /ɑ/ and /ʌ/: This relationship could also be influenced by the factors outlined in #5 and 6. (a) In SLA models, /ʌ/ should assimilate to Spanish /a/. (b) Accommodation to the NCS could also condition some conflation.

The speaker-by-speaker results are given in Table 5.25, where significant differences are

marked with an S. A discussion of general patterns that can be found in this data can be found

in the paragraphs that follow.

Table 5.25: Summary of Vowel Comparison Findings by Speaker

	beet vs bit		bit vs bet		bet vs bat		bat vs bot		bot vs bought		bought vs but		bot vs but	
	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
Bob	S	S	S	S	S	S	S	S	S	S			S	
Carmen	S	S	S		S			S		S	S	S	S	
Domingo			S		S			S						
Grace		S	S	S	S	S	S	S	S	S	S	S	S	
Josie	S	S	S		S		S	S	S	S	S	S	S	
Juan					S			S						
Lacey	S		S	S	S		S	S	S	S	S	S	S	
Melanie			S	S	S		S	S				S	S	S
Michelle	S	S	S	S	S	S		S					S	
Miguel	S	S	S		S		S	S		S			S	
Monica		S	S		S	S	y	S				S	S	S
Rita			S	S	S			S						
Roger	S	S	S	S	S	S	S	S		S		S		
Roman	S	S	S		S	S	S	S		S		S	S	
Salina			S		S			S		S				
Salvador	S	S	S		S		S	S	S	S			S	
Sancho	S	S			S		S	S	S	S	S	S	S	
Servando	S	S	S		S	S		S						
Soliz	S	S	S		S			S				S		
Sonya		S	S		S	S	S	S	S	S			S	

The first vowel pair examined was /i/ and /ɪ/. Four speakers (Domingo, Juan, Melanie, and Salina) show conflation in both F1 and F2 of these two vowels. Juan's conflation appears to be related to EL issues, as he did not begin learning English until he was an adult. Only Domingo's conflation appears to be related to ethnic loyalties. Melanie is highly integrated into the local European-American community, and Salina shows loyalties toward the African-American community. The 16/20 speakers who are maintaining a distinction between the two vowels seem to be doing so largely through the lowering of /ɪ/, though some backing is also be

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occurring. ANOVA results suggest that the F1 change is more susceptible to social variation. These results indicate that the overlap of /i/ and /ɪ/ may be found among late L2 learners, but they also suggest that it is unlikely to become an ethnic marker in this region.

Next, the relationship between /ɪ/ and /ɛ/ was considered. Only two speakers (Juan and Sancho) show conflation in both F2 and F2. Neither of these results appears to be conditioned by ethnic loyalties. In the case of Juan, whose /ɪ/ also overlaps his /i/, this conflation is probably related to his late age of acquisition. Sancho's results are more perplexing since he is not an ESL speaker. The 18/20 speakers who are maintaining a distinction between the two vowels appear to doing so largely in the F1 dimension. Only 7 of them also maintain statistically significant F2 distinctions. This is interesting because of the interpretation of the ANOVA results in the last vowel pair, which showed socially conditioned lowering of /ɪ/ relative to /i/. The ANOVA results for /ɛ/ also suggest greater social conditioning in F1 than in F2. For both /ɪ/ and /ɛ/, a higher NWII appears to condition lowering. These results refute any suggestions that /ɪ/ might be assimilating to the next nearest Spanish phoneme (/e/, and specifically, it's allophone /ɛ/). Instead, this demonstrates that both vowels appear to be lowering, and, while no chronology can be established, we may be looking at a push/pull situation. Since both are also being conditioned by high ethnic-network scores, the lowering of both vowels appears to be a change that the community is embracing.

Then /ɛ/ was compared to /æ/. Interestingly, /ɛ/ and /æ/ are one of two pairs of vowels where no speakers show conflation in both directions, but this result is somewhat misleading since it suggests that there is not a lot going on this area of the vowel space. All speakers maintain an F1 distinction that is statistically significant, but only eight maintain a

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statistically significant F2 distinction. ANOVA results suggest a fronting of F2 overlap for /æ/ and /ɛ/ is being conditioned (predictably) by a longer LOR. These results demonstrate a very interesting development in the development of a regional ethnic variety. A high NWII value conditions lowering of both vowels, but is apparently having little effect on the F2 dimension, where movement appears to be conditioned by accommodation to the NCS. These results are also interesting because, even though all of these speakers are maintaining significantly different F1 values for this vowel, three of them are doing so in the direction of the shift. In other words, for three of them, the significant difference is due to accommodation to the NCS, not resistance to it.

The vowel pair /æ/ and /ɑ/ is the only other pair of vowels where no speakers show conflation in both directions. This result is somewhat surprising, given claims about the stereotypical backing of /æ/ in Mexican-American English. In fact, every single speaker in this sample maintained a statistically significant difference in the F2 dimension, and most also maintained a greater than 1.5 Bark difference between the two. Only about half (11/20), however, also maintained a significant difference in the F1 dimension. This appears to be related to the fronting of /æ/. These results also demonstrate a very interesting regional development in the emergence of an ethnic variety since they suggest that contact with the NCS is inducing /ɛ/ lowering more than /æ/ raising.

Next, /ɑ/ was compared to /ɔ/. It should not be surprising that the low back vowels show considerable overlap. In this sample, eight speakers show complete overlap between /ɑ/ and /ɔ/, including both of the ESL speakers (Rita and Juan) and the speakers with the two highest ethnic network scores (Domingo and Michelle). Given that both Spanish phonology and earlier contact with the low back merger would condition conflation in these two vowels,

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it seems likely that speakers would have to unmerge these vowels before showing evidence of NCS accommodation. All twelve of the speakers who are maintaining significant differences between these two vowels are different in the F2 dimension, but only seven of them maintain a height distinction. ANOVA results suggest that the social variation in the differences between these two vowels is more likely to be found in /ɑ/ than in /ɔ/. Those having acquired English in the Inland North show a fronter /ɑ/, but not a fronter /ɔ/, and those with a younger ESL value seem to have a lower /ɑ/. Cumulatively, the statistics suggest that overlap in this part of the vowel space may be retained as an ethnic marker, inhibiting accommodation to the NCS.

When /ɔ/ was compared to /ʌ/, half of the speakers in this sample were found to show overlap—more than any other vowel pair. This includes Rita and Juan (the two ESL speakers), Domingo and Michelle (the two speakers with the highest ethnic network scores), but also Salina (who is accommodating to the African- American community) and Bob (who is accommodating to the NCS). ANOVA results suggest that the effects of social factors are largely the same on both vowels, but the speaker-by-speaker analysis suggests that the same effect may have multiple causes.

Seven of the speakers in this sample show conflation of /ɑ/ and /ʌ/ in both F1 and F2. These include several speakers who appear to be heavily influenced by Spanish phonology (Domingo, Juan, Rita, and Servando) but also Salina (who is assimilating to African Americans) and Roger, who shows NCS influence. Those who are maintaining significant differences between /ɑ/ and /ʌ/ are doing so in height. Only two are also maintaining distinctions in F2. Again, multiple causes appear to be at work. ANOVAs yielded several significant conditioning factors, but they were largely moving both vowels in the same direction. Combined with the participation of speakers in conflicting accommodation patterns as shown in the speaker-by

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speaker analysis of conflation, it seems premature to make too many claims about demographic effects.

/ɑ/ vs. /c/ vs. /ʌ/

The low back vowels and /ʌ/ show considerable conflation, a result that is compatible both with substrate Spanish influence and to some extent with accommodation to the Northern Cities Shift. Only 7 speakers show conflation of both F1 and F2 for /ɑ/ and /ʌ/, but eight speakers conflate /ɑ/ and /ɔ/, and ten speakers show conflation of /ɔ/ and /ʌ/. These results include four speakers who show conflation for all three vowel pairs (Domingo, Juan, Rita, and Servando). Two of these people are the ESL speakers (Juan and Rita), and the other two have high ethnic network scores. ANOVAs yield a number of significant conditioning factors in the placement of these three vowels, but in general, they seem to have similar effects on each vowel. For example, (1) being female lowers and fronts all three vowels, (2) having acquired English in the Inland North lowers all three vowels and fronts /ɑ/ and /ʌ/, (3) having a longer LOR lowers /ɔ/ and /ʌ/, and (4) having a high NWII score lowers all three vowels. Based on the speaker-by-speaker analysis of statistical differences, it's tempting to attribute conflation in this region of the vowel space to substrate Spanish influence. For some speakers, this may be true. However, even Roger and Bob, who are showing extreme NCS influence in their relationships between /ɛ/ and /æ/, show overlap in at least one of these vowels.

The trends here suggest that the claims in the literature deserve some rethinking. Change appears to be happening rapidly, since we are seeing partial accommodation in the first generation and a half, and some of that change can be determined by basic demographic factors (e.g. sex, EAL, LOR) that do not consider identity. However, the strongest predictor of

substrate Spanish influence is NWII, which is a sort of measurement of identity. So, Milroy's predictions about rapid change in a loosely networked group seem to hold true, but Trudgill's claims about determinism may need rethinking, as may some of the claims made in the SLA literature. At least in a community like this one, where there are several ethnically distinct varieties (and other social divisions, e.g. a rural/nonrural divide), identity is important. Speakers may not need a desire to completely assimilate in order to show accommodation in their vowel system, but identity forces appear to be at work in other ways. In a town that is more than 90 percent African American, the assimilation to the NCS is unlikely to be a result of anything other than a result of identity-related ideologies.

The number of potential varieties in the language setting available to speakers of similar ethnic backgrounds is well documented (Santa Ana 1993), but few studies have explored the interaction of these influences. Because of the large number of options available to those with a Spanish-heritage background, this process can be quite messy. Benton Harbor's contact situation does not mirror the colonial, *tabula rasa* situation described in Trudgill's research. The current study, which relies on data from only 20 speakers in the first stages of settlement, is hardly definite, but it suggests that demographic factors are predictive only about half the time, and occasionally, they are influential in the opposite direction from what is predicted. These findings, in particular, are somewhat problematic for Trudgill's claims about deterministic outcomes sans identity, at least in a *tabula plenus* situation with an *extraterritorial* group of speakers like the ones found in this study. On the other hand, the contexts of the two studies are different, and Trudgill's model suggests that stage two (which roughly approximates the conditions found in Benton Harbor) is characterized by chaotic changes, which means a few anomalies should be expected.

Ultimately, the results of this chapter have shown three major findings:

(1)   Milroy's claims about change happening rapidly in a loosely networked community have been proven true.
(2)   Most of the demographic factors that are significantly affecting the vowel space are doing so in the directions that are predicted by the language setting, suggesting that some deterministic forces (a la Trudgill) may be at work.
(3)   Many demographic factors were not significant, and this, combined with (a) the anomalies in the speaker-by-speaker analysis in this section and (b) the fact that these speakers have managed to accommodate to the NCS in a town that is more than 90 percent African American, suggests that identity considerations are needed (contra Trudgill).

In response to number three, Chapter 6 will investigate the vowel system of three speakers whose identities are significantly different from one another.

However, this chapter's results have implications outside sociolinguistic research as well. It has raised concerns about claims made (and methodology used) in the SLA literature. For example, the sections that discuss /ɪ/ and /æ/, neither of which is a phoneme of Spanish, show that claims about the relationship of similar ethnic varieties to ESL developmental processes need to be reframed so that specific target varieties are considered instead of just idealized systems. This, too, should have implications for future research. It has also shown that most of the demographic factors that are significantly affecting the vowel space are doing so in the directions predicted by the language setting.

CHAPTER 6: CASE STUDIES OF PRODUCTION RESULTS BASED ON THE COMMUNITIES-OF-PRACTICE MODEL

6.0 Introduction

This chapter will examine the production data of the Benton Harbor subjects from the perspective of a communities-of-practice model. This approach contrasts with that of Chapter 5, which demonstrated that social demographic factors can be correlated with language-setting effects even in the incipient stages of speech-community development. A substantial number of possible demographic effects (47 percent) were shown to be significant, mainly in the directions that would be predicted based on accommodation to variety in the language setting of Benton Harbor. This information is important to our understanding of dialect-contact situations, since it demonstrates that new dialect patterns are beginning to form even in generations 1 and 1.5, and that many of them look to be highly compatible with more stable speech communities in the region such as those in Lansing and Chicago, and it offers some support for Trudgill's (2004) claim that linguistic variation is deterministic.

Chapter 6 will examine the vowel plots of several speakers based on qualitative, ethnographic information gathered during fieldwork. Specifically, I will provide three case studies that reflect speakers who are (1) showing high accommodation to the NCS, (2) showing strong evidence of substrate Spanish influence, or (3) showing neither. The speakers in each category are:

1) Bob, a young man who acquired English in the Inland North and shows substantial NCS influence;
2) Domingo, who acquired English in the valley region of Texas and shows substantial Spanish influence even after 40 years in the community;
3) Salina; who acquired English in the Valley region of Texas and is believed to show substantial accommodation to African-American English by most of her ethnically similar peers.

This analysis is a very important supplement to the data examined in Chapter 5 for a variety of reasons, including those related to the structure of the community in Benton Harbor, those related to the linguistic opportunities typically available to members of this ethnicity, and those that are simply related to the differences in the kind of information that each social model offers to linguistic researchers. However it is also important because it counters a claim made by Trudgill (2004); namely that identity should be used as an explanation of linguistic variation only as a last resort. Instead, it will show that this kind of information is extremely valuable.

The remainder of this chapter is organized as follows. Section 6.1 will discuss the reasons for incorporating a communities-of-practice approach into the current study. Sections 6.2 and 6.3 will analyze the vowel charts of Bob, Domingo, and Salina (respectively). Each of these sections will demonstrate why these speakers are thought to show greater accommodation to one variety over another in the language setting. Finally, Section 6.4 will present conclusions.

6.1 Justification for the use of a communities-of-practice–based model

Trudgill's (2004) analysis of a *tabula rasa* community, which has been discussed in Chapters 1 and 5, suggests that new dialect formation is mechanistic, so that, given enough knowledge about the linguistic inputs and certain demographic characteristics of a new community, the resulting dialect patterns are predictable. It is not clear that such claims should be made about a community like Benton Harbor, where the new dialect in question is not being formed in a *tabula rasa* environment. To the degree that the results presented in Chapter 5 mirror similar communities (e.g. those in Roeder 2006 and Konopka & Pierrehumbert 2008), it may be claimed that the same sort of mechanistic predictions are

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possible even when the speakers of the new dialect are not working with a blank slate. Still, recent research, most notably Eckert (2005), has called for greater depth in the investigation of the role of the individual, and the communities-of-practice model seems best equipped to explain the behavior of certain individuals in the Benton Harbor setting.

Recall from Chapter 3 that the communities-of-practice model articulated by Eckert and McConnell-Ginet (1992) contrasts strongly with previous models of language variation because it allows greater focus on the agency of individual speakers as they position themselves linguistically with respect to the different communities with which they interact. These include both real, local communities and/or those with which they want to be associated (e.g. global imagined communities, which might include categories like Latino). The COP model provides different information than those that rely more heavily on externally assigned social categories (e.g. Labov) or opportunity (Trudgill 2004), but is meant to supplement, not replace, earlier models.

The current study was not constructed to examine the claims of the communities-of-practice model, which suggests that a speaker's identity is more fluid than previous models have been able to capture. Subjects in the current study were interviewed only once, and data for this study was taken only from word lists. A more ideal COP study would examine speakers in multiple settings, each designed to elicit different aspects of the person's identity. However, there are a number of reasons why previous models might also be inadequate for exploring the data in Benton Harbor, so there are a number of reasons to attempt to co-opt aspects of the communities-of-practice model so that the role of individual identity in the negotiation of new linguistic patterns in Benton Harbor may be explored in greater depth.

First, the subjects in this study are part of an ethnic community in the region, but it is not clear that they meet Labovian definitions of a speech community. Nor do they demonstrate the tightly knit, geographically based network that is typically used in network models. To the extent, then, that there are weakness in any approach employed during research, every effort should be made to supplement that data with information that can be gathered through other models.

Second, as was discussed in detail in Chapter 4, speakers in the United States who come from a Spanish-heritage background have a wide range of linguistic opportunities that are socially acceptable. Santa Ana (1993) discusses these opportunities in terms of the "language setting," suggesting that a speaker of Mexican-American heritage may reflect his or her own identity by accommodating, more or less, varieties that show substantial substrate Spanish influence, varieties that are considered more regionally or ethnically marked, or varieties that sound more standard. This is in some sense true for all speakers, regardless of their ethnicity, but it does seem to be particularly relevant to Mexican Americans and others who share a similar language heritage. In Benton Harbor, where the number of possible categories far outweighs the number of speakers included in this study, it would be extremely presumptuous to assume that data like that which is presented in Chapter 5 fully captures the linguistic processes currently underway.

Finally, the type of information gleaned from communities-of-practice models can be different from that gathered from traditional speech community or network models of analysis which use quantifiable data to analyze the community as a system. The communities-of-practice model, on the other hand, with its focus on the individual, allows the researcher to examine details that may not necessarily be quantifiable. In other words, this kind of analysis

can be highly productive even in communities that lend themselves better to the more traditional community studies because it complements that data, but it is particularly important in this study, where strong community trends may not be well established.

This chapter will explore data from only three speakers (Bob, Domingo, and Salina), each of whom demonstrate different ethnic loyalties in this community, which is very racially divided. Bob represents speakers who are not linguistically integrated into Latino community, despite opportunities to do so. Instead, he is oriented toward the local European-American community, which appears to be participating in the NCS. Domingo represents speakers who are not linguistically integrated into the NCS community, despite opportunities to do so. Salina is not linguistically integrated into either of the previous communities, despite ample opportunity to do so. Instead, she seems to be accommodating African-American norms.

6.2 Bob, a speaker who is strongly accommodating to the NCS

Bob is a prime example of a child whose culture is different from his parents'. Both his parents are monolingual Spanish speakers, though his father was attempting to learn English at the time of the interview. They live in Benton Harbor and are active in a Spanish-speaking church in a neighboring small town. Based on this cursory evidence, one might predict that his vowel system would show high incidence of substrate Spanish influence, but Bob does not appear to be particularly attached to this part of his life.

At the time of his interview, Bob was 18 years old and still attending school across the river from Benton Harbor in the St. Joseph school district. He told me that most of his friends were white and that he did not really feel like he was part of the same community as his parents. When asked if he would consider dating or marrying a Spanish speaker, he told me

that he would not because he felt that it was important to marry someone from the same cultural background as his schoolmates.

These attitudes are reflected in his vowel system (shown in Figure 6.1). Notice that he shows the complete reversal of /æ/ and /ɛ/ that is typical of some of the more advanced varieties of the shift. His /ʌ/ appears to be backing, since it is farther back than /ɔ/, and /ɔ/ itself appears to be fronting, not only due to its relationship to /ʌ/ but also by its approaching alignment in F2 with /ɛ/. Finally, his lowered and backed pronunciation of /ɑ/ reflects not only accommodation to the NCS but also a resistance to a variety that might reflect his family's heritage language. He has not only acquired English natively, but he is actively participating in the local mainstream sound change.

Figure 6.1: Bob's vowel chart
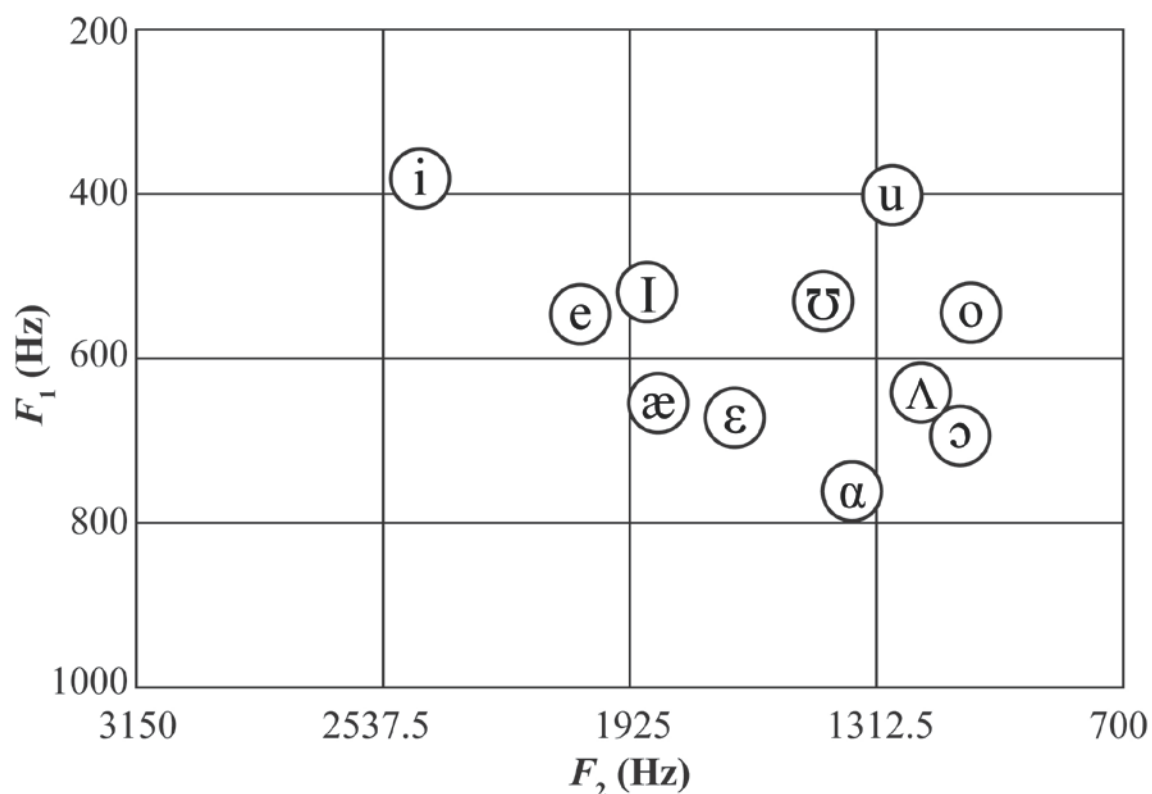
6.3 Domingo, a speaker who is showing strong substrate Spanish influence

Bob and Domingo come from similar family backgrounds and acquired English at about the same age, but their similarities end there.   Domingo (72 years old at the time of the interview) has had twice as long as Bob to acquire the NCS, but he did not arrive in the area until he was in his thirties. He has spent most of his life as a crew chief on a local farm, but now that that family is beginning to retire from the agricultural business he is looking for other ways to support himself and his family.

At the time of the interview, he and his son were renting out a local dance club for semiregular "rodeos," and he was marketing his grandson's DJ services at these events and other events targeted at Spanish speakers in the area. Despite his long term in the area, he does not appear to be especially oriented toward the white community. It is not clear that he has had any bad experiences with them in Michigan, but his interview suggests that he might have when he still lived in the Valley region of Texas several decades ago.

Despite his young age of English acquisition, his attitudes are probably still the best predictors of his vowel system. His vowel system shows considerable substrate Spanish influence. He is, for all intents and purposes, a native speaker of English, but his vowel system shows patterns that might be predicted based on Flege's SLM. For example, /ɑ/, /ʌ/, and /ɔ/ overlap one another in his vowel chart (Figure 6.2). Meanwhile, /i/ and /ɪ/ are clearly conflated, showing even the opposite position one would expect for the English peripheral-nonperipheral organization. Instead of a dispersion pattern that looks like conservative white English or the NCS, his English vowels look as though they have been mapped onto a Spanish five-vowel system

Figure 6.2: Domingo's vowel chart
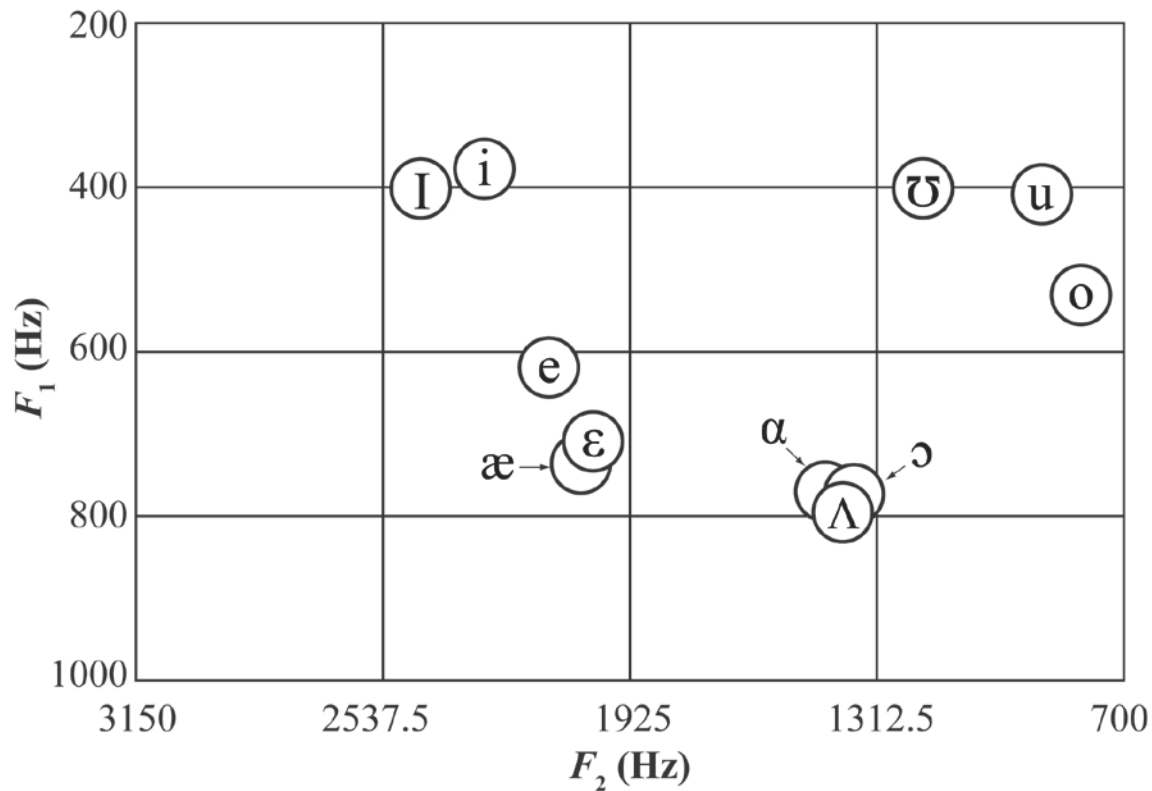
Interestingly, he still shows some evidence of having been in contact with the shift. This influence is demonstrated in relative positions of /æ/ and /ɛ/, which are also nearly overlapping in his system. This is not a pattern that has been found in other regions of the country, but it is one that was found to be significantly correlated with several demographic factors that are compatible with the shift (as discussed in Chapter 5). That is, LOR was significantly correlated with a fronter /æ/ production and a lower /ɛ/ production, both of which can be clearly seen in Domingo's speech.

In addition to aptly illustrating the potential transfer effects of Spanish phonology, Domingo's vowel system offers strong evidence that /ɛ/ lowering (rather than /æ/ raising) is responsible for the conflation or near conflation of /æ/ and /ɛ/ that has been found in this study, in Roeder (2006), in Ocumpaugh and Roeder (2007), and Preston, Ocumpaugh, and Roeder (2009),

though /æ/ fronting may also be seen in early stages. That /æ/ is undergoing some sort of

identity crisis is predictable based on the SLM, but the movement of /ɛ/ is more curious. It is

possible that /e/, which should be phonetically distinct from Spanish /ei/ (though they are

allophones of the same phoneme), might show such drastic changes during the initial contact

with the NCS because speakers who were showing substrate Spanish effects might try to

assimilate /æ/ to /ɛ/. This would prevent the stereotypical backing of /æ/ into /ɑ/, while also

drawing /ɛ/ down. Domingo's vowel chart does not fully prove this hypothesized process of

this change, but it does show that it has occurred in a speaker who does not otherwise meet

any of the criteria NCS accommodation.

6.4 Salina, whose identification with the African-American community makes her unique

The last speaker to be investigated in this chapter is Salina, a speaker who by all

accounts has had ample opportunity to accommodate either of the patterns shown in the

previous two sections. At the time of the interview, Salina was a 28 year old woman. She

learned English in the Valley region of Texas, where she would have had the opportunity to

accommodate to substrate Spanish influences that are prevalent in the speech of many locals

in that area, and she interacts regularly with speakers who have similar Spanish-influenced

patterns at her current place of employment.

Salina arrived in Southwest Michigan as a teenager, at the same age as many of her

fellow employees, who now tease her for the way she talks. They believe she has changed her

speech patterns significantly as a result of her close relationship with members of the African-

American community in Benton Harbor. Impressionistically, it appears that they are right.

She has co-opted intonation patterns and other verbal behavior that made her ethnicity

somewhat mysterious when I first encountered her, but careful acoustic measurement

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indicates that this accommodation may not have occurred in her vowel space. Instead, what is noticeable in her vowel space is her lack of accommodation to either (1) substrate Spanish influence or (2) the NCS.

Figure 6.3 Salina's vowel chart
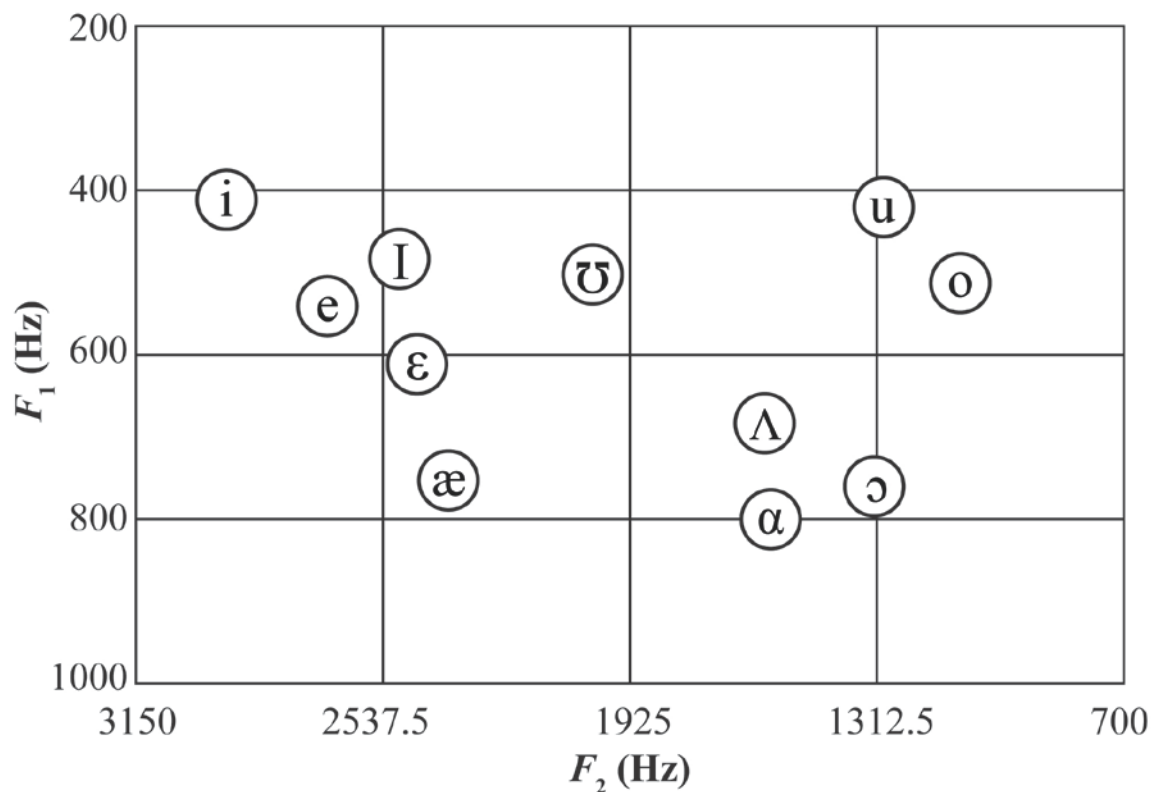
As Figure 6.3 shows, Salina does not have the strong, five-vowel pattern that is readily apparent in the speech of Domingo. Nor is she showing strong signs of NCS accommodation. /ɪ/ might be slightly backer and lower than the typical Peterson and Barney arrangement; /æ/ might be slightly fronter, and /ɔ/ is slightly lower, but none of these vowels show the kind of extreme accommodation apparent in Bob's vowel space. Nor is she showing the kind of overlap in /ɛ/ and /æ/ that is typically even of those who show extreme substrate Spanish influence but have also had sufficient exposure to the NCS (e.g. Domingo, discussed above, and several of Salina's co-workers who are not shown in this chapter).

Salina's vowel space is interesting because ethnographic research reveals that she is the only speaker in this sample who identifies with the African-American community, and her friends attribute this fact alone to the current contrasts between their speech and hers. It seems likely that much of the chatter about how Salina's speech patterns have changed is likely a result of the very salient features that were impressionistically observed (e.g. intonation), but without documentation of what her speech was like when she first arrived in Michigan, there is not sufficient evidence to suggest that she has actually made many changes in her vowel space. Without evidence to suggest that she once had a vowel chart that more closely resembled that of Domingo, it is not clear that she has done anything other than resist the influence of the NCS in her vowel space. Meanwhile, her cohorts have begun to show accommodation to the NCS—at least in their overlap of /æ/ and /ɛ/. In other words, they have experienced a change from below in response to their contact with the Northern Cities Shift, while she has managed to resist it.

6.5 Conclusions

The current chapter has briefly highlighted the need to supplement the kind of quantifiable data typically used in sociolinguistic research (including that in Chapter 5) with detailed ethnographic information about the individual. Each of the subjects included in the current study has had ample opportunity to accommodate to at least one of the other ethnically distinct varieties in the area, and at least some of these opportunities are reflected in the social demographic characteristics considered in Chapter 5. The fact that they have not may be reflected in the kinds of demographic characteristics that are considered in this study.

For example, the fact that Bob is the only of these three speakers to have acquired English in the Inland North is readily apparent in the examination of these vowel spaces, but

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other speakers who share that characteristic (e.g. Roman) are not quite so advanced in their accommodation to the NCS. Bob's advanced accommodation to the NCS is not simply a straightforward outcome of the opportunities that he has had to acquire the variety; his identity has influenced him to exploit networks that support some accommodation and to actively abstain from variables that reflect substrate Spanish influence, which are widely available to him through family and church connections.

It is less clear what kind of agency a speaker like Domingo might have, since his lack of education may contribute to his having fewer social networking opportunities than are available to a speaker like Bob. Still, to the degree that he has actively negotiated a career as a crew-chief, where he interacts more with migrant farmer workers than with local white residents, we could argue that his linguistic patterns also reflect an identity that is strongly aligned with his ethnic heritage.

Perhaps the strongest support in this study for considering the role of identity comes from the very brief ethnographic description of Salina, presented in Section 6.3. By all accounts, Salina has had ample opportunity to accommodate either (1) to substrate Spanish influence or (2) to the NCS. She has had opportunity to adapt to substrate Spanish influences either through her childhood networks in the Valley region of Texas or through her continued work and social networks that put her in regular contact with childhood friends from that region and with others from similar backgrounds. To a lesser extent, she has had opportunity to accommodate to the NCS. Still, she resists accommodation to both varieties, instead reflecting overtly articulated allegiances to the African-American community that were witnessed during ethnographic fieldwork.

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In a study like this one, which examines an extremely small number of subjects in a community that is not yet well established, it is easy to see how trends exhibited by a speaker like Salina might be overlooked if ethnographic methods (like those advocated in the communities-of-practice model) were not employed. In the current incarnation of this community, trends like those seen in the vowel spaces of Bob and Domingo might seem more important, but that does not mean that speakers like Salina should be ignored. As the community becomes more established, these may continue to be the prevalent trends, but it is also possible that as the next generation of Mexican Americans in Benton Harbor comes of age, they will be more inclined to integrate into the African American community. If that is the case, speakers like Salina may also be an example of future trends that could not be readily investigated in the current sample.

CHAPTER 7: A REVIEW OF RELEVANT COMPREHENSION RESEARCH

7.0 Introduction

Although shared comprehension ability has long been a defining characteristic of a

speech community, until recently, the comprehension of spoken words had not been

extensively studied in sociolinguistic contexts (notable exceptions include Labov & Ash 1997;

Preston 2005; Friedland, Bartlett, & Kreuz 2004), particularly in terms of understanding how

different phonetic productions are processed by speakers of different dialects. The next two

chapters will attempt to fill in this gap, tentatively exploring the relationship between the

production and comprehension patterns exhibited by the Mexican Americans interviewed in

Benton Harbor. In keeping with one of the primary purposes of this dissertation—

understanding the acquisition process of local dialect features by Mexican Americans—the

experiment in Chapter 8 is designed to examine the details of how these patterns emerge as

groups with different language backgrounds come into contact with one another. Specifically,

Chapter 8 will explore the degree to which the perception of the Northern Cities Shift (NCS)

correlates with the production norms of individual speakers and whether both are affected by

the same social categories. It will also compare the success of the current subjects to the

success of several groups who were presented with the same stimuli in Preston (2005).

However, before the experiments of the current study are examined, a more exhaustive review

of the literature on perception than the one provided in Chapter 4 (which examined

predictions about the production effects of possible SLA models of perception) is necessary.

Much of speech-perception research falls into two different patterns: (1) research done

in laboratory settings that is carefully control for a variety of patterns relating to phonetic

context, phonotactics, lexical neighborhood density, and listening conditions in an attempt to

discover so-called invariant language-internal phenomena (see Hawkins [1999] for an excellent review of this research) and (2) research that carefully controls for social categories in order to explore speaker-indexical clues, which, by nature, are far more variable (e.g. Johnson 1990 and Neary 1989). Unfortunately, as Clopper, Conrey and Pisoni (2005) point out, there has been relatively little interface between the two linguistic traditions in the investigation of this topic, probably because of a conflict in the goals of each tradition. Variation exists within and across speaker productions, within and across segment boundaries, and at many other different levels, but Clopper and Pisoni show "…the traditional approach to the study of speech perception and spoken language processing has been to ignore these important sources of phonetic variability and to rely on abstract phonemic descriptions that are immune to variability across utterances, talkers, and contexts" (313).

In the same study, Clopper and Pisoni also explain that this approach is motivated by a desire to distill the signal into only those parts of the signal that are linguistically important. Such distinctions typically cause social variation to be ignored. Rather than trying to fit the data to the model, Clopper and Pisoni suggest that researchers should investigate "how variation and variability in speech perception are processed in speech" (313). Note the clarity of their call to discontinue the elimination of social variation from speech-perception models: "this second alternative espouses the notion that variation in speech matters and that listeners can and do encode details of the indexical properties of the speech signal as a routine part of the normal speech perception process" (Clopper & Pisoni 2005:313).

Attempts by laboratory researchers to understand how listeners distill irregular acoustic productions into invariant mental representations have been at cross-purposes with those in the sociolinguistic tradition whose studies explore how identity is reflected and

reinforced in linguistic variation—in the very kind of irregularities that are eliminated from the laboratory models.

As importantly, the research that seeks to study only the language internal elements of variation eliminates meaningful parts of the signal. Clopper and Pisoni's call to unify these two approaches restates the urgency of this unification as a critical step in the advancement of both areas of the field of speech perception. As the rest of this chapter will show, evidence suggests that phonological features manifest themselves differently across different phonemes and that listeners likely use a myriad of converging evidence when deciphering a linguistic signal—including evidence from nonphonological patterns. Raw acoustic data is critical to understanding the perception of spoken languages, but speakers also rely on phonotactic patterns of their language, on syntactic and semantic cues surrounding the token in question, and (cf Clopper, Conrey, & Pisoni 2005; Jusczyk & Luce 2002; Boothroyd & Nittrouer 1988) on speaker-indexical cues (such as age, gender, and dialect) when interpreting the acoustic signal. Though this last category of clues is sometimes ignored by those who are not from a sociolinguistic background, sociolinguistic researchers such as Niedzielski (1999) have shown that knowledge of speaker-indexical patterns significantly interacts with the perception of acoustic cues, and any attempt to model perception must be able to account for such patterns.

That is, research on social stereotypes[9] demonstrates that declarative labels are often in conflict with the implicit patterns used by both producers and perceivers to construct social categories. This chapter will argue that by eliminating the study of the sociological factors that might condition differences in the production and perception of the linguistic signal,

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[9] See for example the Implicit Association Test developed by Nosek, Banaji, and Greenwald, which shows that strong social stereotypes persist despite their conflict with declarative beliefs about the same social categories.

researchers have ignored cues that are likely critical to the normalization process in speech perception. The remainder of this chapter is organized as follows.

The first section of this chapter will review the literature from laboratory experiments of perception, including a brief discussion of Peterson and Barney's (1952) research on vowel recognition based on acoustic cues and later research on the interaction of these acoustic cues with other so-called language-intrinsic factors (e.g. phonological and phonotactic expectations, syntactic and semantic cues, and indices of such contextual effects [e.g. the k-factor and the j-factor]). Studies showing that listeners use converging evidence even when cues are restricted to such language-intrinsic factors (e.g. Benki 2000, 2002, 2003 and Boothroyd & Nittrouer 1988) will also be considered.

The second section embraces Clopper and Pisoni's (2005) call to incorporate speaker-indexical patterns into more clinical examinations of speech perception research, arguing that such meanings must be part of a speaker's grammar of the language. The present study is not the first to embrace their call, which is well-grounded in the traditional Labovian model of sociolinguistics. Still, their theorem bears repeating so that typical objections to the merging of sociological and phonological patterns may be addressed. The current study will demonstrate that it is not only possible to include such information, but that Clopper and Pisoni's case for incorporating aspects of sociolinguistics into speech perception research provides an explanation for the variance that is perceptually tolerated in the acoustic signal.

The third section will return specifically to Kuhl's magnet theory, which serves as a foundation for many SLA models of language acquisition and other popular explanations of perception. This chapter will offer a thorough critique of the magnet theory and go on to suggest that electromagnetism might not be the best physical phenomenon to serve as a

metaphor for speech perception. Finally, it will also provide a brief overview of stochastic

learning algorithms that are showing considerable promise in their ability to model speech

perception (e.g. Boersma 1997; Escudero 2006; Escudero & Boersma 2001, 2004).

The cumulative results from these separate research traditions will be used as evidence

for the underlying claim of Chapter 7: that it is perfectly intuitive for the phonological

responses of speakers to be influenced by their own production patterns, but that the two

need not be in perfect harmony. That is, evidence for flexible and sometimes idiosyncratic

standards might be the critical clue for understanding how listeners may perceptually process

speech that is different from their own production.

Similarly, the fact that humans underreport their biases in research on social

stereotypes might be seen to parallel the results of the experiment in the next chapter, which

show that positive NCS results in production correlate with improved perception of NCS

variables, but that the two results are not perfectly parallel. Such results highlight the need

for studying production and perception in tandem so that interactions between the two tasks

may be better understood.

7.1: General perception

The call for social constraints to be included in the grammar of a language in no way

diminishes the importance of factors that are traditionally considered to be "more linguistic"

in nature. An enormous number of factors influence the auditory processing of words, and

some of these factors (e.g. acoustic waveform patterns and phonotactics) are considered to be

more phonetic and phonological than others (e.g. syntactic and semantic clues). This section

will address the nature of these factors in terms of their variable production and perception in

speech. As this section will show, there are very few invariant cues to the perception of speech

segments, an issue which is sometimes framed as "the invariance problem" (see, for example, Jusczyk & Luce 2002 for an extensive review) in the literature, but Winfred Strange (1998 in Picket) terms the small number of invariant cues "dynamic constancy."

Attempts to model the listener's ability to create phonological constancy out of exceptionally dynamic data are often grouped into two distinct approaches (e.g. Neary 1989): (1) those which deal with the acoustic pattern of the vowel itself, or *vowel-intrinsic-normalization models*, and (2) those which suggests that listeners rely on contextual clues in establishing these patterns, or *vowel-extrinsic-normalization models*. This section will begin with those cues that are most often considered vowel intrinsic (e.g. the fundamental frequency, formants, duration, and amplitude). It will then use the discussion of temporal, spectral cues and research on noise and silent-centered syllables to bridge to cues that are considered more extrinsic (e.g. phonotactics, lexical neighborhood density, syntax, semantics, and the use of speaker-indexical information).

Those who approach perception from a vowel-intrinsic normalization process are typically interested mainly in several cues, including f0, F1, F2, F3, F4, duration, and amplitude; but research often focuses only on the relationship between F1 and F2. In sociolinguistic research, one of the more influential studies of the relationship between F1 and F2 is the one conducted by Peterson and Barney (1952). This research documented the productions of 76 English speakers (men, women, and children) before testing the production of 70 adult listeners, only 32 of whom participated in the production experiment. The now famous vowel chart of individual tokens from their production experiment (shown below in Figure 7.1), has also been supplemented by those who simply use the average results of F1 and F2 that were reported in this study.

Figure 7.1: Peterson and Barney's vowel plot of F1 by F2 as produced by 76 speakers (1952:182).
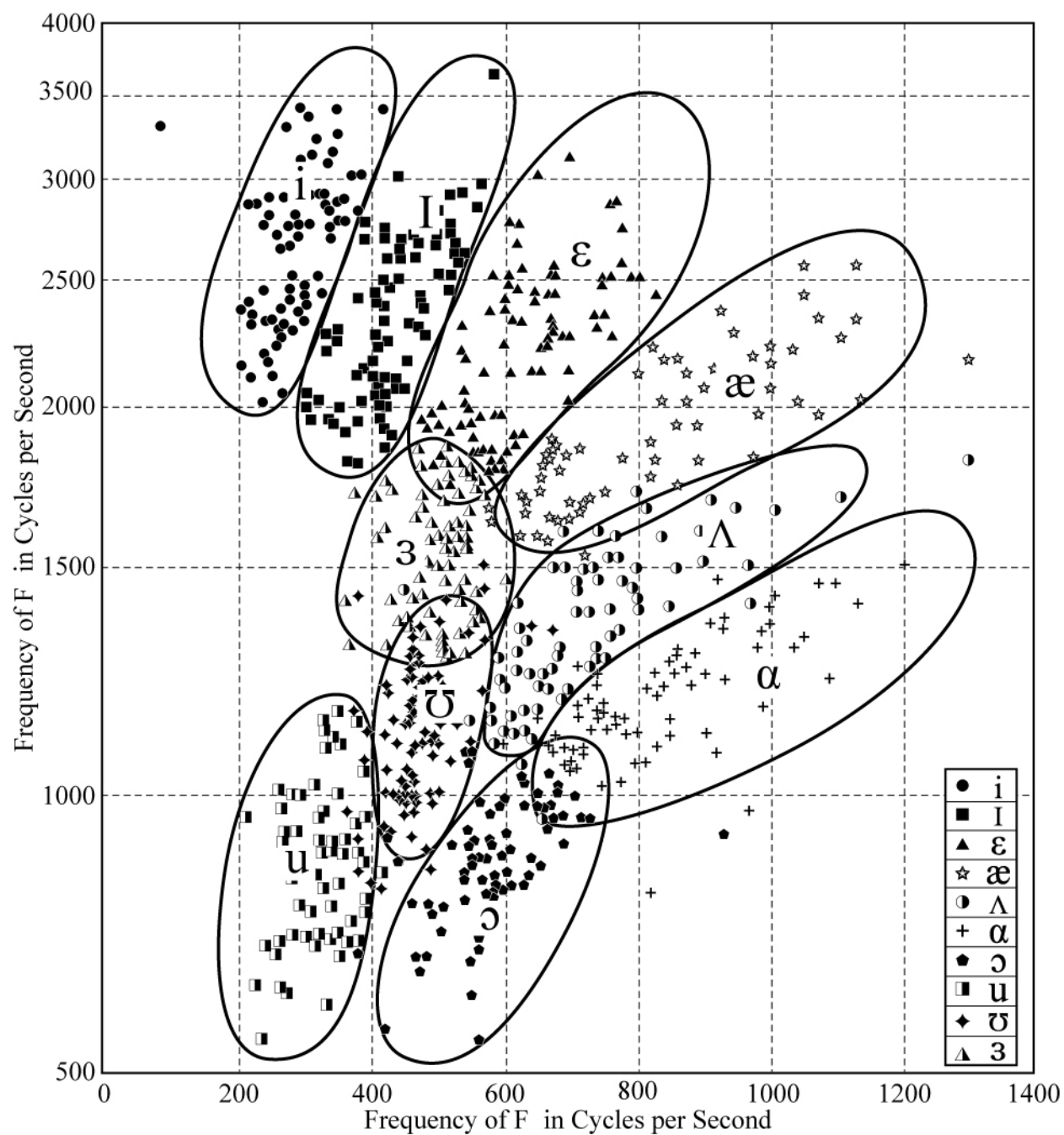
The average F1 and F2 values reported by Peterson and Barney are often used to

approximate the intended target value for speakers' productions or prototypes for listener's

perceptions (see for example Kuhl's NLM or Flege's SLM), but this practice is somewhat

problematic since the averages were computed from speakers from a variety of language backgrounds. The reliance on an average from such a heterogeneous group assumes that all speakers and listeners are aiming for or relying on an identical target (cf Hagiwara 1997), and this assumptions flies in the face of decades of sociolinguistic research on variation in the American-English vowels system (cf Labov, Ash, & Boberg [2006], who show that several American dialects are in the process of diverging from one another).

The results from the listening experiment in Peterson and Barney (1952) indicate that vowels in this experiment were perceived as intended 87 to 99.9 percent of the time, and that "when observers disagreed with speakers on the classification of a vowel, the two classifications were nearly always in adjacent positions of the vowel loop" in Figure 1 (1952:178), but even these numbers suggest that other cues may be in play. For example, despite these high levels of agreement, the results in Figure 1 show that there is often considerable overlap in the individual tokens of a given phoneme. In fact, as Figure 2 shows, even those tokens that were correctly identified unanimously in their experiment show overlap in the F1 and F2 dimension. Thus, the ability of listeners to eliminate invariance in productions must rely on additional cues.

Figure 7.2: Peterson and Barney's vowel plot of F1 by F2. Vowels included were produced by men and children and were unanimously classified by all listeners (1952:183).
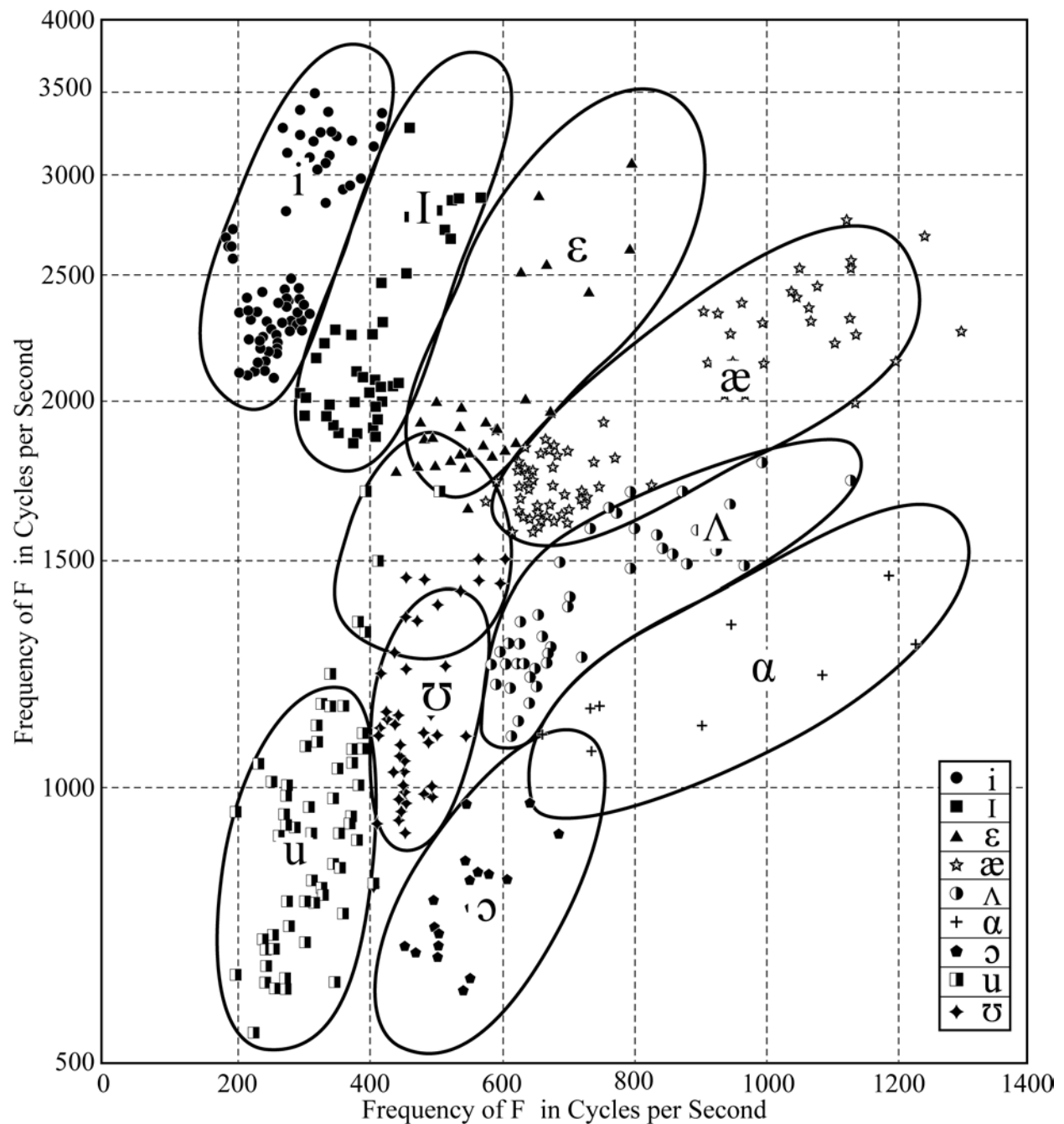
Researchers can account for some of the apparent variance in frequency (Hz) by

considering the logarithmic nature of speech perception. For example, it has become clear

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that the difference between 2,000 Hz and 2,100 Hz is about five times greater than the difference between 10,000 Hz and 10,100 Hz. (See Traunmüller [1990] for a meta-analysis of the Bark Scale, which helps to quantify these differences). By converting from Hz into scales that more closely model the auditory differences that humans are capable of perceiving, researchers have been able to eliminate a considerable amount of variance in the F1xF2 dimensions, but this research has also shown that the interpretation of each of these formants may be affected differently in different vowels. Psychoacoustic research has shown, for example, that listeners may perceive frequencies in terms of critical bands (less than 3.5 Barks), so that "the effective formant frequency is a weighted average in frequency and amplitude of the spectral peaks within [that] range" (Strange in Pickett 155). This means that frequencies within this range become perceptually integrated with one another, explaining why auditory perception of F2 is different for back vowels than it is for front vowels, as first found by Delattre, Liberman, Cooper, and Gerstman (1952). In back vowels, where F1 and F2 are very close, F2 becomes integrated with F1. In front vowels, where it is much higher, F2 becomes integrated with F3. Especially in light of this evidence of high integration, speech-perception models must begin to incorporate information from parts of the signal other than F1 and F2.

Other intrinsic-normalization models have had some success by doing exactly this: adding the contributions of other parts of the acoustic signal to the F1xF2 dimension, which is typically treated as the primary cue for English vowels. This success has been particularly fruitful when the data is first converted to a psychological scale (e.g. Bark or Mel). For example, Syrdal and Gopal (1986) first convert to the Bark scale, then modify the F1 dimension

with calculations that incorporate f0 and the F2 dimension with calculations that incorporate F3.

Cues such as duration receive less attention from perception studies, though, as Morrison (2006) points out, duration is often taught as a cue to non-native speakers. Duration can be difficult to study, since conversational speeds affect long and short segments differently (Port 1976 in Jusczyk & Luce 2002). Longer segments show greater reduction than shorter segments in fast speech, making control efforts for such studies quite difficult. In all likelihood, however, the relative lack of attention to durational cues is more likely a consequence of early findings that speakers could identify English vowels using only F1 and F2. This is somewhat troubling since this research bias may have kept us from investigating cues that are important to language variation and change (e.g. those that are not used for the identification of the speech segment, but may be used for speaker-indexical factors), but it may also have prevented us from discovering important differences in primary cues across dialects of the same language. For example, though it is considered a secondary cue by most speech-perception researchers, Escudero and Boersma (2001) demonstrate that durational differences are weighted more heavily than the F1 dimension among Scottish-English listeners, providing further evidence that this cue should not be assumed to be unnecessary for English perception—particularly in studies of language variation and change.

Further attention needs to be given to other so-called secondary acoustic cues (including those not found in the steady state portions of a vowel segment) though some important progress has already been made in this area. For example, much research has examined dynamic information in the spectrum showing that the steady-state F1xF2 may not be as critical as one might think (e.g. Ito, Tsuchida, & Yano 2001; Jenkins & Strange 1999; Lea &

Summerfield 1994; Massaro & Cohen 1983; Wassink 2006). In fact, Rakerd (1984) has shown that vowels are perceived more linguistically when they are in a consonantal context (where transitions are present) than they are in isolation, and numerous other studies have demonstrated that listeners can correctly identify vowels even when the syllable center is either silent or masked by noise (Rakerd & Verbruge 1987; Verbrugge & Rakerd 1986; de Cheveigné & Kawahara 1999; Winters & Johnson 1998; Benki 2003; Benki & Felty 2005).

Given such overwhelming evidence of vowel transitional effects, explorations of the effects of surrounding consonants on the perception of vowels should also be incorporated into more studies of language variation and change (e.g. Plichta 2004). For example, Benki (2005) has shown that voice onset time (VOT), a cue that is important in the perception of consonant voicing contrasts in both English and other languages (Liberman, Delattre, & Cooper 1958; Lisker & Abramson 1970 in Benki 2005:1), is implemented differently in Spanish than in English. That is, both languages prevoice the consonants /bdg/, but they differ in their production of /ptk/. In Spanish, these voiceless stops "are produced with a near simultaneous release and onset of laryngeal vibration, resulting in VOT values that are approximately zero or a few milliseconds." In contrast, English speakers (who must also aspirate /ptk/) produce longer VOT values for these same consonants. Benki (2005) shows that both English and Spanish/English bilingual speakers are sensitive to VOT differences, but that language background affects where this threshold can be found. Since phonotactic information (to be discussed below) has also been shown to affect perception, future research might consider how differences in the interpretation of the consonant might affect differences in the interpretation of the following vowel.

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Nonacoustic evidence has also been shown to affect listener's perception, though one may argue that phonotactic probability is likely still an important factor in these conditions. Numerous studies have demonstrated perceptual biases for words over nonwords and syntactic and semantic appropriateness, and these effects are often complicated when Signal-to-Noise (S/N) ratios are also considered (e.g. Benki 2003, Benki & Felty 2005).

The incorporation of such a potentially large number of vowel-extrinsic, contextual effects may seem difficult to quantify, particularly in the research contexts of many sociolinguistic studies where controlling for possible social factors already necessitates a considerable effort. Yet, Boothroyd and Nittrouer (1988) demonstrate that mathematical functions such as the k-factor and the j-factor can be used to quantify contextual effects. These calculations have important repercussions since they may help to unify more general speech perception research with that which is more interested in variation and change.

As Boothryod and Nittrouer (1988) explain, the k-factor is based on the assumption that "the effect of context is quantitatively equivalent to adding statistically independent channels of sensory data to those already available from the speech units themselves " (102). The k-factor is derived from a ratio of "the logarithms of the two error probabilities" (112) or the probability in context over the probability without context. Thus, the value of k should be one when context has no effect. Increases in contextual effects result in corresponding increases in k. In other words, based on the probability that a given speech unit will be recognized with or without the context, the k-factor represents "a dimensionless quantity that represent the magnitude of the context effect and that is independent of the degree and type of degradation in the speech signal" (102). That is, the k-factor quantifies effect of context independent of the type of context being considered.

The j-factor, on the other hand, determines a unit's independence of context given specific assumptions about the number of possible contextual effects. As Benki (2002) summarizes, it "quantifies the relationship between the recognition of a whole and the recognition of its parts" (63). The j-factor is calculated by dividing the logarithmic probability of the recognition of the whole (e.g. the syllable) by the logarithmic probability of the part (e.g. the phoneme), so that, if the three parts of a CVC syllable are being perceived independently, the j-factor for each phoneme should be 3. If, however, parts are not being perceived independently, the j-factor will decrease (e.g. j = 2.4). So, unlike the k-factor, the value of the j-factor is inversely related to the effect of context (higher context effects = lower j-factor).

Using these calculations, Boothroyd and Nittrouer (1988) conclude that "by combining the equations for k and j, one can predict relationships among many measures of speech perception" (112). Contextual effects of meaning on a CVC syllable, for example, increase the k-factor in their data from 1 to 1.3, while the contextual effects of meaningful four-word sentences was found to have a k-factor of 2.7. Meanwhile, they showed that contextual effects of meaning on the CVC syllable decrease the j-factor from 3 to 2.4, but that syntactic effects were less important unless the signal was also presented in unfavorable S/N conditions (112). Thus, their research (and those who have followed, eg. Benki 2003) has shown that phonotactic probabilities based on language-internal factors have very real effects on perception.

In addition to providing evidence for phonotactic effects, the j-factor also provides evidence about the use of phonemes in speech perception. If the j-factor accurately represents the number of units the speaker is perceiving relative to the number of possible phonemes in a given production, then this research suggests that the phoneme is not the smallest unit of

perception, leading some (e.g. 2001) to hypothesize that articulatory features may be the units used in perception.

The current analysis will propose a similar but distinct hypothesis based on the fact that even different features manifest themselves differently with different phonemes. Although speech recognition is highly automatized, very quick, and very accurate, we cannot ignore that it is a psychophysical phenomenon. Psychological experiments are full of examples that prove that human perception cannot always be trusted, and speech perception experiments show that we should be particularly suspicious of the accuracy of acoustic perception since the signal is not likely to be in working memory for longer than 250 ms (Cheour, Ceponiene, Leppanen, Alho, Kujala, Renlund, Fellman, & Naatanen 2002). This is a cause of much consternation for many speech perception researchers, but examples like the Ganong Effect (Ganong 1980) are well documented, and it should be no surprise:

> It is well-known in social and cognitive psychology that behavioral responses to stimuli require reference and comparison to a standard, either internal or external. If a benchmark is not provided by the experimenter, then the participant must rely on his or her own internal standard which may shift over the course of the experiment. (Helson 1948 in Clopper & Pisoni 2005:321)

Maximal differences in the articulators (so-called binary features) are likely preferred because maximal difference in the acoustic patterns is desired, but since (1) the effects of these differences are not necessarily binary in the acoustic signal, (2) the effects of these differences are likely manifested in multiple ways within the same phoneme and in different ways across phonemes, and (3) phonemic patterns are reinforced by other kinds of social and linguistic clues, maximal differences are not necessary for accurate perception. Such a system allows listeners to tolerate a range of manifestations in one part of the signal as long as sufficient evidence is available elsewhere. An understanding of this process of converging evidence is

critical not only to those who are interested specifically in speech perception, but also to those who are interested in how speech perception might influence language change. Further explanation of how this research might work, based on evidence from Boersma (1997, 1998) will follow in Section 3, but first a review of the importance of social information in speech perception is needed.

7.2: Speaker indexical categories are linguistically encoded

Strong evidence suggests that social information must be part of the listener's grammar, an argument that is implicitly illustrated by Labov's (1966) early reaction to the label of "sociolinguistics," in which he explains that his resistance to the label stems from the belief that it is not possible to explain language patterns (grammars) without including social factors. Resistance to the inclusion of social factors is somewhat puzzling, but it seems to be grounded in a few assumptions that must be addressed. Among them is the belief that the study of social systems is somehow less scientific because the human behavior is so irregular. Also implicit in this assumption is the idea that the variation of sociolinguistics is somehow too variable to be part of the grammar and that the social categories themselves are too susceptible to change. This section will address these assumptions, arguing that the concerns that some linguistic researchers might have about variability and change in social categories are much the same as other challenges more traditionally classified as language intrinsic.

One might argue that the social categories created by listeners are too localized (individualized) to be considered part of the grammar, but previous research of social categories offers evidence to the contrary. For instance, the social categories may be locally constructed with different behavioral patterns and given different local labels, but underlying sociological differences might be predicted in much larger (more global) contexts. Eckert's

(1989) discussion of *jocks* and *burnouts* in a Detroit high school provides an interesting example of this, as she notes that the labels themselves (*jocks* and *burnouts*) may be different in other high schools, but the groups are much the same. If we were to compare this example to more traditional discussions of the grammar, we might say that the surface structures of the labels and their affiliated behaviors might show differences, but that the same organizational system of the social categories (those who conform vs. those who rebel against authority) underlies this categorization, as does the organization of social categories in many other instances. In other words, suggesting that the same social principles are guiding the construction of these two groups is not unlike the argument that even though the acoustic patterns employed by Mexican Americans may be different from those used by European Americans, they still share much of the same underlying phoneme system. To the extent that social organization shapes the production and perception of phonemes, then, it must be considered part of the grammar.[10] In other words, phonetic clues to phonemes are locally acquired in much the same way that phonetic clues to social categories are locally learned.

One might also argue that the representation of social factors is too variable to be part of the grammar of the speaker/hearer, but this argument is inconsistent with both (1) any phonemic description that includes allophonic variants and (2) most phonetic research of phonological patterns that have been shown to have very few invariant acoustic cues from one context to the next.

In large part, arguments against incorporating variability into the grammar seem to be grounded in the idea that speakers use knowledge of their own (binary) articulatory strategies

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[10] Note the easy comparison between this and the McGurk effect, where nonacoustic information also informs perception.

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to constrain their perception, but normal L1 acquisition (of spoken languages) cannot occur without initial exposure to the acoustic productions of that language. Ample evidence suggests that children's perceptual capabilities develop long before they begin speaking (e.g. Kuhl 1992). It would be far more accurate to suggest that children learn to use their perceptual categories to constrain their articulatory strategies. That is, in the initial stages of language acquisition, children must learn to control their articulatory strategies so that they conform to the range of acceptable acoustic signals in their linguistic environment.[11] This claim is supported by the evidence that production shows predictably distinct patterns between casual vs. careful speech, the so-called stylistic dimension of much sociolinguistic research. That is, production is informed, but not solely constrained by the speaker's own needs as a listener.[12]

A person's production results may consequently influence their own perception, but perception must be more flexible than production if listeners are going to accommodate to new people, growing children, and new dialects. The acoustic signals that a listener is exposed to are inherently variable, as they depend upon the size, shape, and other physical qualities of the vocal tract as well as the listening environment. Listeners are capable of adapting their perceptual strategies to all these differences, despite the fact that they are not aware of the detailed anatomical differences in the vocal tracts that are conditioning these acoustic

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[11] Likewise, parental perception of child-speak need not entail perfect imitation.

[12] Note: The "army brat" vs. "homebody" (NORMS) distinctions in Clopper shows that army brats are better perceivers of other dialects.

patterns. Similarly, they are also capable of understanding socially and physiologically

conditioned language variation that they are incapable of imitating.[13]

Finally, it could also be argued that social categories are too susceptible to change to be

considered part of the grammar, but this is also inconsistent with research traditions more

traditionally considered to be language intrinsic. For example, the Northern Cities Shift has

drastically changed the production of speakers in the Inland North, even as Preston (2005)

shows that their perception has not necessarily kept up. Although the variability in the

phonetic production of the phonemes in this study is traditionally considered an acceptable

arc of study for linguists, similar changes in the perception of speaker-indexical information

are often considered more problematic. Yet, perceptual changes are well documented in

psychology and other research traditions, which provide ample evidence for priming effects—

instances where the perception of a specific stimulus is affected by its presentation in

conjunction with other factors. The fact that social categories show similar susceptibilities

presents a challenge to researchers, but it is no different from other challenges that linguists

interested in perception have dealt with in the past (e.g. challenges presented by phonetic

priming like the those demonstrated by Ganong [1980]). If speech perception is going to be

successfully modeled, it must account for all variables, not just the ones that are easily

controlled.

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[13] One might counter this argument with evidence (including that found in the present study)
showing that those whose production correlates most closely with a particular linguistic
variable are best at perceiving it, but these studies do not demonstrate which phenomena
occurred first. To my knowledge, no real-time research has been done which could clarify this
issue (e.g. testing perception and production in an area where change is incipient, then
following up to see whether those who were decent perceivers in the initial study have
become more advanced in the production than those who weren't or vice versa.)

Interactions between linguistic and social factors are easily documented. In early sociolinguistic research in New York City, for example, Labov (1966) showed that the vocalization of even one /r/ strongly influences social evaluations of the speaker. Likewise, in research with salient social implications, Baugh and his colleagues have worked with the Fair Housing Project to examine whether landlords screen callers based on ethnic dialect patterns. These studies show that landlords are likely to tell potential renters that the property is no longer available if the first vowel in the production of the renter's *hello* correlates strongly with political minority speech patterns (Baugh 2000). Similarly, Campbell-Kibler (2006) shows strong social evaluations for *-ing* that echo earlier Labovian research on the same variable. Each of these examples offers strong evidence that powerful social meanings are attached to very minute acoustic details in the acoustic pattern. If this stands true, the listener has had sufficient exposure to the linguistic patterns that indicate that the acoustic waveform in the relevant signal fits a pattern that is typical of a particular group. Meanwhile, Niedzielski (1999) and Rubin (1992) demonstrate that speakers can learn to ignore certain acoustic signals when their knowledge of the speaker's social category conflicts with the acoustic patterns that they typically associate with that group.

Such evidence suggests that social constraints on language are no less linguistically natural than the types of category constraints that are traditionally invoked in phonological traditions. Crosslinguistic similarities in phonological inventories, for example can be explained by the fact that spoken language is a largely an acoustic phenomenon that is articulatorly and perceptual constrained. To the extent that humans share similar vocal tracts and similar auditory-perceptual structures in the ear and in the brain, it is no surprise that we find remarkable similarities in the preferences they exhibit for the perceptual

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organization of possible acoustic productions. Similarly, to the extent that we share social and emotional reactions (which some might argue are just as biologically constrained), it should be no surprise that these also inform environmentally conditioned constraints on the production and perception of acoustic phenomena that would be encoded in the grammar of the individual. It is an innate part of the human capacity to try to impose order on our experiences in the world, and these social classifications can no longer be ignored if progress is going to be made in understanding what linguistic features are or are not perceptually salient to listeners.

7.3: Synthesis

This section will attempt to integrate information from the previous two sections (which have discussed some of the available cues for speech perception) into a discussion of attempts to model the perceptual effects reported by researchers like Kuhl, Flege, Boersma, and Escudero. As discussed in Chapter 4, Kuhl's NLM and Flege's SLM both examine the acquisition of speech perception in terms of a token's proximity to some sort of prototypical representation in the F1xF2 spectrum, but Kuhl's research focuses on L1, while Flege's interests are in L2. This section deals first with some of the problems presented by such models, including assumptions that have already been shown to be problematic in the last two sections (e.g. the assumption that the F1xF2 dimension is a primary cue for all speakers) and the use of the magnet as a metaphor. This analysis goes on to conduct a meta-analysis of the magnet theory, including a review of critics who suggest that the idea of a prototype needs to be scrapped (e.g. Lively & Pisoni 1997) and the suggestion of a different physical phenomenon (gravity) that might help to push the models of prototype effects forward. Finally, it considers some of the most recent contributions to these theoretical models, namely the stochastic learning algorithms proposed by Boersma and Escudero. Drawing on mathematical models of

other phenomena that are not easily studied in tightly controlled experiments, stochastic models allow chance to be systematically introduced into scientific predictions, an effect Boersma describes as fundamental in understanding the relationship between production and perception—not only because it is so difficult to control for all of the possible factors that might influence linguistic data but also because listeners themselves do not operate in ideal listening conditions.

Boersma's Stochastic Learning Algorithm suggests that Gaussian distributions, not single-point prototypes, serve as targets for production and perception, thus bridging the L1 and L2 perceptual models and accounting for possible accretion in a listener's perceptual strategies that may contribute to language variation and change. Recall that Kuhl's subjects conformed to predictions that the F1xF2 prototype warped the perceptual space of her listeners so that those tokens with a smaller absolute distance from this prototypical point were given higher "goodness" ratings than those with larger distances from this point. Thus, "goodness" ratings were predicted based on concentric circles whose center point was the target value, and those closest to the prototype were more difficult to differentiate from one another than those farthest from the prototype.

Figures 7.3 and 7.4 show the vowel measurements of the two conditions used in Kuhl's (1991) research and replicated in later work by Lively and Pisoni (1997) and Sussman and Lauckner-Morano (1994). Although the distance from the center point in each condition was determined by Mels intervals (30, 60, 90, and 120 Mels from the center), these measurements are given in Hz. Figure 7.5 shows Kuhl's results for category goodness ratings.

Figure 7.3: Sussman and Lauckner-Morano's diagram of the stimuli used in their own research, a replication of Kuhl's (1991) experiment. This figure represents the prototype condition used, which was based on Peterson and Barney's average measurements of /i/. (1994 Figure 1 page 542)
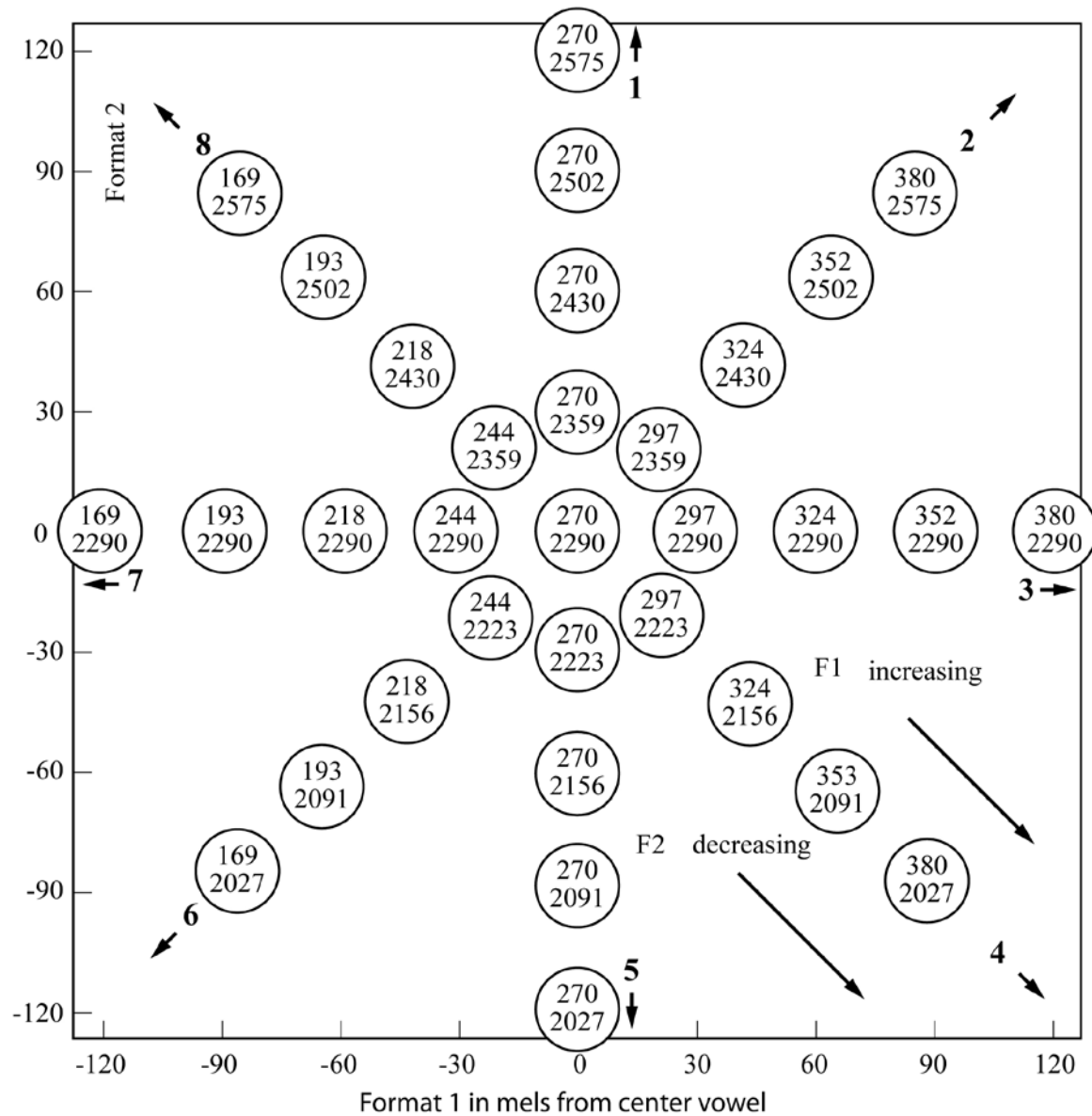
Figure 7.4: Sussman and Lauckner-Morano's diagram of the stumuli used in their own
research, a replication of Kuhl's (1991) experiment. This figure represents the nonprototype
condition used (1994 Figure 2 page 542)
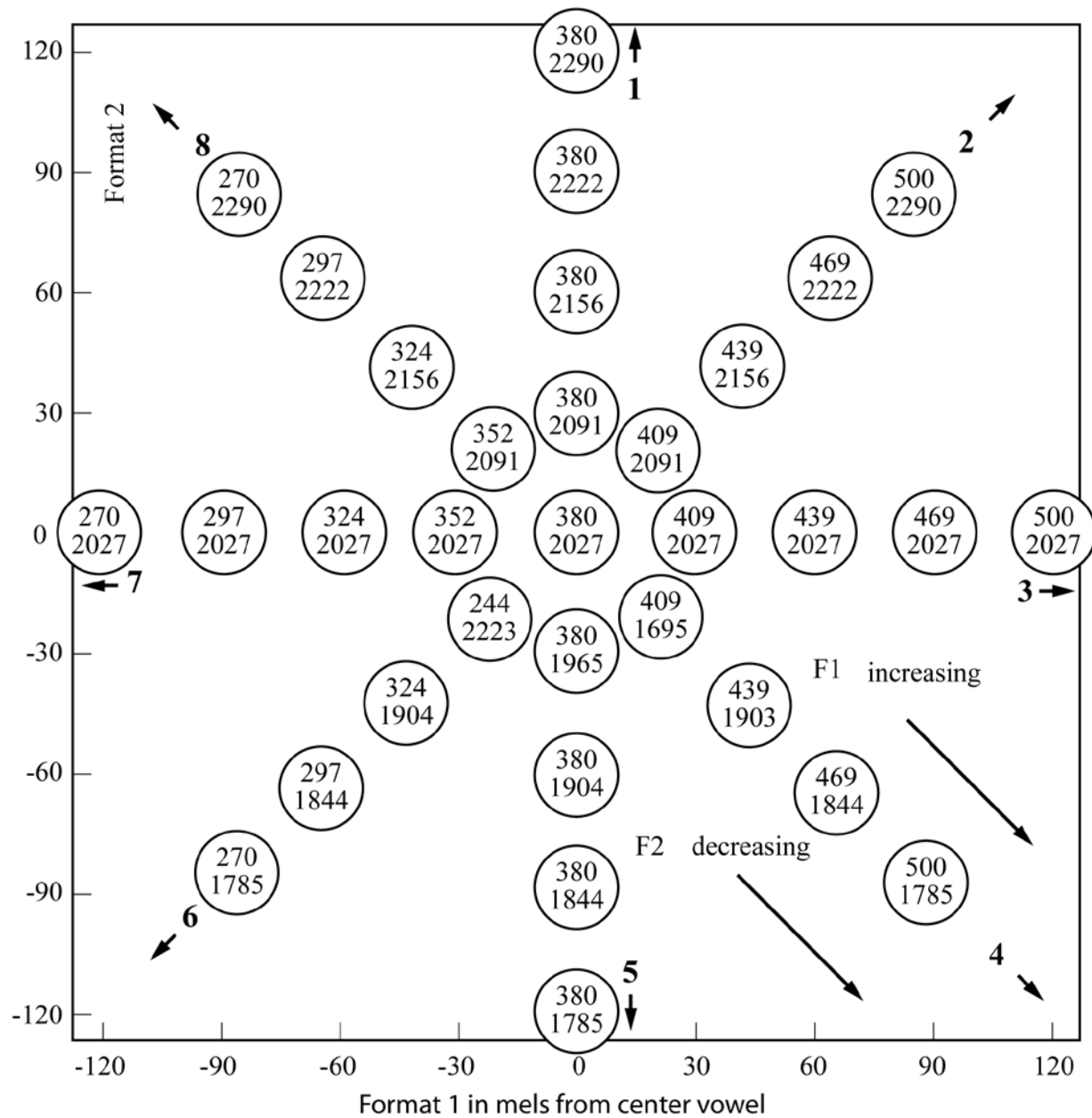
Figure 7.5: Kuhl and Iverson's (1995) results:
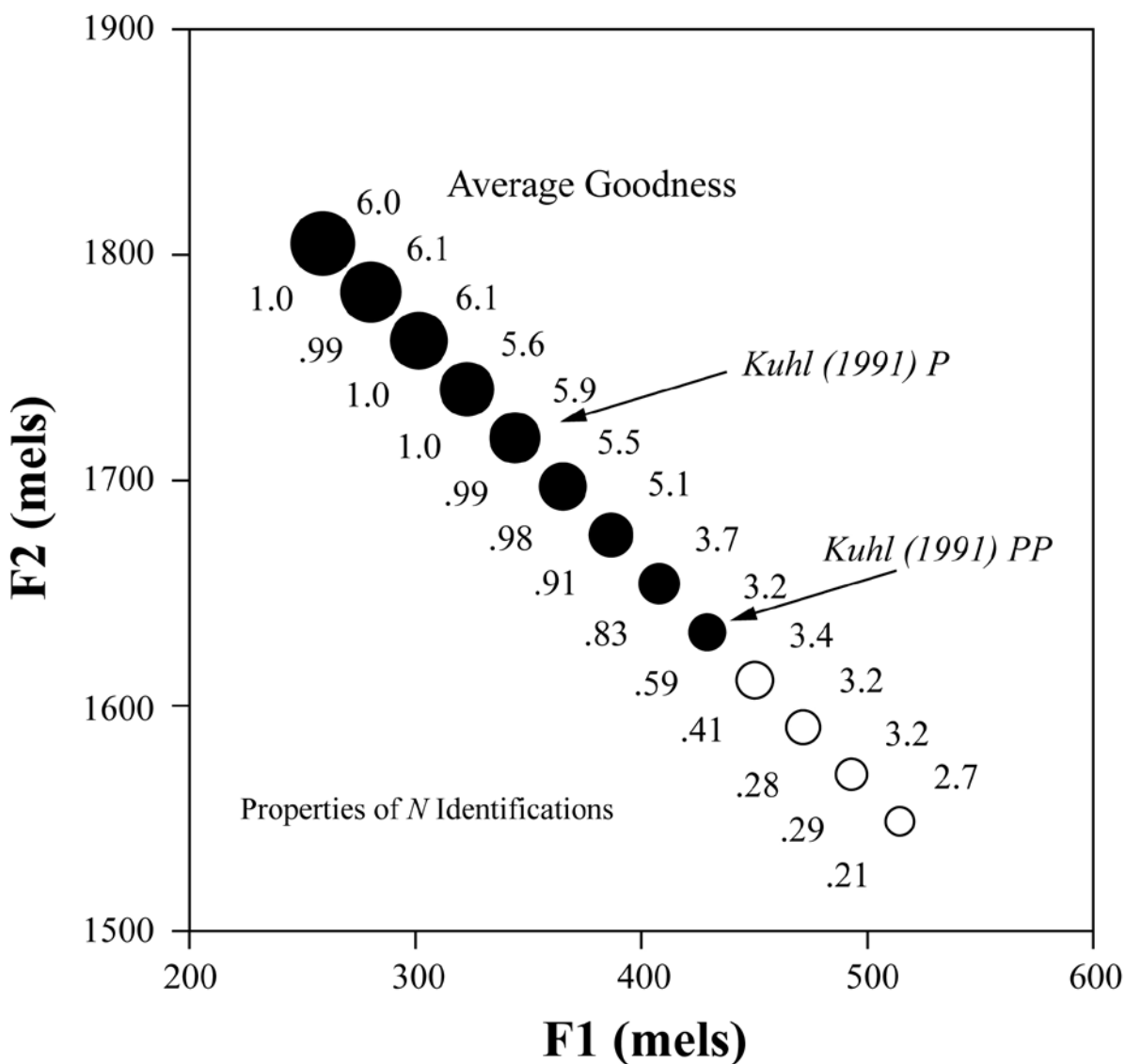
One problem with Kuhl's model is that it is based on research methodologies that may have induced biases into her results. As Lively and Pisoni (1997) first pointed out, Kuhl's subjects were given feedback on how well their classification of tokens matched the hypothesized results. Thus, listeners were not relying solely on their own evaluations of the token, but also on the hypothesized models' appraisal of these assessments. The potential for

bias is not sufficient evidence to discard her data, but it does raise suspicions. Eliminating this potential for bias (by eliminating such feedback), Lively and Pisoni (1997) report on very similar experiments that were designed to more accurately test the NLM. In these experiments, they show two results that they interpret as evidence against the prototype system—at least as initially conceived. First, they demonstrate that inclusion in a different stimulus group provokes different responses for two tokens with the same F1xF2 value. Second, they show that absolute distance from the "prototypical" point on the F1xF2 plane is not the only predictor of category goodness ratings. Whereas Kuhl's subjects demonstrate goodness ratings that fell in concentric circles from the center point, Lively and Pisoni's results were more complicated. There were some limited effects of absolute distance (like Kuhl's concentric circles). Given two points on the same radius, the point farthest from the prototypical center point was usually rated worse than the one closest to the prototype.

However two points on the same concentric circle were not rated the same in Lively and Pisoni's research as they were in Kuhl's. Instead, they also showed effects of the relative proximity of a neighboring phoneme, particularly when the experiment was changed from the relatively artificial task of identifying something as a "good" or "bad" instance of /i/ to either a same/different classification or a phonetic labeling task. For example, consider a line that runs through the prototypical F1/F2 dimensions of /i/ and the prototypical F1/F2 dimensions of /I/. In their results, the absolute distance of a given token on this line from the prototype /i/ had a strong inverse effect on whether it was perceived as a good token of /i/, but so did its absolute distance from prototype /I/. That is, category-goodness ratings cannot be sufficiently defined by whether a given token is merely similar to the prototype of a given category; a token's dissimilarity to other neighboring phonemes also affects its goodness ratings. They

interpret this as evidence against the magnet metaphor since the prototypical position of a

single phoneme is not solely responsible for the goodness ratings of its tokens.

Figure 7.6: Goodness Ratings for /i/ in Lively and Pisoni (1997:1674)

PB Prototype Condition

PB Nonprototype Condition
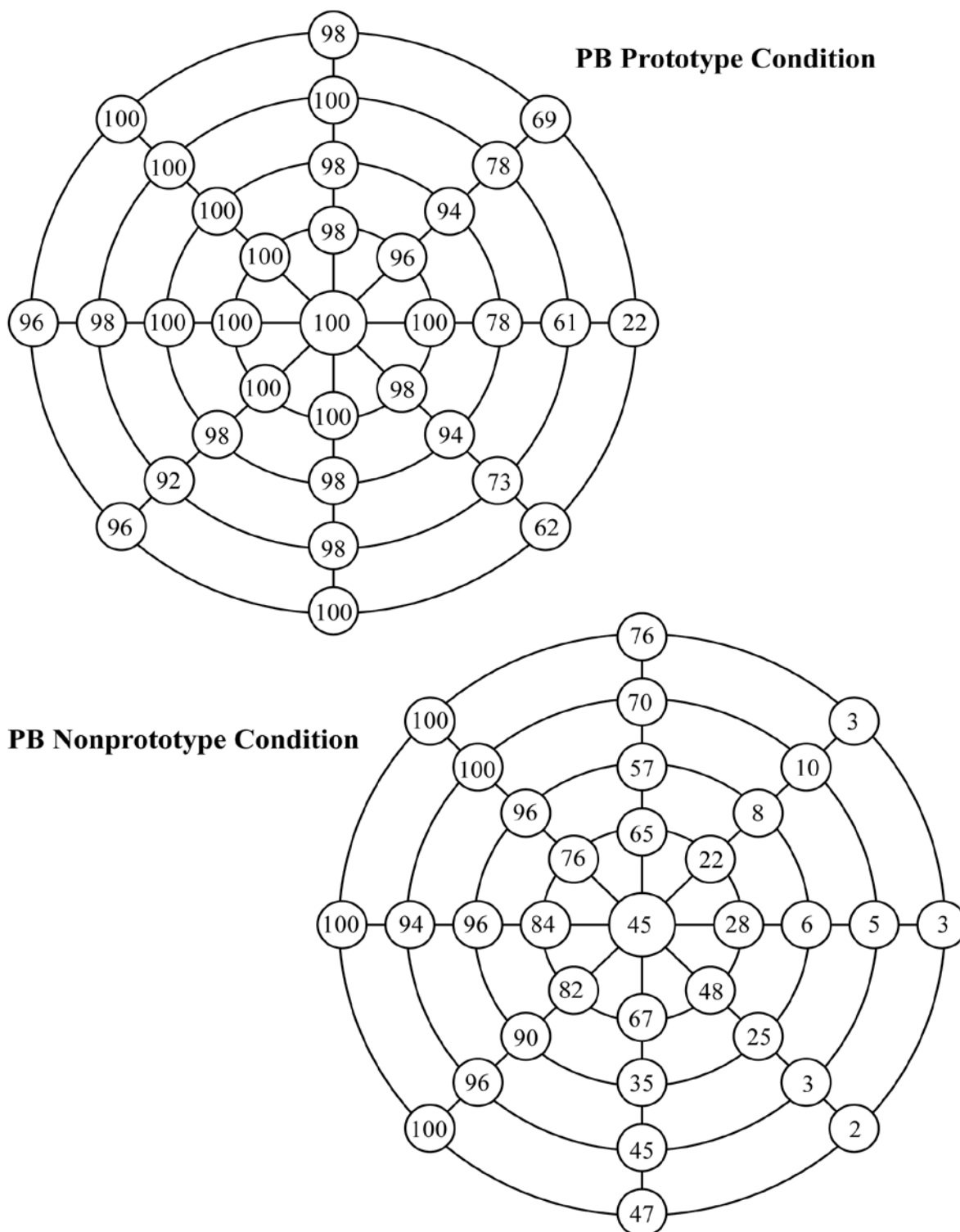
Lively and Pisoni concede based on these results that "the perceptual magnet effect may reflect differences in category membership rather than differences in discriminability among items of the same phonetic category" (1997:1667), but they resist the metaphor because of the results they collected from the "goodness" rating task, which mimic's Kuhl's (1991) experiment minus the feedback she provided to her subjects. Like Kuhl, they find a general effect of the absolute distance of a given token from the Peterson and Barney prototype; but in Lively and Pisoni's data, this effect is not as robust.   They consider this to be strong evidence against Kuhl's model, but, taken in concert with their findings in other tasks (such as those already seen in Figure 7.6), this may not be particularly problematic since these results, shown in Figure 7.7, also show the same kind of effect that might be predicted based on distance from other phonemes.

Figure 7.7: Goodness Ratings found by Lively and Pisoni (1997:1668)

PB Prototype Condition

PB Nonprototype Condition
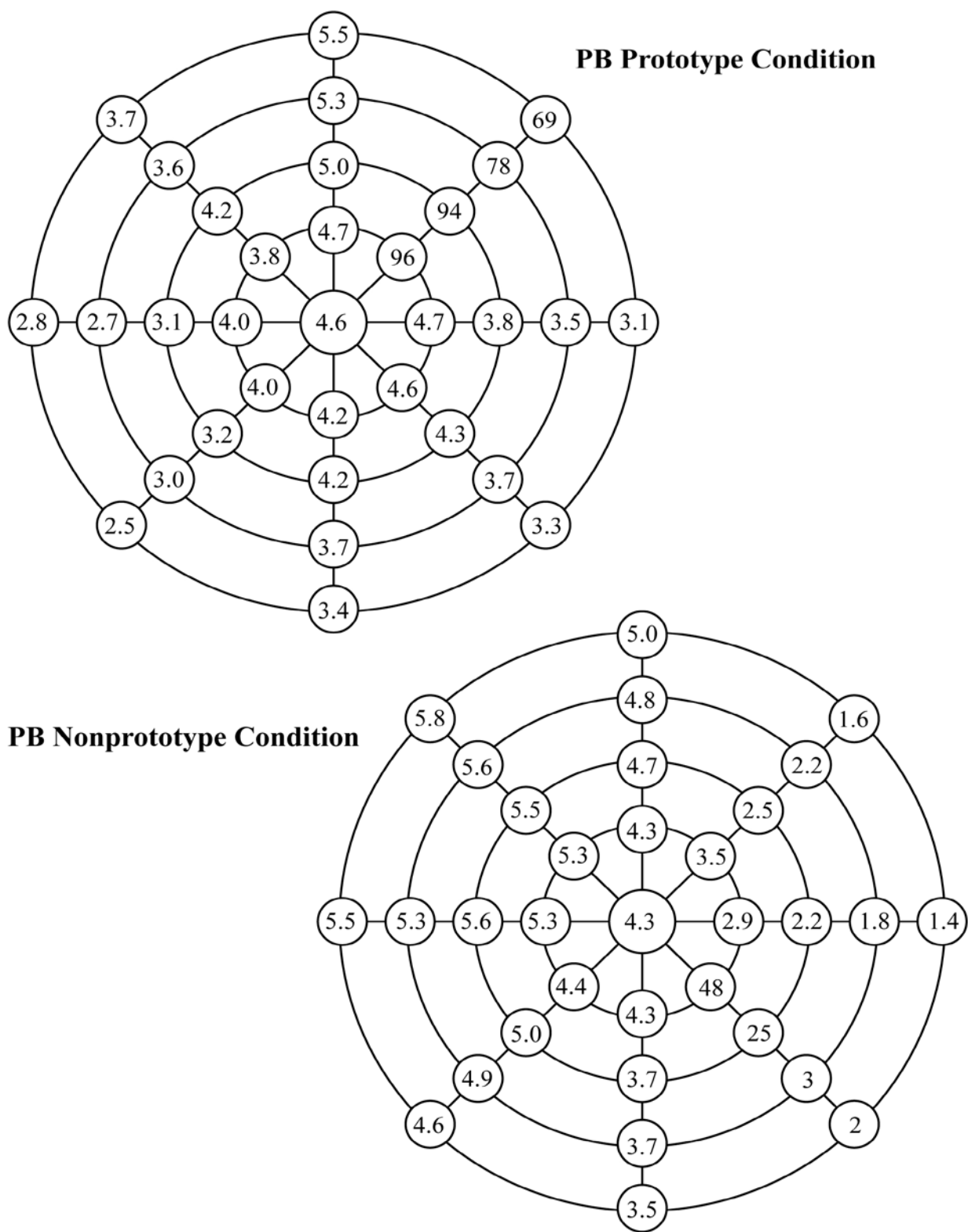
Although they continued to resist Kuhl's magnet metaphor, the data from Lively and Pisoni supports this comparison since /i/ would not be the only magnet in the perceptual space of these listeners. That is, the "prototype" of /i/ could act as a magnet that attracted tokens of similar properties in the acoustic space, but competition with categories like /ɪ/ might be acting upon these tokens simultaneously. Taken in concert, this might explain the patterns found in Lively and Pisoni's data.

If we were to hypothesize that the "prototype magnet" had a stronger magnetic field than the "token-magnets" that a listener is exposed to, this metaphor would still capture some of the problems of the prototype model, since magnets respond to other magnetic fields in addition to producing one of their own. In other words, at any given time, the prototype magnet could be subject to priming effects from the "magnetic field" of the tokens a listener is being exposed to, but that wouldn't necessarily be evidence that the prototype magnet had moved—just that its magnetic field had been temporarily altered. In this way, it would take an exceptionally large number of weaker magnets (token magnets) to be able to dislodge the prototype, but it wouldn't be impossible. Thus systemic accretion could modify a listener's perceptual space, but only with substantial exposure to "token magnets" that are pulling the "prototype magnet" in one direction; and, even then, there would be interactions with neighboring prototypes.

However, this is not to suggest that we shouldn't reconsider the magnet metaphor, since such descriptions do not exactly mimic electromagnetic behavior. In fact, one might argue that the underlying magnet metaphor is fundamentally flawed, since electromagnetism is based on the attraction of opposite magnetic poles, and, to date, all verifiably observed

instances of magnets have been dipoles—those with both a North pole and a South pole.[14]

Any use of accurate theories of electromagnetism as a metaphor for the effect of prototypes in the acoustic space, then, would require both the prototype and the individual tokens to be dipoles, thus requiring opposing forces to be at play in each; that would complicate the general interpretation of the metaphor considerably. Put simply, the forces created by dipoles do not match either the hypothesized warping of the perceptual space or the data provided by Kuhl's critics. Although all metaphors leak, this pattern directly contradicts the phenomena that Kuhl is trying to explain.

A better analogy might stem from a different physical phenomenon—gravity.[15] Here, we could assume that exposure to language-specific phoneme patterns allows vocalic prototypes to build up based on a number of language-specific (but biologically constrained) cues. We could metaphorically treat this build-up as an equivalent to the "mass" used to predict an object's gravitational force on surrounding objects. These prototypes could accumulate greater mass over time, making them less likely to be moved and more likely to attract others towards them, accounting for the "perceptual warping" effects that are now well documented.

A gravitational metaphor might also account for two observed phonomena that seem to contradict one another: priming effects (such as those shown by Lively and Pisoni) and the relative stability of the vowel system. That is, the priming effects of recent exposure to tokens

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[14] Monopoles are hypothesized by some physicists to exist, but have not been observed in nature and are also unlikely to match the perceptual warping of the acoustic space.

[15] Gravity has served as a metaphor for other linguistic patterns. Trudgill (1974) uses it to model the spread of innovative forms geographically, but my usage is distinct from this practice.

of particular vowels could be compared to a smaller mass's effect on the gravitational field of the percept with greater mass—the prototype. Speech is very rapid, and individual phonemes are unlikely to be preserved in the short-term memory for very long, but their residual effects may be hypothesized to remain for a short time afterwards (e.g. retinal imprints). This short-term memory effect could be described as a temporary interpretation of mass. That is, much as two objects with mass exert force upon one another, the "mass" of the prototype and the "mass" of recent tokens would pull against one another, altering the perceptual space temporarily if not systemically. Thus, tokens that occurred between /i/ and /I/ would be affected by the gravitational force of both prototypes, explaining why they would be less likely to be "sucked in" to /i/'s perceptual space than tokens on the opposite side of /i/ from /I/ on the F1xF2 plane.

After the listener's attention shifted away from the recent tokens, they could then have their values "added" to (averaged into the values of) the prototype average through long-term memory processes. Thus, the stability in the vowel system would also be explained by linguistic effects similar to gravitational effects—the object with greater mass shows greater resistance to the forces applied, but both objects are affected by the gravitational force.

Only with sufficient exposure to cues with perceptual salience, then, would the prototype be moved, and one could easily imagine that other cues (and perhaps even biological constraints of memory) could create resistance that would potentially slow this process. If speakers can ignore acoustic cues based on social evidence (as Niedzielski [1999] and Rubin [1992] have shown), then there is no reason why they couldn't ignore acoustic cues

based on language-internal cues—even other acoustic ones.[16] Particularly in less than ideal

listening environments, one's perception of specific cues may actually be triggered by a

different cue than is associated with that pattern.

Leaky metaphors aside, the more substantial problems with Kuhl's model include, but

are not limited to, three faulty assumptions that may lead to problems in explaining priming

effects (although long- and short-term memory processes should be considered):

> (1) the assumption that F1 and F2 are the primary cues for all listeners;
> (2) the assumption that F1 and F2 are weighted equally when they are the primary cues; and
> (3) the assumption that a single point in any given dimension (e.g. F1, F2, duration, etc.) serves as a prototype.

Evidence shows that listeners with the same language background may use different cues for

vowels in different parts of the spectral envelope. For example, Crowder and Repp (1984) show

that the perception of the /iy/-/i/ contrast can be predicted by single formants just as reliably

as from the whole vowel, but that these results cannot be replicated for the /æ/-/e/

continuum. In fact, even within the same region of the spectral envelope, there may be

different perceptual strategies. Kluender, Lotto, Holt, and Bleoeder (1998:3578) find that

English speakers identify /iy/ first by F2, then by the absolute distance from their

hypothesized prototype in the F1/F2 plane. For /I/, the strategy is different. English speakers

use the absolute distance first, then F2, and finally F1 in their identification, probably because

there are more neighboring competitors for the former than there are for the latter.

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[16] Though well beyond the scope of this dissertation, these predictions match those of
Hebbian theories of neuro-pathways, which are commonly summarized as "neurons that fire
together, wire together." That is, the associations between two perceptual phenomena may
become so strong that the neurons responsible for interpreting one phenomenon may be
triggered in a Pavlovian manner by the presentation of the other.

If these issues are problematic for Kuhl's theory, which aims to explain perceptual effects within one language system, they are magnified in the research used to develop Flege's SLM model, which, as discussed in Chapter 4, shares assumptions about prototypes that are similar to Kuhl's models but attempts to address L2 perception. Recall that the SLM suggests that the success of a speaker's L2 production follows directly from the success of his or her perception as he or she learns to categorize spectral differences based on prior exposure to stimuli. The model suggests that L1 and L2 sounds must be perceptually distinct in F1/F2 dimension in order for L2 learners to create a discrete category for the phoneme of the target language. At face value, these appear to be reasonable assumptions since perception must modulate a speaker's ability to control production, but the model still deserves careful critique.

First, (as already discussed in the evaluation of this model that was presented in Chapter 4), Flege's model does not account for so-called muscle memory effects. That is, someone could have excellent auditory skills but still lack the motor control to override the effects of years of L1 training on his or her articulatory system. Therefore production and perception must be measured carefully in isolation before any definitive claims can be made about their relationship.

Second, like Kuhl's models, Flege's SLM was also based on assumptions about the primacy of the F1/F2 spectral dimension. As was suggested in the evaluation of Kuhl's model, perceptual research cannot be limited to two factors (e.g. F1 and F2), to a single point in a given dimension, or to purely acoustic information. This problem is more robust in Flege's model, since the acquisition of L2 perceptual constraints requires language learners to battle

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more established constraints in addition to learning new ones, particularly in languages where other cues are weighted more heavily.

Third, the incomplete nature of the data in much of this literature makes these conclusions questionable. Many of the experiments that Flege uses to support this model rely solely on impressionistic categorizations of data rather than the subjects' actual acoustic production of F1 and F2. Without this evidence, it is impossible to say what cues in the acoustic signal are guiding the perception of his listeners in their evaluation of certain speakers as "more nativelike." Asking native speakers if another speaker "sounds native" could theoretically address whether the L2 speakers' productions have acoustic cues that satisfy the highest ranking perceptual constraints, but interactions (both with other acoustic cues and with perceived social information) could also be present. With little or no empirical evidence about the acoustics, it is not possible to say that their production was actually nativelike, only that it was perceived to be nativelike. Passing as native might be the ultimate goal for the subjects in his study, but this linguistic description is not sufficiently sophisticated for understanding language variation and change since it fails to isolate which variables are creating that effect.

To be fair, these impressionistic studies are grounded in acoustic evidence from earlier research, but current models suggest that even this data is inadequate. For example, even Flege (1987), which compares F1, F2, and VOT results of speakers with varying degrees of experience in French and English, is fairly limited given the wide range of social and acoustic features that could prove to be relevant in real-world contexts.

A more promising theory for speech perception is the stochastic learning algorithm proposed by Boersma (1997) and developed in his later work with Escudero. This model

suggests that the prototypelike effects that can be found in perceptual research result from different rankings of linguistic constraints, but that the data is better described in terms of Gaussian distributions than in terms of a single idealized set of values with no range. By creating an algorithm that accommodates multiple cues, by allowing the target for each cue to be defined by a range of acceptable values, and by allowing the constraints for different tasks (e.g. production vs. perception) to have different rankings, Boersma has produced a model that appears capable of correctly predicting the effects of exposure to language-specific cues and the relationship between production and perception.

Boersma appears to be highly influenced by ideas about brain plasticity and not so much from new ideas from acquisition studies. He distinguishes between perceptual and cognitive categorization, noting that "perceptual categorization is a prerequisite for lexicalization and acquisition of production [patterns]" (1998:277), but not necessarily for production itself. Thus, unlike magnet-metaphor models (e.g. Kuhl and Flege), his theory would account for change induced by an L2 learner passing as native when, say, the production differences of a phoneme are not so different to be marked as "foreign" but are still measurably distinct from natives. For example, magnet-metaphor models would suggest that English /a/ would be easily acquired simply because Spanish /a/ is so close. In fact, we might find that such variables, while not different enough to cause native speakers to label the productions as foreign, are still important agents of change since Liljencrants and Lindblom (1972) have shown that, depending on the number of vowels in the phonology of a language, their location in the spectral envelope may shift to preserve perceptual distinctions. Boersma quotes Waterson's (1971) model of phonological acquisition as "a gradual loosening of constraints on the complexity of internal lexical representations" (1998:277). Thus

neurological plasticity, which may correspond roughly with age, is used to explain stability among older speakers, including resistance to acquiring the new constraints of an L2.

Boersma's theory may be lacking in the kind of elegance typically expected in phonological theory, but Occam's razor may not be the best standard for modeling linguistic patterns that are known to show considerable duplication. The benefits of compartmentalization (e.g. efficiency) are not likely to outweigh the evolutionary benefit of maintaining redundancies in the brain's linguistic mechanisms, particularly since listening environments are rarely ideal.

7.4 Conclusions

To summarize the findings of research in speech perception as succinctly as possible, a listener likely builds a model of speech perception that must be very flexible in terms of the differences it can tolerate. Differences in some cues (which OT theorists would describe as being ranked higher in the evaluation process) are likely to be more important than others, but evidence suggests that listeners are capable of reconstructing the expected cues when the information is missing (as in silent centered syllables) or distorted (either by noise or by being completely out of range).

Changes to the perceptual system could stem from language contact with people who are minimally socially different, since even two people with very similar vocal tract shapes and language backgrounds are likely to produce different speaker-indexical cues. In the Labovian tradition, these would be described as language-external changes.

Language-internal changes are also likely in the perceptual system. If Boersma is correct, these changes are tolerated because (1) listeners expect tokens in a certain range—not a certain point on a given auditory scale and (2) people use different constraint rankings for

production than they do for perception.   So, even a native speaker may not have a production

target that exactly correlates with their perceptual target ranges. Therefore, if Boersma is

right, many of the underlying assumptions present in the NLM, SLM and related models need

significant recalibration.

Exposure to such differences in production is likely necessary for the speaker to change

his or her perceptual targets, but it may or may not be sufficient. For example, a listener is

unlikely to change his or her internal model of necessary acoustic cues based on one disparate

token. A critical number of tokens that either (1) fell outside of the predicted range or (2) fell

either above or below the mean value for that cue would be needed for the listener's

perceptual strategy to be altered, and a number of contributing factors (auditory capabilities,

secondary acoustic cues, syntactic/pragmatic cues, perceptual expectations, and social factors)

could inhibit or promote this perceptual change. Having such a large number of factors makes

accurate predictions of language change very difficult on any kind of large scale, but they

deserve consideration, particularly in light of the success that Boersma's learning algorithm

appears to have achieved at smaller scales.

General auditory capabilities are necessary to any model, since raw acoustic differences

may or may not be perceptible even under ideal listening conditions. In terms of cues related

to the frequency spectrum, models should probably consider conversions from Hz to auditory

scales like Mels and Barks. A comprehensive account will incorporate critical band effects into

the model, helping to demonstrate differences in the learning strategies between front vowels

and back vowels, for example, but also the effects of noncontrastive nasality (e.g. Plichta 2004).

This is probably the easiest factor to make predictions about. If there is no perceptual

difference between the productions that a listener is being exposed to and their own mental

representation of that cue, they are unlikely to make any changes to the acoustic representation of that cue. Resistance to changes in the acoustic cues does not imply, however, that slight changes in the motor strategy are incapable of becoming more permanent. Nor does it suggest that everyone who uses a cue with a similar range shares similar rankings; such differences in perceptual rankings could result in differences in the tolerated production rankings for speaker/listeners and vice versa.

Although many of the details of the perceptual mechanism are well beyond the scope of the current investigation, the analysis of the literature on perception in the current chapter should help to explain the results of the following chapter: that speakers who have more advanced productions have slightly more advanced perceptual capabilities, but that the two are not perfectly aligned.

CHAPTER 8: PERCEPTION RESULTS

8.1 Introduction

Labov and Ash (1997) describe the primary linguistic task as "the coding and decoding of information," but, as Thomas (2002) and Clopper, Conrey, and Pisoni (2005) note, most sociolinguistic investigations have not incorporated speech-perception research. Investigations of spoken-word recognition are particularly neglected, though, as mentioned in Chapter 7, some notable exceptions include Labov and Ash (1997); Rakerd and Plichta (2003); Friedland, Bartlett, and Kreuz (2004); and Preston (2005). The current experiment uses the same stimuli as the last of these studies, which investigates the degree to which historical and other phonetic principles influence perception. In particular, Preston (2005) is interested in the following:

(a) the degree to which "locals have an advantage in understanding words that contain advanced tokens of change-in progress vowels";
(b) whether the concept of "local" also reflects nongeographic demographic data (sex, age, status, urbanicity, ethnicity, etc.);
(c) whether the misperceptions of advanced tokens of an ongoing vowel shift are perceived using a preshifted or postshifted phonological system.

His data suggest that (a) there is a local advantage that is (b) influenced by nongeographical demographic data, but (c) that even those who are most actively producing the Northern Cities Shift often perceive these tokens in a preshifted manner. The current study complements this research, demonstrating that the Benton Harbor subjects are lagging behind other groups in the state in terms of their perception of the NCS. It also suggests that error patterns found in the Benton Harbor data, which are somewhat different from previous research, may be due to perceptual strategies defined by substrate Spanish effects.

The data collected in the current study offer tentative support for claims about the relationship between production and perception. After a brief description of the methods used in this study (grounded in a review of Preston [2005]), this chapter will address several questions related to this relationship and make suggestions about research designs that might more effectively address this issue.

The first question to be examined is about the degree of "localness" of the perceptual behavior of Benton Harbor Mexican Americans, which will be addressed in section 8.3. This section will demonstrate how to compare Benton Harbor speakers' perceptions to those of other groups in Michigan. Preston (2005) investigated five groups of Michiganders that differed in geography, urbanicity, and ethnicity. All were members of communities that had been in Michigan since at least the 1950s. The current study will investigate where the perception of the Northern Cities Shift by members of the incipient Mexican-American community of Southwest Michigan falls in relationship to these others group. Like Preston (2005), this section will make reference to expected vowel systems based on evidence from Peterson and Barney (1952), Hillenbrand et al (1995), and the Northern Cities Shift.

The second question to be addressed examines the degree to which factors internal to the Benton Harbor community affect perceptual results. Whereas section 8.3 will consider demographic factors comparable to those used in Preston (2005), section 8.4 will consider those that were found to be significant in the production results of Benton Harbor residents and that are not relevant to the subjects in the earlier study (e.g. length of residence).

Finally, section 8.5 will examine the error patterns in the Benton Harbor data. The data show that the perceptual strategies of these subjects largely reflects more conservative, preshifted English phonemic system, as Preston (2005) found with his subjects. But tentative

evidence suggests that postshift strategies and substrate Spanish influences might also be at work.

8.2 Methods

8.2.1 Subjects

The same 20 speakers included in the production experiments (Chapters 5-6) constitute the subjects of the current study. In addition, data from Preston's (2005) study, which compares the effect of region and ethnicity on Michiganders' perceptions of the NCS, has been generously provided as a point of comparison. In total, that allows the Benton Harbor speakers to be compared to five, demographically distinct groups of native Michiganders.

1. MA-BH: Mexican Americans from Benton Harbor
2. EA-U-S: European Americans from urban areas of Southern Michigan
3. EA-Y: So-called Ypsitukians, European-American immigrants and their descendents from Appalachia now living in Ypsilanti (urban Southern Michigan)
4. EA-R-S: European Americans from rural Southern Michigan
5. EA-R-M: European Americans from rural mid-Michigan
6. AA-U-S: African Americans from urban Southern Michigan

In Preston (2005) some of these groups are conflated. However, in the interest of showing how the very small group of Mexican-American speakers in Benton Harbor compares to other groups across the state, both racial and regional distinctions were maintained in this data set.

8.2.2 Stimuli

The same stimuli used in Preston (2005) were presented to the Benton Harbor subjects. Twenty words (each spoken by a different woman from the Detroit suburbs who was advanced in the NCS) were each played twice to the subjects at the conclusion of the recording stage of the interview. Sixteen of these words included vowels participating in the shift: *bag, cut, big, can, bond, bed (=bud), hawk, done, sock, tin, hot, caught, pat, Ben (=bun), dawn, bed (=bad).* All were chosen so that likely misunderstandings included real words, e.g. *tin* pronounced as *ten*. The

remaining four words contained vowels that are not participating in the NCS and that are unlikely to be confused due to Spanish interference: *boot, beet, bait,* and *boat).*

8.2.3 Data-collection procedures

Following the procedure of the previous study, subjects were asked to write down what they heard after being presented with both repetitions of each word, with one exception. For those subjects who were not comfortable writing (often because of poor literacy skills), instructions were augmented. They were instructed to use the word that they thought they heard in a sentence so that it could be accurately recorded. When a non-word was perceived, they were asked to describe the sound by, for example, providing real-word rhymes for the pronunciation of the non-word.

8.2.4 Method of analysis

Data were analyzed using Goldvarb X (Sankoff, Tagliamonte, & Smith 2005), which is specifically designed for sociolinguistic research. Benton Harbor data was combined with Preston's (2005) data to determine how these residents compare to other cultural groups in the state, but also considered separately to determine which variables were relevant within the community. Factors considered in the first part of the analysis included the dependent variable (whether the intended vowel was correctly identified), region, sex, age group (young, middle, or old), socioeconomic status, and intended vowel (the vowel intended by the speaker). Factors considered when the Benton Harbor data is treated separately include the dependent variable (correct identification) those demographic variables considered in previous chapters (ESL, LOR, EAL, AOA, and ethnic network strength), and the intended vowel. Qualitative analysis is employed in the analysis of error patterns.

8.3 Expected demographic results based on previous research (compared to Preston [2005])

Preston (2005) had two major conclusions. The first was that the same demographic characteristics that predict participation in the production of the Northern Cities Shift also prefer accurate comprehension:

a) Ethnicity — European American (significant)
b) Sex — female
c) Status — middle
d) Age — younger (significant)

Similar results were found in the current study, except that sex and status were also found to be significant. Table 8.1 shows the probability of correct identification for each of the demographic statistics given above (though European Americans are also separated by region and urbanicity, following Preston [2005]). The first column of numbers shows the Varbrul factor weight when all 20 vowels in the stimulus set are considered. (Note that a Varbrul factor above .5 promotes and below .5 demotes the probability that a factor is having an effect.) The second column shows the effects found when the four tokens not involved in the NCS are removed from the data set. Results are broken down for the four demographic variables that will be examined in this section, but also include results for the intended vowel, which will be dealt with more substantially in following sections. Within each group, factors are presented in order from those most favoring correct identification to those least favoring correct identification.

Table 8.1 Varbrul Factor Weights for All Subjects based on Preston (2005) Demographic Information

Factors:		All Vowels	Only NCS
Region/Ethnicity	EA-US	0.82	0.74
	EA-RS	0.8	0.71
	EA-Y	0.79	0.7
	EA-RM	0.78	0.68
	AA-US	0.73	0.63
	MA-BH	0.64	0.53
Age Group	Young	0.79	0.7
	Middle	0.76	0.66
	Old	0.67	0.56
Sex	Female	0.79	0.7
	Male	0.76	0.66
Status	Middle	0.78	0.69
	Working	0.77	0.68
Intended Vowel	bait	0.98	NA
	boat	0.98	NA
	beat	0.97	NA
	boot	0.95	NA
	cot	0.84	0.85
	cut	0.82	0.83
	bat	0.79	0.8
	bet	0.66	0.68
	caught	0.37	0.39
	bit	0.34	0.36

Preston (2005) demonstrated that groups whose demographic factors have been shown

to favor accommodation in the production of the NCS are also the best at accurately perceiving

it. European Americans are most likely to correctly identify the intended vowel, particularly if

they are from the urban areas of the state where it is most advanced. African Americans lag

behind rural European Americans; when only the NCS tokens are considered, the African-

American factor weight is .63, .05 lower than that of European Americans from rural mid-Michigan. Predictably, the Mexican Americans from Benton Harbor perform even worse, with a factor weight of only .53.

Though following sections will show that the error rates of Mexican Americans show some evidence of substrate Spanish influence in their perceptual strategies, a comparison between the results for all tokens and the results for only NCS tokens (the first and second columns of factor weights) shows that the error patterns in both data sets appear to be driven by the NCS tokens. That is, eliminating the non-NCS tokens from the data set has roughly the same effect on each regional/ethnic group.

This data shows that the difference between the Mexican Americans in Benton Harbor and European Americans from southern Michigan is roughly the same as the difference between older and younger speakers, which, as in Preston (2005), is also significant in this data set.

Unlike Preston (2005), however, sex and socioeconomic status are also significant predictors of accurate identification of NCS tokens in this study. Women, who also tend to be more advanced in their productions, have a factor weight of .70, favoring correct identification. Men lag behind with a factor weight of .66. Socioeconomic status shows only a slight difference in factor weights (.69 for middle class vs .68 for working class), but this difference was found to be significant.

Cumulatively, these effects show that the Benton Harbor residents are predicted to correctly identify NCS tokens, but as can be seen in Table 8.1, the factor weight for this category is substantially lower than all of the other demographic factors considered in this

section. That is, they confirm Preston's (2005) suggestion that the definition of localness cannot be delineated by geographic factors alone.

8.4 Demographic Results Unique to Benton Harbor

The demographic results considered by Preston (2005) and used in the previous section to define "localness" included sex, age, SES, and a category based on ethnicity and region. This section will address a number of other demographic categories that have been shown in previous chapters of this study to define "localness" among the Benton Harbor subjects, but which were not applicable in Preston (2005). For example, age of ESL acquisition (ESL), location of English acquisition (EAL), length of residence (LOR), and age of arrival (AOA) were not particularly relevant to the monolingual lifetime residents investigated in Preston (2005), and ethnic Network scores were also not considered. There is reason, however, to believe that these categories might account for significant patterns in the perceptual data of the Benton Harbor subjects.

Table 8.2 repeats tables of speaker demographic data that were provided in Chapters 1 and 5, but converts relevant information from gradient to categorical data as necessary. All of the demographic categories shown in Table 8.2 were considered for this analysis, as was the intended vowel. Varbrul analysis showed only three of these factors significantly predicted whether a token would be correctly identified: sex, intended vowel, and ESL. As Table 8.3 shows, both sexes favor correct identification, but the factor weight for women (.64) is .12 higher than that of men. For ESL, the difference is more extreme. Those who learned English before the age of ten years old are favored to correctly identify tokens with a factor weight of .61; those who were older when they acquired English were generally incapable of correctly identifying the vowel in question.

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Table 8.2: Speaker Demographic Information as Categorical Data (LOR recoded for short (0-9 years) vs long (10+ years); AOA recoded for younger (0-16 years) vs older (17+ years); NW total recoded for low (0-4) vs high (5-9); age recoded to match the young (0-30), middle (31-54) and old (55+) categories used by Preston (2005))

Subject	Sex	ESL	EAL	Age	LOR	AOA	NW Tot
Juan	M	older	Inland N	mid	short	older	low
Sonya	F	younger	elsewhere	young	long	younger	high
Salvador	M	younger	elsewhere	young	long	younger	low
Salina	F	younger	elsewhere	young	long	younger	low
Soliz	M	younger	elsewhere	mid	long	older	high
Sancho	M	younger	Inland N	young	long	younger	low
Servando	M	younger	elsewhere	young	short	older	high
Monica	F	younger	elsewhere	young	short	older	high
Michelle	F	younger	elsewhere	young	long	older	high
Roman	M	younger	Inland N	young	long	younger	low
Melanie	F	younger	Inland N	young	long	younger	low
Rita	F	older	Inland N	young	long	younger	high
Bob	M	younger	Inland N	young	long	younger	low
Lacey	F	younger	elsewhere	mid	long	older	low
Domingo	M	younger	elsewhere	old	long	older	high
Josie	F	younger	elsewhere	mid	short	older	high
Roger	M	younger	Inland N	mid	long	younger	low
Miguel	M	younger	Inland N	young	long	younger	low
Grace	F	younger	Inland N	young	long	younger	low
Carmen	F	younger	Inland N	young	long	younger	low

Table 8.3: Varbrul Factor Weights for Significant Factors among Mexican Americans in Benton Harbor

Significant Factors:		Varbrul Factor Weight
Sex:	female	0.64
	male	0.52
Intended Vowel:	beat	0.86
	boat	0.86
	boot	0.82
	cut	0.79
	bat	0.71
	hot	0.7
	bet	0.55
	bit	0.19
	caught	0.19
ESL:	younger (Native)	0.61
	older (ESL)	0.38

Notice that these results contrast strongly with the vowel-by-vowel analysis of production patterns in Chapter 5, where location of English acquisition (EAL) played a substantial role in predicting accommodation to the NCS in nearly every vowel and where more significant results were found for LOR, AOA, or NW than for ESL. For perception, Varbrul shows that EAL, LOR, AOA, and NW are not significant.

The significance of the ESL category is especially surprising since only two of the subjects in this study are identified as ESL. With such a small sample, it is probably premature to try to compare their error patterns to those who are classified as native, but these results are given in Table 8.4 for the purpose of documenting this information for future research. Stimuli are arranged in order from the highest correct identification by Benton Harbor subjects, and identification rates for other ethnic groups are also given.

Table 8.4 Error patterns of the ESL speakers (Juan and Rita) by token; Error rates for each token (by ethnicity) are also given.

ITEM	Juan		Rita		All EA	AA-US	MA-BH
bait		bait		bait	97	95	100
done	X	band		done	88	81	95
hot		hot		hot	87	88	95
beet	X	bit		beat	99	91	85
boat	X	bet		boat	99	95	85
boot	X	but	X	eat	96	91	80
bed=bud		bet		bread	95	84	80
bag		bag	X	beg	98	93	75
can	X	gent		can	76	67	65
pat		hat		fast	73	42	65
cut	X	cot	X	caught	79	67	60
bond	X	band		bond	75	79	55
sock	X	back		rock	90	91	55
bed=bad	X	bad	X	fire	91	86	50
caught	X	cat		taught	48	37	35
tin	X	tent	X	ten	54	47	30
ben	X	fun	X	bun	19	9	30
hawk	X	bag	X	puck	24	9	10
dawn	X	done	X	John	57	40	10
big		big	X	beg	27	2	5

8.5 Language internal constraints

8.5.1 Preliminary results of language internal constraints compared to Preston 2005

This section will analyze the language-internal data considered in this experiment, namely the identity of the intended vowel. Preston (2005) shows not only that vowels involved in the NCS are more likely to be misperceived, but also that within this subset of vowels there is a combination of synchronic and diachronic effects that influence this misperception. This section will explore the degree to which the Benton Harbor subjects' results conform to

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previous research, and it will consider the possible effects of other language varieties (e.g.

Spanish or English varieties from other regions of the country)

Preston (2005) outlines six characteristics of the vowels involved in the NCS that might

affect a listener's ability to accurately perceive the intended vowel:

1. Recency: "The oldest changes in the NCS should be better understood than more recent changes."
2. Historical Class: "Vowels not involved in complex, historical phoneme word-class changes should be better understood." (For example, the vowels in *bet* and *bit* have not changed substantially since Old English, but the other vowels considered in this study have.)
2. Phonetic Clue: "Vowels which give some distinctive clue to their identity other than formant positions should be better understood." (Here, the change in /æ/ production includes a change from a monopthong to a dipthong, which Preston classifies as an improved listening situation.)
4. Distinctness: "Vowels at a greater distance in the F1/F2 plane from those with which they might be confused should be better understood." Misinterpretation results indicated that subjects' errors were overwhelmingly in the preshifted direction (e.g. *not* would be misunderstood as *nat*, not *net*), so Preston (2005) based his distinctiveness scores only on possible confusions in the preshift direction.
5. Chromaticity: "Vowels which, as a result of F2 changes, bring about some chromatic change (e.g. +round → -round) may be more poorly understood."
6. Formant Perceptual Strategy: "Vowels which, as a result of F2 changes, bring about a change in formant perceptual strategy may be more poorly understood."

Preston goes on to score each of the six vowels participating in the NCS based on each

of these factors. By weighting recency more heavily than the five other factors, he creates a

scoring system that somewhat reflects the results of his Varbrul analysis. Table 8.5 repeats

this scoring system, comparing it with the Varbrul weights for vowel identity found in Preston

(2005).

Table 8.5: Preston's (2005) ranking of phonetic facts influencing comprehension of NCS vowels (higher scores = worse comprehension) compared to Varbrul Factor Weights from the same study and to the Varbrul Factor Weights found for the Mexican Americans in Benton Harbor.

Vowel	Recency	Historical Class	Phonetic Clue	Distinctness	Chromaticity	Perceptual Strategy	Preston Scoring Total	Varbrul Factor Weight from Preston (2005)	Varbrul Factor Weight for MABH data only
bad	1	1	0	0	0	0	2	0.7	0.71
cot	2	1	1	0	0	0	4	0.67	0.7
but	5	1	1	0	1	0	8	0.64	0.79
bet	4	0	1	1	0	1	7	0.49	0.55
caught	3	1	1	1	1	0	7	0.24	0.19
bit	6	0	1	1	0	0	8	0.24	0.19

Preston's (2005) scoring device highlights several factors that are likely affecting the

Varbrul weights demonstrated in this study, but they do not closely model the distribution of

such weights, probably because he has not justified weighting recency on a 1-6 point scale

while placing other factors on a 0-1 point scale. As the literature review in Chapter 7 discusses,

it is not clear at this point that we have enough knowledge about perception to rank one factor

above another (or even to rank each factor equally) across groups with different dialect

backgrounds. Extensive testing of perceptual differences (using more controlled stimuli than

the 20 tokens used in the current study) is needed in order to develop a more sophisticated

model of the influences involved in the perception of the NCS.

When compared to the Varbrul factor weights for the subjects in the current study (the

Mexican Americans from Benton Harbor), the scoring system develops further problems. For

example, the weighting of the recency effects is particularly problematic for this population,

who has come into contact with the shift during its later stages. If the reorgnization of the

phonemic system is happening among the mainstream participants in a process of accretion (as suggested in the previous Chapter), it is unlikely to behave similarly for those groups who have not been in contact with it from the beginning. This seems especially true for the Mexican Americans in Benton Harbor, who are part of a large, multinational group of speakers who share a Spanish-heritage background—many of whom are acquiring English in the region.

It is premature to suggest what weightings individual factors deserve, but it is clear from previous research that, in addition to considering factors related to a Spanish-heritage background, other English-related factors should probably be included in both models (e.g. those determined by duration, the j-factor, the k-factor, formant dynamics, social indices, etc). Once the factors relevant to perception have been more fully documented (a chore that is well beyond the scope of this dissertation), weights can be assigned, and a more accurate model can be developed.

8.5.2 Insight about possible factor weightings from the error patterns of Mexican Americans

Preston (2005) demonstrated that error patterns among the speakers considered in his study were based on preshift positions. For example, shifted tokens of /ɑ/, which have formant values in the range of a nonshifted tokens of /æ/ or postshifted tokens of /ɛ/, were perceived in the nonshifted direction. This generally appears to be true of the Mexican Americans in this study, though it appears that joining the shift after it was already in progress may be affecting their judgments, and some substrate Spanish influence is also apparent.

Table 8.6 compares the error rate of Mexican Americans to European Americans and African Americans from Preston's (2005) sample. Table 8.7 shows the distribution of error patterns for the speakers in this subject by individual stimulus. Stimuli are grouped by phoneme, with the NCS vowels listed first. Distracter tokens of non-NCS vowels are given

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toward the bottom of this table as a point of reference. The remainder of this section addresses each of the error patterns of each NCS vowel for the current subjects (shown in Table 8.7) while making reference to how their error rates compare to the ethnic groups in Preston's (2005) study (shown in Table 8.6). This information will be grouped into subsections by vowel, followed by a brief synthesis of these findings.

Table 8.6: Error rates based on ethnicity

	All EA		AA-US		MA-BH	
	N	**%**	**N**	**%**	**N**	**%**
bag	140	98	40	93	15	75
can	108	76	29	67	13	65
pat	104	73	18	42	13	65
ae total	**352**	**82**	**87**	**67**	**41**	**68**
bed=bud	136	95	36	84	16	80
bed=bad	130	91	37	86	10	50
ben=bun	27	19	4	9	6	30
ep total	**293**	**68**	**77**	**60**	**32**	**53**
big	39	27	1	2	1	5
tin	77	54	20	47	6	30
ic total	**116**	**41**	**21**	**24**	**7**	**18**
caught	68	48	16	37	7	35
dawn	82	57	17	40	2	10
hawk	35	24	4	9	2	10
ct total	**185**	**43**	**37**	**29**	**11**	**18**
hot	124	87	38	88	19	95
bond	107	75	34	79	11	55
sock	129	90	39	91	11	55
as total	**360**	**84**	**111**	**86**	**41**	**68**
cut	113	79	29	67	12	60
done	126	88	35	81	19	95
vt total	**239**	**84**	**64**	**74**	**31**	**78**
boot	**137**	**96**	**39**	**91**	**16**	**80**
beet	**141**	**99**	**39**	**91**	**17**	**85**
boat	**141**	**99**	**41**	**95**	**17**	**85**
bait	**139**	**97**	**41**	**95**	**20**	**100**

Table 8.7: Error patterns (by token) among Mexican Americans in Benton Harbor

| | i | ic | ep | ae | ct | u | vt | ei | o | as | other | % |
	bead	bid	bed	bad	caught	boot	but	bait	boat	cot	other	right
bag	*	*	4	15	*	*	*	*	*	*	1	75%
can	*	*	7	13	*	*	*	*	*	*	*	65%
pat	*	*	7	13	*	*	*	*	*	*	*	65%
ae total	*	*	18	41	*	*	*	*	*	*	1	68%
bed=bud	*	*	**16**	1	1	*	2	*	*	*	*	80%
bed=bad	*	*	**10**	4	1	*	2	*	*	2	1	50%
ben=bun	*	*	**6**	*	*	*	13	*	*	*	1	30%
ep total	*	*	**32**	5	2	*	17	*	*	2	2	53%
big	*	**1**	14	3	*	*	2	*	*	*	*	5%
tin	*	**6**	9	*	*	2	*	1	*	*	2	30%
ic total	*	**7**	23	3	*	2	2	1	*	*	2	18%
caught	*	*	*	1	**7**	*	3	*	*	9	*	35%
dawn	*	*	*	*	**2**	*	8	*	*	10	*	10%
hawk	*	*	*	1	**2**	*	6	*	*	9	*	10%
ct total	*	*	*	2	**11**	*	17	*	*	28	*	18.30%
hot	*	*	*	1	*	*	*	*	*	**19**	*	95%
bond	*	*	*	3	*	*	3	*	*	**11**	3	55%
sock	*	*	*	7	*	*	1	*	*	**12**	*	60%
as total	*	*	*	11	*	*	4	*	*	**42**	*	70%
cut	*	*	*	*	7	*	**12**	*	*	1	*	60%
done	*	*	*	1	*	*	**19**	*	*	*	*	95%
vt total	*	*	*	1	7	*	**31**	*	*	1	*	78%
u=boot	2	*	*	*	*	**16**	1	*	*	*	1	80%
i=beet	**17**	*	*	*	1	1	*	*	1	*	*	75%
o=boat	*	*	1	*	*	*	*	*	**17**	1	1	75%
ei=bait	*	*	*	*	*	*	*	**20**	*	*	*	100%

8.5.2.1 Results for /æ/

Three tokens of /æ/ (*bag, can,* and *pat*) appear at the top of both tables, and analysis shows that the Benton Harbor subjects react to each of these stimuli in much the same way (with the same error rate and distribution pattern). Subjects correctly identified these tokens 68 percent of the time, and misidentifications follow the pattern confusion based on the preshifted English vowel system. That is, as predicted by Preston's (2005) study, tokens that were not understood to be /æ/, were mostly identified as /ɛ/.

Substrate Spanish influences are difficult to identify in this sample. Mexican Americans appear to be slightly better at identifying *bag* than the other two stimuli, but this pattern is also found among European Americans and African Americans from Preston (2005). Instead, results indicate that the Benton Harbor subjects' pattern of misidentification reflects the same conservative arrangement of English vowels that is conditioning errors for the other two ethnicities. They show higher error rates, but that is to be expected given their recent settlement in Michigan compared to the other two groups.

8.5.2.2 Results for /ɛ/

Each subject in this study was also presented with three different examples of /ɛ/, which may take two different tracks in the Northern Cities Shift. In both tables, these tokens are marked to indicate whether the stimuli has backed toward /ʌ/ or lowered toward the region that /æ/ used to occupy, differences which may substantially influence subjects' abilities to correctly identify the token. The subjects in this study, for example, correctly identify tokens of *bed* pronounced as *bud* 80 percent of the time, but only correctly identify *bed* pronounced as *bad* 50 percent of the time. (Misidentifications are generally in the preshifted direction.)

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Though the data set is small, this distribution lends itself to an analysis that Benton Harbor subjects are more sensitive to F1 changes than to F2 changes, a possible substrate Spanish influence. This analysis could be treated with skepticism, since *ben* pronounced as *bun* has only a 30 percent correct identification rate, but since the same effect (a higher error rate for nasalized *ben* pronounced as *bun* than for nonnasalized *bed* pronounced as *bud*) is found among European Americans and African Americans, nasality is probably to blame for the differences between the two tokens pronounced like wedge, and substrate Spanish influence should be considered for the differences between the two tokens of *bed*. A greater sensitivity to F1 changes (*bed=bad*) than to F2 changes (*bed=bud*) compliments research by Escuerdo and Boersma that suggests that the more crowded English phoneme system requires English speakers to develop a greater sensitivity to F2 differences than is needed for those who come from a language background with a smaller vowel inventory.

8.5.2.3 Results for /ɪ/

Tokens of shifted /ɪ/ were predictably difficult for the Benton Harbor subjects, who, in addition to having been exposed to the shift for a shorter amount of time than the groups in Preston (2005), may also be affected by substrate Spanish influences such as the ones identified above. Only one speaker in twenty (5 percent) correctly identified the token of *big* in this stimuli, but six (30 percent) correctly identified *tin*. As with the within-category differences found in the previous sections, this split can also be found among European Americans and African Americans presented with the same stimuli, so there is little reason to attribute this difference to a substrate Spanish influence. Instead, these results seem to reflect Preston's claims that "localness" in production (greater participation in the shift) contributes to greater "localness" in perception.

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However, error patterns for /ɪ/ may suggest that the Benton Harbor subjects are showing different perceptual strategies than the other two groups. Benton Harbor subjects usually identified both *big* and *tin* in the preshifted direction (as /ɛ/), reflecting the perceptual strategies of other ethnic groups, but three speakers thought *big* contained tokens of /æ/. Others thought these words showed instances of /u/, /ʌ/, /ei/, etc.

With such a small sample of subjects in the Mexican-American group, any claims about these error patterns should be considered tentative, but the identification of *big* as /æ/, suggests that postshift positions of /æ/ may be playing a greater role in this sample of subjects than in others, and this could be related to their Spanish-heritage background. Though only two of the subjects in this sample are defined as ESL speakers, ethnographic evidence suggests that most of these subjects are interacting with second-language learners, who, since they are learning English in an NCS region, are likely to assimilate /æ/ to a higher vowel (like /ɛ/). Meanwhile, guesses of /u/, /ʌ/, and /ei/ offer further evidence of a weakened F2 sensitivity brought about by substrate Spanish influence.

8.5.2.4 Results for /ɔ/

Identification of /ɔ/ is very poor. Benton Harbor subjects were only correct 18 percent of the time. This low rate of identification might look like evidence that vowels not found in the Spanish phonemic inventory are more difficult for Mexican Americans to identify; but as Table 8.6 shows, other ethnic groups also had lower identification rates for this vowel.

Other differences among the different ethnic groups are more interesting. Benton Harbor subjects correctly identified *caught* 35 percent of the time. Most (9/20) erred in the preshifted direction, but three thought they heard /ʌ/, and one thought they heard /æ/. Tokens of *dawn* and *hawk* were correctly identified only 10 percent of the time, and their error

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patterns were nearly identical. More than half guessed that they were hearing tokens of /ɑ/ when they were presented with these items, but a substantial number also heard /ʌ/, and another heard /æ/. Because of the overlap typically found in this area of the vowel space and the possibility of substrate Spanish influence, it is as difficult to say which influences are most likely to explain these error patterns as it was to determine which varieties of the language setting were contributing to production differences in this region. Table 8.6 shows that while the Mexican Americans in this study are much more likely to correctly identify *caught* than they are *dawn or hawk*, the other two ethnic groups are more likely to correctly identify *dawn* (57 percent correct for EA, 40 percent for AA) than *caught* or *hawk.* Preston (2005), Peterson and Barney (1952), and Hillenbrand et al also showed subjects who interpreted /ɔ/ as /ʌ/, but at comparably lower rates than are found among the subjects of the current study. So it seems possible that substrate Spanish effects could be at play; but if they are, they may be related to something other than the F1/F2 target for this vowel.

8.5.2.5 Results for /ɑ/

Correct identification of /ɑ/ was very high for *hot* (95 percent), but only better than half for *bond* and *sock.* This pattern distinguishes the Benton Harbor subjects from the European Americans and African Americans in Preston (2005), who correctly identified *sock* 90 percent of the time, and showed only slightly lower rates for the other two tokens of /ɑ/.

Misidentification results for /ɑ/ shows an interesting split among the Benton Harbor subjects. Most guessed in the preshifted direction for *sock* (/æ/), but misidentification of *bond* was divided evenly between guesses of /æ/, /ʌ/, and the dipthongs in *bound* and *five*, the latter probably resulting from the exaggerated breaking that occurs in this stimulus. This contrasts with Preston's (2005) speakers, who showed a much stronger trend towards a pre-shift analysis

when misidentifying this phoneme, and with Peterson and Barney and Hillenbrand et al, who showed a much lower error rate generally.

Cumulatively, these results suggest that the fronted /ɑ/ of the NCS is quite compatible with the perceptual system of the Mexican Americans in Benton Harbor, but that factors other than the F1/F2 target (e.g. formant dynamics) may be playing a more significant role among these subjects than among those from previous research.

8.5.2.6 Results for /ʌ/

The last shifted vowel in this stimuli set is /ʌ/. Almost all of the tokens of *done* were correctly identified (95 percent). Only 60 percent of the tokens of *cut* were identified correctly. This is a fairly large split, but the data from Preston (2005) show that it is not unique to the Benton Harbor speakers.

Given the considerable overlap in this area of the vowel space, it is difficult to attribute the error pattern of /ʌ/ to one language setting influence over another. Seven of the misidentified tokens occurred in the preshifted direction (/ɔ/) predicted by Preston (2005). This would also be compatible with influence from a Spanish phonemic system, but the fact that these subjects are overwhelmingly identifying these tokens as /ɔ/ (as opposed to /ɑ/) suggests a strong influence of an English phonemic system is at work.

These results offer further evidence that substrate Spanish influences may be at work in very interesting ways. Neither /ʌ/ nor /ɔ/ can be found in the Spanish phonemic inventory, but /ʌ/ has a much higher rate of identification than /ɔ/ among Benton Harbor residents. In and of itself, this is not a substantial finding, but an interesting pattern emerges when one compares the error rates for these two vowels across ethnicities. This information, which can be found in Table 8.6, is repeated below in Table 8.8 for the reader's convenience. The correct

identification of /ɔ/ shows a stairstep pattern conditioned by ethnicity. European Americans are correct 43 percent of the time, followed by 29 percent by African Americans, and then by a substantially lower rate of 18 percent among Mexican Americans. However, there is virtually no difference between African Americans and Mexican Americans in the correct identification of /ʌ/.

Table 8.8: Error Rates for /ɔ/ and /ʌ/ by Ethnicity

	EA	AA	MA
/ɔ/	43	29	18
/ʌ/	84	74	75

This pattern may be related to a greater reliance on F1 among the Benton Harbor subjects. Recall that the F2 differences between /ɑ/ and /ɔ/ are not being greatly affected by the shift (since both are moving forward in the vowel space), while the F2 differences between /ɑ/ and /ʌ/ are becoming much greater. It is possible that the F2 difference between /ʌ/ and /ɑ/ are becoming so great that confusion between the two vowels is simply becoming impossible, but if that were the sole cause of the split between /ɔ/ and /ʌ/ identification results for the Mexican-American subjects in this study, they it should have roughly the same effect on the African-American data. This suggests that differences in F1 perceptual strategies may be at work.

If /ɔ/ is lowering more than /ʌ/, then the F1 difference between /ɔ/ and /ɑ/ is probably much smaller than the F1 difference between /ʌ/ and /ɑ/. English speakers are generally thought to rely on these two cues (F1 and F2) relatively equally, but Escudero and Boersma (2001) have suggested that this is not always the case. If those with a substrate

Spanish background are more reliant on F1 than they are on F2, this could explain the differences in the distribution patterns among Mexican Americans and African Americans. Mexican Americans are able to identify /ʌ/ at a higher rate than African Americans because they are weighting F1 differences more heavily.

8.6 Discussion of error pattern results and areas for future research

As the last two chapters have shown, the complications of the perceptual system require extensive testing, much of which is beyond the scope of the current study. Preston's (2005) scoring system for the NCS vowels considered in this study outlines many (but by no means all) of the factors that should be considered when trying to explain how the shift is being perceived among the mainstream white population who is leading the region in its production; but further research is clearly needed, particularly when groups like the Benton Harbor subjects are being compared to the mainstream.

Recent theories of speech perception suggest that even those who share similar phonemic constraints (e.g. the same distinctive features) may enact these distinctions in different ways. The contextual and phonotactic constraints quantified by the j-factor and the k-factor (discussed in Chapter 7) would be a good place to start, and they would be more interesting if future experiments involving these factors controlled for regional/ethnic background and language internal differences (shifted and nonshifted tokens). Factors like duration, formant dynamics, and judgments about speaker- indexical information would also contribute to a richer understanding of this data.

This chapter has confirmed claims that "localness" is best defined by a combination of geographic and other demographic factors related to a subject's likelihood of having participated or been in contact with the Northern Cities Shift, but it has raised questions about

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the perceptual strategies employed by nonlocals who come in contact with advanced speakers of a major vowel shift, particularly when a non-English-heritage language is present in the community. The pilot study presented here suggests that a conservative English phoneme system is the primary guide for most of these speakers, but that heritage language perceptual strategies may be employed, even among those who acquired English at a young age. Further research is needed, preferably with more controlled data, so that these details can be worked out.

CHAPTER 9: CONCLUSIONS

This dissertation has documented the early stages of production changes in a Mexican-American community that has only recently come in contact with the Northern Cities Shift. It has also made suggestions about the mechanisms involved in such accommodation, both social and linguistic. This chapter will summarize the processes believed to be involved with this accommodation, comparing it to those in the mainstream population who have been driving the NCS.

The literature reviewed in this study offers a compelling explanation for how production is leading perception in the mainstream participants of the Northern Cities Shift. Accommodation theory suggests that speakers attune themselves to the language of those around them, particularly when strong, positive social ties exist, and evidence suggests that this accommodation is possible even when the speaker is completely unaware of his or her accommodation.

In the case of the Northern Cities Shift, Plichta (2004) has made a compelling argument that nasality initially triggered a change from below since nasalized productions of /æ/ appear to be leading the change in that phoneme in a language-internal change process. This change from below appears to have been helped along by the strong linguistic allegiance in the area in a manner that is consistent with Ohala's theory that the listener is the source of sound change, particularly if Boersma's stochastic model is correct.

Recall that Boersma's stochastic model assumes the following: First, he assumes that phoneme targets are represented by Gaussian distributions, rather than single points on a spectrum, and that goodness ratings are informed by multiple channels of information. Second, he assumes that production constraints are different from perceptual constraints.

Synthesizing these theories, it would be easy to suggest that unconscious social accommodation began among the mainstream NCS population in such a way that they were attuning their production strategies to the nasalized productions of /æ/ without fully changing their perceptual strategies. Assuming that Boersma is correct in claiming that a stochastic system is needed in order for language users to be able to function in the case of speech errors, it would be easy to hypothesize that the perceptual system might be able to effectively ignore or otherwise downplay advanced tokens of the NCS even as the listener was beginning to produce such tokens herself. That is, multiple memory processes could be at play, explaining the apparent perceptual lag that is found in studies like Preston (2005) and Chapter 8, where tokens are presented in isolation. The fact that NCS speakers are not having much trouble understanding one another when context provides other clues, as happens in normal linguistic circumstances, offers further support for the stochastic processes suggested by Boersma.

Evidence from second language acquisition research, where older speakers tend to have a more difficult time acquiring non-native sounds despite their ability to perceive them in specific laboratory contexts, might also be explained by such processes. That is, once the brain determines which categories are linguistically relevant for the speaker's first language, it is not impossible to perceive within category differences, it is simply more difficult to convince the stochastic perceptual system that these are not merely speech errors.

For the Mexican Americans in this study who are just coming into contact with the Northern Cities Shift, the situation is considerably more complicated. For one thing, the small sample in this study demonstrates only a fraction of the possible demographic variables at work in this part of the state. For another, even within this sample, there are varying degrees

of nativeness to the shift. Women appear to be better at accommodation for both production and perception. For production, nativeness appears to be defined by length of residence, age of arrival, and the location of English acquisition. For perception, these factors do not appear to be particularly relevant, but ESL status is.

Mexican Americans in Benton Harbor, who (based on questions initially proposed by Milroy 1980) do not have a dense, multiplex, territorially based network appear to be showing rapid accommodation to the NCS in their production, but are not showing the same kind of NCS accommodation that can be found among urban European-American populations in the state. It is not clear the degree to which this can be attributed to differences caused by substrate Spanish influences over other possible influences (e.g. the different process of accommodation caused by later contact with the shift). Both Milroy and Trudgill suggest that changes under such conditions can be rapid and chaotic, but a larger-scale study might have revealed more robust social patterns. In addition to the social variables at play, the complicated language setting contributes another set of linguistic variables that, upon further examination, help to explain the unique pattern of production accommodation that is being found among the subjects in this study as well as those in similar contact situations in Chicago and Lansing (Konopka & Pierrehumbert 2008; Roeder 2006).

Many of the differences found between mainstream NCS participants and those in the current study may be attributed to the lateness of accommodation. Mexican-American residents in Benton Harbor generally believe that they have a better chance of integration and acceptance into the white community in this area than they might in other parts of the country (e.g. Texas), and they have bought into the folklore that there is no accent among speakers in the Midwest. Based on these ethnographic facts, accommodation theory would

suggest that they are primed for participation, while research by Boersma and Escudero explains that this priming would be tempered by differences in perceptual and production strategies (e.g. the results that indicate that these speakers may be more reliant on F1 than F2). Thus, even the subjects in the current study who are L1 English (like Ito's rural Michiganders) must adapt different perceptual strategies than participants in the mainstream white population of the Inland North who had contact with earlier stages of the shift.

These combined production and perceptual results for the Mexican Americans in Benton Harbor are compatible with predictions that follow from a stochastic system with slight perceptual differences. That is, like the mainstream participants in the shift, these speakers appear to be showing results that reflect multiple layers of memory. The error patterns found in the perceptual study suggest that a more conservative English vowel system is the primary guidepost, but these subjects did not go through the same process of accretion as mainstream shifters. As late arrivers, they appear to be more prone to postshift strategies (e.g. Preston 2005), which, combined with other differences in the ranking of perceptual cues (e.g. the greater reliance on F1), resulted in new and interesting patterns of production, such as the conflation of /æ/ and /e/, that appear to be unique to those with their particular linguistic background.

Clearly, more research is needed. Research by Konopka and Pierrehumbert (2008) and Roeder (2006) suggests that those with similar heritage-language backgrounds who are in contact with the NCS develop many of the same production patterns found among the subjects in the current study. Continued investigation of the production patterns found among Mexican Americans in Benton Harbor (and those who share their heritage-language background elsewhere in the county) would help us to better understand the mechanisms

involved in this change. Just as important, however, is the need for future research in perception. Normalized stimuli needs to be carefully controlled so that future research can determine which parts of the signal each group is reacting to in perceptual studies, particularly if Boersma's suggestion that Gaussian distributions interact with a stochastic perceptual model are correct. It is hoped that the current research will prove a useful pilot study for research yet to come.

APPENDICES

Although efforts were made to imitate natural conversation patterns whenever

possible, the following questions were used as a guide during the sociolinguistic interview.

1. [Name] Can I get your first/last name? Can you spell that for me?
2. [Address] What is your address?
3. [Phone] Can I get a phone number? (Or some other sort of contact information? Email?
Friend? Etc?)
4. [Age] How old are you?
5. (Note Sex, Group Membership)
           How old were you when you moved to Michigan?
           Where all did you live before:
           How long have you been in Benton Harbor (or wherever now)
           Where were you bornBorn:
           Where are your parents from? What did they do?
6. [Occupation] What do you do for a living?
           What's that like?
           Do you enjoy it? (etc.)
           Did you ever do anything else?
7. [Education] (If appropriate) How much training did you need for that?
           Is that what you always wanted to do?
           Did you ever go to school to do something else?
           (Did you get to go to/finish school, etc?)
               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
8. [Network Info] How well do you know people that you work with? How well do you know
people that live in this neighborhood?
      Do you like who you work with?
      How many people that you work with live around here?
      Does anybody that you live with work in the same place?
      (How many people do you live with?)
      Do most of the women around here work at one place and the men in another?
      How many people of the same sex do you work with?
      Do they live in this neighborhood?
      Freetime:
      Do you hang out with people from work outside of work, then?
      Do you spend a lot of time with people from this neighborhood?

9. [More Network] (I know this is kind of awkward, but I am supposed to ask you to give me an estimate on the following.) Around here, there are the following groups: African Americans, European-Americans, and Mexican Americans. What percentage of people from the following groups are your close friends? (For example, How many people would you count as close friends? How many of each are members each group?)

> Black: _____
> White: _____
> Mex. Am.: _____
> Other: _____

10. [General Conversation]
> So is this [network] pretty typical of people around here?
> What is the best thing about working/living in Benton Harbor?
> What do you miss most about where you lived before?
> Do you get to talk to people from home still?
> What does the rest of your family think about the area/schools/the cold weather/etc?

11. Metalinguistic Questions
> How many languages do you speak?
> How old were you when you learned English? _____
> Do you consider yourself a Native speaker of English? _____
> How good is/How comfortable are you with your Spanish/English?
> Where is it appropriate to speak Spanish around here? (work, home, etc?)
> Do you ever feel embarrassed to use your language in public?
> Has anybody every made fun of you for the way you say things (in either language?)
> How well do younger people in the area speak Spanish?
> Do they sound like Michiganders when the speak English?
> Do boys and girls talk differently?
> What kind of English do you think you learned?
> Do you think you talk like (other) Michiganders?
> What do native Michiganders sound like?

12. Reading Passage: I'm going to give you a short story to read. It's only about a page. I'll give you a minute or two to look it over, then we'll have you read it out loud.

13. Word List: I'm going to show you some words on the computer. Just read the word on the screen, and I'll hit a button to have it move onto the next screen.

14. Comprehension Test: I'm going to play a word twice. Please write down the word you hear. If you aren't sure which word it is, do the best you can. We're not interested in right or wrong answer, just what you think you hear.

15. [Estimates of Use]: Sometimes you hear people pronounce words like 'bag' and 'man' with a different vowel. (Play the 'banker' example at the end of the comprehension test.) Have you ever heard people pronounce it this way? (Once you are sure that the respondents understand the variant you are after, ask them to estimate the percentage of use in their own speech. Remember to press for a numerical estimate?) Do you know of any groups or subgroups around here who do pronounce it that way?

> Estimates of /ae/ raising:

> > Self: _____
> > Others; _____

> Comments on:

"man"
"thank"
"bank"

16. Have you heard people in your neighborhood (or friends) who don't make a difference between /i/ and /I/? For example, do they say "lead" for "lid"? How much do you think they do this?

Estimates of /i/ and /I/ conflation

Self: _____

Others: _____

17. Some dialects, for example, some people in Texas might say words like "I", "cried", "mine," or "chime" differently. They might say "I cried" or "I tried" differently. Have you heard anybody around here say anything like that? Do you think you do?

Estimates of /ay/ monopthongization:

Self: _____

Others: _____

APPENDIX B: "A BAD DAY FOR DUCKS" READING PASSAGE

Tom and Bob were supposed to meet at Tom's house. They planned to go to a pond and watch the ducks that lived there. While they were waiting for Bob, Tom picked up around the house. The weather had turned cold. He put the electric fan in the garage and did the dishes.

He wanted to have a snack before he left, so he peeled an apple and cut it into slices. He bit into one, but it was awful, probably rotten. He spit it out and tired to rince his mouth out with hot coffee. He poured it into a tin cup, but when he put it up to his lips, he spilled it on his hand. His hand puffed up and hurt a lot, so he stuck it under the faucet to make it feel better.

He grabbed a dusty hat out of the closet and shook it, but he couldn't get the dirt off. He got a cap instead and put a scarf around his neck and put on his socks and boots. He saw a big hole in his sock, but Bob was already late. His alarm buzzed, and t was past two-o'clock. Nothing was working out.

Just then Bob phoned and said he wanted to talk. He told Tom that the flock of ducks had left the muddy pond. A pack of dogs had chased them off. Tom was said; he had really wanted to see the ducks slosh around in the water, but Bob said they could go shoot some pool instead. Tom thought that was a good idea and forgot all about the ducks and his burned hand.

APPENDIX C: WORD LIST

1. Sam	42. hope	82. Bob
2. past	43. duck	83. black
3. cup	44. kid	84. Lansing
4. have	45. mesh	85. gamble
5. body	46. gone	86. pool
6. mop	47. rock	87. fist
7. ask	48. watch	88. step
8. dust	49. brag	89. tall
9. hole	50. rack	90. bug
10. tip	51. jazz	91. John
11. bet	52. bath	92. ride
12. horse	53. mouse	93. pill
13. block	54. sleep	94. food
14. oil	55. business	95. fish
15. state	56. father	96. neck
16. road	57. weather	97. dog
17. pull	58. cash	98. caught
18. pig	59.	99. doll
19. fed	mattress	100. gun
20. chalk	60. boot	101. Saginaw
21. awful	61. bun	102. pal
22. possible	62. bend	103. dull
23. stop	63. fog	104. saw
24. rag	64. lost	105. pat
25. plant	65. car	106. apple
26. laugh	66. house	107. bite
27. toy	67. bead	108. peel
28. make	68. foot	
29. cabin	69. puff	
30. pot	70. tin	
31. bell	71. song	
32. head	72. pause	
33. has	73. logic	
34. good	74. tom	
35. sub	75. banker	
36. hit	76. buzz	
37. pen	77. dad	
38. closet	78. tab	
39. gosh	79. night	
40. loud	80. meat	
41. hate	81. mess	

APPENDIX D: COMPREHENSION STIMULI

1 bag
2 cut
3 boot
4 big
5 can
6 bond
7 beet
8 bed
9 hawk
10 done
11 boat
12 sock
13 tin
14 hot
15 caught
16 pat
17 ben
18 bait
19 dawn
20 bed

APPENDIX E: NETWORK SCORE

Network scores calculations adapted from Milroy (1980)

Part 1

What percentage of people form the following groups are your close friends and associates:

<ul style="list-style:none">
A. Rural and/or small town or city European-Americans   _____
B. African-Americans   _____
C. Arab-Americans   _____
D. Mexican-Americans   _____
E. Big City (e.g. Detroit) European-Americans   _____
F. Polish-Americans   _____
G. Other   _____

Score part one_____

Computation of part one score:

    100% respondent's group is 5
    75% - 99% respondent's group is 4
    50% - 74% respondent's group is 3
    25% - 49% respondent's group is 2
    1% - 24% respondent's group is 1
    0% respondent's group is 0

Part 2

A: Membership in high-density territorially based network: _____

B: Substantial kinship ties in neighborhood
    (More than one household in addition to the respondent's own.)   _____

C: Work at the same place with at least two people from
    neighborhood   _____

D: Work at same place with at least two people from
    neighborhood of same sex as respondent   _____

E: Associates extensively with people from place of work
    in leisure time activities   _____

Total score part 2 (one point per item checked)   _____

Overall score (part one total plus part two total)   _____

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